J. A. Hodgkinson.

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WILLIAM HODGSON, A.L.S.,

BOTANIST.

By JAMES MURRAY.

(*Read January 10th*, 1924).

Cumberland has been less fortunate than most of the surrounding counties in producing men or women who have attained any note in the pursuit of Botanical Science, and what few there have been have met with little appreciation from their fellows. Some years ago, when Joseph Adair (a capable botanist of West Cumberland) died, the " Whitehaven News " devoted a column-and-a-half to an obituary, which extolled his commercial successes, yet made no allusions to his botanical work, although about 1893 he had contributed a series of well-written articles on the Flora of the Whitehaven district to its pages, and several important botanical papers to the Transactions of the Cumberland Scientific Association. Hodgson, however, was a little more fortunate.

William Hodgson was born on the 7th of April, 1824, at the village of Raughton Head, which lies in the beautiful valley of the Caldew, and about seven miles South of Carlisle. His love for his native village never left him, and in after years he returned again and again to gather plants in that delightful neighbourhood, and to fish in the little River Roe or Raugh, as he was also a keen angler. In one of his numerous papers he recalls an early experience in practical botany. He says : " I remember when a schoolboy, being elected to fill the post of huntsman, in a game of " hare and hounds." Of course I must have a hunting horn. A robust stem of *Heracleum sphondylium* (Hogweed) grew quite

handy, and was quickly utilised for that purpose, which it served admirably. The consequences were decidedly unpleasant. For ten days or more my lips were in a painfully chapped and excoriated state. On explaining the cause to an aged neighbour, his remark was: 'served you right; you will use the Smooth Kesh next time you want a hunting horn!'" Thus the future botanist learned to discriminate between one plant and another. He commenced his education at the school of the village in which he was born, where he evinced a marked preference for classical study. After the village school, he went as a day pupil to the Rev. Henry Monkhouse, the then incumbent, who kept a private school for gentlemen's sons.

After completing his education, he was appointed Head Master of the Parish School of Watermillock, on Lake Ullswater, at the early age of seventeen, and here he remained until 1851. Here he made himself thoroughly familiar with the plants and animals of this lovely district, and which later bore fruit in his papers on the "Flora of Ullswater," and the "Hill Naturalist." He then went in a similar capacity to Aspatria, where he remained for the long period of twenty-four years. In 1875 he transferred to the mining village of Frizington. Here he only remained a few years, returning to his first charge at Watermillock. He remained here until his retirement, in 1884, at the completion of 44 years of unbroken service.

On his retirement, he went to live first at Flimby, and then at Workington, where he spent the remaining seventeen years of his life in the quiet study of nature. He found the ballast heaps along the coast, and the banks of the River Derwent, to be fruitful hunting grounds, and he could often be seen in the streets of Workington with his vasculum on his back, as he returned from his rambles. He also made excursions to various other parts of the county in quest of plants, and, should any of his correspondents report anything of unusual interest, he made a point of seeing the plant *in situ*, if possible. He was a good correspondent, his letters being couched in homely phrase, yet full of interest. The following letter was addressed to the late J. C. Varty-Smith, of Penrith;—

FLIMBY,

MARYPORT,

August 13*th.*

DEAR MR. SMITH,

Rumex scutatus is a form of Sorrel, which I think I have seen cultivated in gardens, its leaves being sometimes used as an ingredient in salads. I never found it wild. The *Polygonum*, from its distinctly hastate leaves, may be *Polygonum fagopyrum*, Buckwheat, sometimes sown in game preserves for the sake of its seed . . . The Masterwort below Lyulph's Tower, doubtless came down the stream from Dowthwaite Head, where it grows in great quantity, and where at some period or other it must have been cultivated. . . . *Spiræa salicifolia*, though occurring here and there, is looked upon as introduced and not indigenous to Cumberland. *Ononis spinosa ;* don't suffer if you can avoid it, any puncture from its spines. They give a stinging, venomous pain for five or six minutes. Of your find of *Sedum villosum*, I am happy to hear. I transplanted some to my garden from Matterdale Common, and seedlings therefrom have bloomed beautifully this year.

Faithfully yrs.,

WM. HODGSON.

It was after his retirement, and during his residence in Workington, that most of his literary work was done ; he wisely putting on record some of the vast fund of botanical lore he had been accumulating during his lifetime. While paying diligent personal attention to our flowering plants, he also collated and sifted the work of those who had preceded him. Friend tells us that he had all the historical data obtainable, and deplores the fact that he did not make full use of it in his Flora. He enjoyed the friendship of most of the local botanists, the Rev. R. Wood, Vicar of Westward ; Mr. W. Dickinson, F.L.S., of Workington ; the Rev. Hilderic Friend ; Dr. Leitch, of Silloth ; and others. He worked through the records left by Bishop Nicolson (*circa*, 1690), and in a letter to Mr. Varty-Smith, he tells how Nicolson's manuscript came under his notice. He writes ;—

FLIMBY,

November 15*th*, 1888.

DEAR MR. SMITH,

A very interesting discovery has been recently made. Some two months ago I heard in Carlisle that the Bishop had in his custody a M.S. book on botanical subjects, which had been presented to him by Mr. Robt. Ferguson (late M.P. for the City), and which, I understood, was in the handwriting of Dr. Goodenough, one of his Lps. predecessors, who was an eminent botanist in the earlier years of this century. Meeting the Bishop at the late Diocesan Conference at Carlisle, I enquired as to the truth of the rumour. Dr. Goodwin admitted its truth, and on my asking to see the book, he said that I might examine it either at Rose Castle, or at Mr. Mounsey's office at Carlisle. . . . Judge of my surprise and gratification, when I found that the manuscript was one of tenfold more value than I had been led to expect. The book, substantially bound, and in capital condition, proves to be in the handwriting of Bishop Nicolson, and is dated 1690, when, I believe, the Bishop was Rector of Great Sa'keld. The whole is in Latin, and the Title runs thus :—

CATALOGUS
PLANTARUM BRITANNIAE
AD FIDEM
C. L. L.
JOHANNIS RAY
THOMAE LAWSON
ROBTI. PLOTT
ALIORUMQUE

Cum Synonymis Graiis—Gallis—Germanicis—A Saxonicis, etc., ad naturam cujusque explicandam inservientibus. Additis insuper locis singularum nativis per comitatus Cumbriae, et Westmeriae caeterisque Regni veteris Northumbrici ditionis.

H. COTTON. GUL. NICOLSON, 1690.

As an introduction the Bishop gives at length Ray's System of Classification of Plants in XXVI. orders, all of which was quite new to me. He then proceeds to give the full list as set out on

the Title page, marking with an S. in red ink such as he had himself observed as indigenous to his own parish of Great Salkeld. The list is in alphabetical order, and will necessarily take up some time to examine thoroughly. . . . There is a similar List of Birds, which has set my good friend, the Rev. H. A. Macpherson, of St. Cuthbert's, Carlisle, almost wild. I had asked that he might be permitted to look it over, and we had a high day over it on Monday. . . .

WM. HODGSON.

Some of these records of Nicolson's are of great interest to others than botanists, showing many changes in the topography of the district. As an example, he records *Ranunculus hederaceus*, the Ivy Leaved Crowfoot, " In the Sitadell pond, Carlile, 1690." This pond occupied a site on what is now Court Square, right in the heart of the City. Hodgson also went over the plant records in Hutchinson's " History of Cumberland," and reluctantly came to the conclusion that they were unreliable. On the other hand, he held a very high opinion of the work of the Northumbrian botanist, N. J. Winch, who contributed a list of Cumberland plants to the Newcastle Magazine in 1824.

In 1879, Mr. Hodgson presented a collection of Cumberland Carices, including many rare ones, to the Whitehaven Scientific Association, and these were preserved in their Museum in Howgill Street. This Association at that time had among its members several enthusiastic botanists who worked up the local Flora, and issued a list compiled by Mr. Joseph Adair. In the " Naturalist " for 1891, Hodgson has a lengthy paper on the disappearance of plants in Cumberland, mentioning many rare plants with ancient date records to show the changes in the Flora. In the " Gardener's Chronicle " for 1884, he wrote on the Ferns of the Lake Country, noting the extermination of *Osmunda* near Keswick.

But his best work is a series of papers contributed to the Transactions of the Cumberland Association for the advancement of Literature and Science. These papers were, prior to publication, read before several of the local Literary Societies, as those

at Whitehaven, Workington, Maryport, Penrith and Carlisle. The first of these was read at the Annual Meeting of the Association, held in May, 1881, at Workington. The paper is entitled: "The Grasses of Mid Cumberland," and is printed in part 6 of the Transactions. At the outset he states that he was most familiar with the middle portion of Cumberland, North of the River Eden, and South of the River Ehen, being a sort of *terra incog.* to him. He goes on to say that much more of the land in Cumberland is being applied to grazing purposes than formerly. As he puts it: "the *horn* is ascending and the *corn* descending." He, therefore, concluded that a paper on the *Graminae* might be of use to agriculturists, as well as to the professed botanist. In this paper he deals with the 59 species of Grass he had found growing in pastures, etc., between the Eden and the Ehen, giving particulars of their occurrence, with localities, and remarks on their utility or otherwise to the agriculturist.

His second paper was entitled: "Notes on the Flora of the Ullswater District." This was read to the Penrith Society, in January, 1882. He was at that time schoolmaster at Watermillock, which is within the area dealt with, and on which, consequently, he could speak with authority. After defining the boundaries of the district, he briefly refers to its geologocal structure, and salient physical features. He then states that he had found about 520 species of Flowering Plants growing in the district, and in a discursive manner deals with the majority of these in the following pages. This paper is rather a long one, claiming about 28 pages of the Transactions.

His third paper deals with "The Botany of the Caldew Valley," and was read before the Carlisle Field Naturalists' Club, on January 25th, 1883. This paper bespeaks his intimate knowledge of the beautiful Vale of the Caldew, his native vale, from its source to its confluence with the Eden. He says: "of the many valleys ramifying from the Lake District as a centre, the one now under notice is equalled by few for its picturesque loveliness. Viewed from the rugged summit of Carrock, whence the whole course of the river may be traced through its devious windings along the valley . . . we are struck with the agreeable alternations of timber and pasture

grounds until we approach the grand, park-like scenery of both Rose Castle and Holme Hill." Before commenting on the wild flowers, he has a few words to say on the timber trees of the valley ; his remarks on some of the gigantic Oaks, which formerly grew there, being most interesting. He then proceeds to deal with many of the more notable flowering plants to be met with. Speaking of the Wood Vetch (*Vicia sylvatica*), he remarks : " really a most elegant plant. I first met with it in a young larch plantation near the abandoned Sebergham Colliery, at the outskirts of Denton Side Woods. By means of its powerful tendrils it had managed to climb and overtop the larches, and from the summits, some eight or nine feet from the ground, there depended large clusters of drooping flowers, white, tinged with light crimson, or blue, which had a most charming effect." Of the Hawkweeds, he says only six species are indigenous to the Caldew Valley. The Pennines produce far more species than the Cumberland group of hills. He gives a long list of the *Cyperacae*, and some guarded notes on the Ferns, lamenting the reckless way in which many of the most interesting kinds are being carried off and exterminated.

His fourth contribution bears the title " The Hill Naturalist," and was also read to the Carlisle Field Naturalist's Club in two parts ; the first part on January 24th, 1884, and the second part on December 18th of the same year. This paper, in the opinion of its author, is the best of the series. Unlike his previous papers, this one is not exclusively botanical, but deals largely with the Birds and Mammals of the Hills of Lakeland, and shows his intimate knowledge of his furred and feathered neighbours, his remarks being based on his own personal observations, extending over many years. He commences with a reference to the Climatic Zones of H. C. Watson, stating that of the six Zones of that author, four are represented in the Lake District, the coldest and the warmest being alike excluded. He then proceeds to discuss a number of plants characteristic of the Super-agrarian Zone (at which cereal tillage generally ceases) and upwards, mentioning such plants as *Thalictrum alpinum*, *Helianthemum vulgare*, *Lychnis alpina*, *Salix herbacea*, *etc.* He then deals with the various kinds of birds he had met with

among the hills. He knew his birds very well, as can be proved by reference to Macpherson's "Birds of Cumberland." He remarks that birds of prey must have been much more plentiful in Lakeland in former times than now, to judge from the number of Eagle Crags, Falcon Crags, etc., that are to be found. He deplores the wanton destruction of these fine and useful birds, remarking: "the prodigious increase of Field Mice—both the Long and Short-tailed varieties—in different quarters, must bring about a reaction in favour of the persecuted Owls and Hawks, especially the Kestrel. He contradicts the statement that the Skylark is seldom seen in the Lake Country. He gives a very interesting account of the home life of the Squirrel, and an amusing defence of its alleged egg-stealing proclivities, all from first-hand knowledge.

In the same part of the Transactions (Part XI.), he commences a long paper dealing with "The Botany of the Solway Shore," which he had previously read at Maryport, on November 10th, 1885, and at Carlisle a fortnight later. He refers to the slow and steady erosion of some of the coast of West Cumberland, and the consequent disappearance of many plants within his own recollection. He then briefly chronicles the large number of plants he had met with along the coast between St. Bees Head and Bowness. A second instalment was read at Carlisle, on March 8th, and a third part at Carlisle again on December 22nd, 1887. These last two parts were printed together in Part XIV. of the said Transactions. This paper is a long and really valuable contribution to Cumberland Botany, including, as it does, many references to casual and alien plants found about the ballast heaps and mill refuse tips along the coast, and introduced by commerce from many distant parts of the world. Very few of these survive more than a season or two, and it is well that they should be recorded. Altogether the Botany of the Solway Shore runs to 35 pages of closely printed matter.

Some years prior to this, he had been appointed botanical recorder to the Cumberland Association, and in Part XIV. of the Transactions, he issued his first and only report. In the 11 pages which this paper occupies, he gives notes on the occurence of many uncommon Cumberland plants, not a few being from his own personal observation.

His last paper to the Transactions appeared in Part XVI., and is entitled: "Botanical Waifs in Cumberland." He says: "The date of my earliest investigations on this question may be set down as co-eval with the opening of the first floating dock in Cumberland, viz.:—the Marshall Dock at Silloth. . . . . The ballast from merchant ships, and the sweepings from the holds of vessels when exposed upon the beach—especially at Silloth and Maryport—have been found covered with vegetation differing widely in character, according to the localities from which the ballast, etc., has been brought. . . . Intermingled with plants of undoubted foreign origin, plants are occasionally found, which, though not indigenous to the North-Western Counties of England, are yet included in the "London Catalogue" of British Plants." He also expresses his obligations to the late Mr. J. G. Baker, F.R.S., of the Royal Herbarium, Kew, for his courtesy in identifying specimens regarding which any doubts existed. Then follow lengthy lists of these stranger plants from Silloth, Maryport, and the refuse tips of the Derwent Tin Plate Works, at Workington. His concluding remarks deal with some of the anomalies and puzzles of plant distribution.

This series of papers contains much information of value to anyone interested in the Cumberland Flora. In 1891, we hear of him being laid aside by illness, but still keen on his favourite study. He wrote to Mr. J. C. Varty-Smith:—

202 Harrington Road,
Workington,
November 13*th*, 1891.

My Dear Mr. Smith.

It gives me very sincere delight to hear from you at Buxton. I was at the time seriously unwell, and confined to bed for more than a month . . . Moreover a long series of family bereavements have told heavily upon me. . . . In June and July I was in charge of the Free Library here. My discoveries have been limited to casual examinations of the ballast heaps at Maryport, and the cinder mound at Barepot, alias the Derwent Tin Plate Works, a short half-mile above Workington Bridge,

on the N. or Seaton Bank of the river . . . and a solitary example of the Musk Thistle, the only one I ever saw growing. Specimens is a dried state had been sent me by my able and energetic lady helper, Miss E. J. Glaister, now of Skinburness. About the time of the receipt of your letter also, I had a lovely specimen sent me from Robberby, by a youth named Benson Falder, a student at the Agricultural College at Aspatria, who had gathered the plant on Melmerby Scar, almost midway up Crossfell, at which station he reports it as fairly plentiful. . . . I believe the *Chara* you sent to be identical with the Newton Moss plant, and, therefore, *polyacantha*. It was first identified to me by A. Bennett, Esq., A.L.S., of Croydon, who told me at the time that I was the first to discover it North of Derbyshire or Tadcaster in Yorks.

Faithfully yours,

Wm. Hodgson.

In 1883, Hodgson found some rare plants in Ennerdale, which found their way to the Royal Herbarium at Kew Gardens. This brought him into contact with the Keeper, Mr. J. G. Baker, who was himself preparing a Flora of the English Lake District (published in 1885). Through the instrumentality of Mr. Baker, Wm. Hodgson was elected an Associate of the Linnaean Society of London in 1884. Mr. Baker, in a letter to Mr. Wm. Thomson, says: " It was when staying at Penrith, in 1884, to work at my Flora of the English Lake District, that I first made Mr. Hodgson's personal acquaintance through Mrs. Frank King. I went over to Watermillock to visit him, and we had a walk together along the shore of Ullswater. Since then we have kept up a correspondence, and he has sent me every year specimens of the more interesting and difficult plants he had gathered. What impressed me about him was his geniality and wide range of knowledge. He took such an interest in so many things that he must have lived a happy life. I was always pleased that I had been instrumental in obtaining for him a place amongst the 50 Associates of the Linnaean Society, and I feel very glad that before he died he was able to commit to print the information he had gathered during his long life about the plants of Cumberland."

In 1893, we learn he was again suffering from illness, and also working at his Flora. In an interesting letter to Mr. Varty-Smith, he writes :—

202 HARRINGTON ROAD,
WORKINGTON,
June 1st, 1893.

DEAR MR. SMITH,

Your photo. of the Ash is most interesting, and I decidedly mean to keep it. I have seen no male plant of the species hereabouts, in fact trees of any sort are scarce. Those that care least for the keen blasts of the Solway are apparently the Sycamore and Beech, at least they form the majority of the timber trees in Workington Hall Park, the only place that can boast of even a decent show of wood. Perhaps I might include the Broad-leaved Elm.

In late February and early March, I had a tough struggle with "*la grippe*," and subsequently with neuralgia, which affected the left side only of my head, and was so severe that after I began to get about again, I feared to lose the sight of my left eye. I could not judge of distance with it at all, and many a time I reached out my left hand to grasp plants which grew on that side of me, and my fingers closed when the object was still half-a-yard away. Gradually I improved, and my sight has returned to its normal condition.

As soon as it was judged prudent, I was packed off to my brother's place at Gatesgill, near Rose Castle, close to which I was born. There in the Bishop's grounds, and the more extensive park of Major Salkeld adjoining, I was privileged to roam about at pleasure. The woodlands especially presented a scene of gorgeous beauty, quite without parallel in my experience, and I mentally thanked God many a time that I had been spared till my 70th year to witness such a scene. Foremost I must rank the Wild Cherry, *Prunus avium*, in which the Holme Hill Woods abound. Fine trees, many of them 60 feet high, with the lower branches drooping in pendulous form, were clothed in bloom of spotless white, so profuse as to cover the entire surface of the tree,

for the leaves were as yet but partially developed. Smaller shrubs of the same family, *Pr. spinosa* and *Pr. insititia*, were in their humbler style quite as handsome. A wonderful contrast to this snowy brilliance was the way in which huge trees of *Ulmus montana* were profusely adorned with the newly-formed flat seed vessels of a curious shade of colour . . . Orchards and gardens were also gay with plum, cherry, and pear tree blossom, and all this splendour when April was yet young. . . . *Radiola millegrana* is by no means common. Until my 60th year I had never seen it in a growing state. Quite by accident I stumbled upon it growing in a well eye on Dent hill, over Cleator, associated with *Scutellaria minor*, which also was new to me. *Radiola* likewise grows on Salta or Saltom Moss, near Dubmill, gathered by that Nestor of Cumberland Botanists, Wilson Robinson, of Whinfell Hall, Lorton. I am now busy with the compilation of the Cumberland Flora on lines recommended by Mr. J. G. Baker, of Kew, from whom I had a kindly note yesterday. Mr. Jos. Adair, of Egremont; Mr. L. Petty, of Ulverston; and Rev. F. A. Malleson, have all sent me contributions from S.W. Cumberland. . . . I could wish you to procure for me two or three specimens of *Carex vesicaria*, which I fancy you once sent me from Edenhall pond. I find *C. acuta* in two or three places by the river, and about half-a-dozen plants of *Crambe maritima* about 1 mile N. of the Harbour—also *Coronopus didyma*. . . .

Faithfully yours,

WM. HODGSON.

His greatest work, the "Flora of Cumberland," was published in January, 1899, two years before his death. The title page bears the date of 1898, while 1899 appears on the cover. In this work all the plant records for the County are classified and arranged in an easily accessible form. He divided the county into four areas, arranging his notes under each. This was the first attempt ever made to present a complete account of the Flowering Plants of this county, and its author had been gathering materials for it for over twenty-five years. For it he had explored every part of the county, including a visit to Longtown and the

Solway Moss (Nat., 1899). By diligent work he personally verified over 1,100 of the 1,200 species recorded in his book. Although nothing like so pretentious as some county Floras, it has proved of greatest interest and use to us who are interested in the county's Natural History. In it the list of plants and their habitats is as complete as it was possible to make it at the time. In addition to his own work, he had the willing help of several other able botanists then living in Cumberland. No attempt is made, however, to indicate the time of the first county record, and the account of deceased Cumberland Botanists is very brief and incomplete. In his selection of doubtful records, he wielded the pruning knife a little too vigorously, and for this he met with some criticism, but he ably defended himself in a note to the " Naturalist " for 1899. p. 275. Among these omissions may be mentioned incidentally *Goodyera repens*, reported from near Brampton and Armathwaite. This has since been found at Durdar and Corby (Nat., 1919, p. 46), thus establishing its just claim to a place in our Flora.

Wm. Hodgson contributed notes and papers to the current botanical periodicals, but chiefly to the " Naturalist." His contributions to the latter magazine were numerous, mostly botanical, but not exclusively so, sometimes Birds and Animals, and even Insects furnishing material for his pen.

His last important work was the part treating on the Flora which he wrote for the Victoria County History of Cumberland, in 1900. He there uses the four divisions of the county as defined in his Flora of Cumberland, and gives a long list of the plants found in each area. Probably his very last contribution to botanical literature will be found in the Naturalist for 1901, pp. 77—79. This is an account of a number of plants sent to him for examination by Mr. Wm. Thomson, who had gathered them in the Carlisle district, and of some plants gathered by himself at Silloth and Skinburness. His concluding words are : " This completed our gatherings on a most lovely summer day," and is dated 31st December, 1900.

A few months later (on March 27th, 1901), he passed to his rest, and was interred at Workington. He did more than anyone who had preceded him to make known and place on

permanent record the flowering plants of his native county. The opportunity was his, and he made full use of it. His Flora, and numerous other writings, will be his enduring monument to posterity.

An interesting sketch of his life, with an excellent portrait and autograph, from the pen of Mr. W. Thomson, appeared in the "Naturalist" for 1901, pp. 261—265, and of this sketch I have made full use in preparing this memoir. To the late Mr. J. C. Varty-Smith, of Penrith, I am also indebted for placing at my disposal a number of Mr. Hodgson's letters.

The following is, I believe, a fairly complete list of Mr. Hodgson's writings :—

1. "Ferns of the Lake Country.—*Gardener's Chronicle*, 1884, p. 218.
2. "Ruppia rostellata in Cumberland."—*Nat.*, 1890, p. 304.
3. "Disappearance of Plants in Cumberland."—*Nat.*, 1891, p.p. 7—12.
4. "Œnanthe Lachenalii in Cumberland."—*Nat.*,1891, p. 42.
5. "Water Rail near Workington."—*Nat.*, 1891, p. 49.
6. "Buffon's Skua at Workington."—*Nat.*, 1891, p. 372.
7. "Otters (*Lutra lutra*) not found in the Caldew.—*Nat.*, 1892, p. 20.
8. "Early Appearance of Fieldfares in West Cumberland." —*Nat.*, 1894, p. 15.
9. "Hylurgus piniperda in Cumberland."—*Nat.*, 1894, p. 157
10. "Singular Discovery of Sisyrinchium angustifolium in Cumberland."—*Nat.*, 1895, p. 17.
11. "Stellaria aquatica and S. nemorum in Cumberland."—*Nat.*, 1895, p. 51.
12. "The Nightjar in Cumberland."—*Nat.*, 1895, p. 332.
13. "Hedge Hog at Lorton."—*Nat.*, 1895, p. 336.
14. "Vicia lutea and other Rare Plants near Workington."—Cumberland."—*Nat.*, 1897, pp. 145—147.
15. "Occurrence of Rare Plants in Cumberland."—*Nat.*, 1899, pp. 1—3.
16. "Lobelia and Vaccinium in the Lake Country."—*Nat.*, 1899, p. 4.

17. " Hodgson's Flora of Cumberland."—*Nat.*, 1899, p. 275.
18. " Interesting Botanical Finds in Cumberland."—*Nat.*, 1899, pp. 291—2.
19. " Blea Tarn and Lobelia Dortmanna."—*Nat.*, 1899, p. 304.
20. " Natterjack in Cumberland."—*Nat.*, 1900, p. 223.
21. " Botanical Notes from Cumberland for the year 1900." *Nat.*, 1901, pp. 77—79.
22. " The Grasses of Mid Cumberland."—*Trans. Cumb. and West. Ass. for Lit. and Sci.*, Part VI., pp. 31—46.
23. " Notes on the Flora of the Ullswater District."—*Trans. Cumb. and West. Ass.*, Part VII., pp. 127—154.
24. " The Botany of the Caldew Valley."—*Trans. Cumb. and West. Ass.*, Part VIII., pp. 127—144.
25. " The Hill Naturalist."—*Trans. Cumb. and West. Ass.*, Part XI., pp. 13—39.
26. " The Botany of the Solway Shore."—*Trans. Cumb. and West. Ass.*, Part XI., pp. 114—126, and Part XIV., pp. 49—72.
27. " Botanical Record for 1887-88."—*Trans. Cumb. and West. Ass.*, Part XIV., pp.1—11.
28. " Botanical Waifs in Cumberland."—*Trans. Cumb. and West Ass.*, Part XVI., pp. 23—34.
29. " A Century of ' Paines,' or Local Government in the Time of the Stuarts."—*Trans. Cumb. and West. Antiq. and Arch. Soc.*
30. " Flora of Cumberland."—Carlisle, 1899, 398 pages and map.
31. " Flora of Cumberland in the Victoria History of Cumberland," 1900, pp. 73—94.

ON THE RAVEN.

By E. BLEZARD.

(Read March 10th, 1927).

The following notes on the raven are the result of personal observations during recent years, and over a somewhat circumscribed area around the City of Carlisle. The ground covered includes certain parts of the Pennine Range, on the borderline of Cumberland and Westmorland, part of the Cumbrian group of mountains to the north-east of Keswick, and portions of the hills just across the Scottish Border.

The raven is one of the very few birds in Britain which commences nidification during the winter months. At this time snow often lays thick on our fells, and great, gleaming white cornices may surmount the precipices, which are the time-honoured retreats of this hardy bird, whilst the adjoining slopes can be so frost bound as to be as hard as the native rock. If the snow be very heavy or fallen late in the season, nesting operations may be delayed a little, for in the overshadowed recesses beloved by the raven it lingers longest.

On an extensive range of crags a pair of ravens may possess as many as half-a-dozen eyries, with nests in every degree of dilapidation, according to age or exposure to the inclemency of the weather. They may renovate several of these old nests before deciding which will finally be lined and used for the deposition of the eggs, and sometimes, after expending much time and labour on various nests, may suddenly decide to use some ancient site only to be distinguished as such by a litter of decayed material, and build thereon an entirely new structure.

Some aver that the same nest is not used in successive seasons, owing to the need of more than one winter's storms to restore it to a sanitary condition after the rearing of young. This practice of changing about is, I think, rather to be attributed to caprice, together with the possession of territory which offers a wide choice of ledges and corners. When a pair fails to rear young through the taking of their eggs, they will, if owners of several sites, generally utilise a different nest in their next attempt, and seldom the one previously harried.

Whether a pair of birds own alternative sites or not sometimes depends on locality. In a picturesque glen of limited extent, on the Scottish side of the Border, a pair annually succeed in rearing a family in an eyrie beneath a huge projection of rock. This position is the only suitable one afforded, and has been used by ravens from a period begond the memory of the oldest inhabitants of the district. When the first eggs of a season are taken, as sometimes happens, the second complement is still deposited in this ancient cradle.

The Pennines of Cumberland do not at present claim the raven as a nesting species. The old Crossfell haunt was deserted many years ago, and coincides with the advent of peregrines. A rock shelf there, which once supported a massive pile of sticks, became the nursery of young falcons. Further north another long deserted haunt was recently re-occupied, but the disappearance of the birds, and the fragmentary state of the nest, could probably be explained by the gamekeepers of the locality.

Of two constantly used eyries in the portion of the Pennine chain bordering Westmorland, one is built in an overhung hollow in a sheer limestone face, the other rests on a slab wedged between the columns of a basalt precipice.

The Solway cliffs are annually resorted to, and the strongholds there can only be raided with difficulty. In March, 1923, I descended to two eyries, and found the first had not been repaired, while the second, which practically filled a great vertical crevice, was still incomplete. Strangely enough, two pairs of ravens were frequenting the cliff at the time, but subsequent to my "descents," the place was deserted in favour of

inland crags. This appears to have been the only instance in which the ravens abandoned this particular cliff within the recollection of local people, whose acquaintance with the birds extended over a long period of years.

Among those Lakeland crags with which I am acquainted, the most frequently chosen nesting sites are in the form of overhanging ledges or angular niches; the latter is greatly favoured if protected from above by a jutting slab. As a consequence to this fondness for a natural roof, the homes there are sometimes in a position very easy of access. A certain pair will at times build in an extremely bare and exposed situation, which is close to a road and human habitations, although their territory offers more suitable sites in plenty.

The material used in the outer structure of the fell eyries varies little, stems of old heather and dead mountain ash branches and twigs; the usual copious lining of sheep's wool is generally intermixed with rabbit "fleck," a little grass and moss, and perhaps a few flakes of bark. The feathers sometimes found can be traced to the peregrines' plucking stations. In one nest a falcon's primary wing feather was worked into the lining; whilst to the same nest in a previous season, such a quantity of wool had been carried that numerous tufts fluttered and hung from the outer sticks, and from the branches of a stunted oak sapling, which grew from under it, were similar festoons.

Before a new lining is placed, some of the flattened old one is apparently removed, before being shaped out cup-like, but in a long used eyrie, a matted and filthy mass, chiefly wool, will be found underlying the latest lining.

From an eyrie to which I was making my first climb, there came a very strong and familiar odour; on reaching it I found the eggs bedded in a new and lavish lining of long, black goat hair. Close at hand lay the body of a large goat, with its massive horns locked in the rocks. Thus, after a miserable end, the sometime leader of a feral herd which roams the Cheviots, provided the ravens with convenient food and nesting material,

Where space permits, a regularly used eyrie will grow to considerable size. In Lakeland there is one which once stood nearly five feet high, having an equal width at the base—an accumulation representing many years of use. During the periods of disuse, subsidence and weathering reduce the bulk.

Close to an eyrie, a sheltered ledge, much bedaubed, indicates the roosting place of the bird not brooding. The same ledge may also form the nightly quarters of the pair when they have been robbed of their eggs, which then only return to the home crags at evening, after spending the day further afield.

Four or five eggs form the usual complement, but clutches of two and three are frequent; the latter are probably the product of old birds, being mostly pale and sparsely marked.

An unusual egg, the only one in the nest, had a coarse, granular shell, almost white, with a pale blotch of nondescript colour on the broad end.

My earliest date for a complement of eggs is March 9th: this was over the Scottish Border. In Lakeland, the full clutch is usually at least a week later.

That incubated eggs of the raven can withstand prolonged exposure is proved by the following. A heavy snowstorm driving through a dense pall of clammy mist, found Mr. Ritson Graham and myself stranded high up in a range of crags, and so dense was the atmosphere that for some time we were groping about within a few yards of an eyrie containing eggs. So great was the concern of the owners, which we had disturbed before the storm, that they were literally flapping around our heads. One of them, in a close swoop, brought a leg over its wing to scratch its head, and the comical attitude in which it glided past rather suggested amazement. The birds had no opportunity to return to the nest until we had worked along the crag front to where, hidden from them by the mist, we sheltered behind a juniper. Our intrusion caused the eggs to be exposed to most adverse weather conditions for at least two hours, and yet within a week they hatched. The young were safely reared, and later on other occasions Mr. Graham and I saw them flapping about their wintry birthplace.

Throughout the nesting period the raven tolerates no feathered intruders near the home, but launches out to drive off trespassing buzzards or wanderers of its own kind. In the long-standing feud between raven and peregrine, the former is not slow to attack ; the ensuing encounter, however, is invariably ended by the discreet retirement or complete rout of the aggressor, for not one of our native birds can attack the peregrine with impunity.

Bold as it is, I have more than once seen the raven fleeing from the stoops of a screaming kestrel, and have seen one in full flight down a dale before an angry curlew, which made the surrounding hills echo with its wild cries.

Following the warning bark of the vigilant male, announcing human intruders in the nesting haunt, the deep voices of both birds quite often betray anxiety rather than anger ; this is naturally most pronounced after the young are hatched. The female of one well-known and often visited pair will alight within twenty yards and croak repeatedly, almost in a pleading tone, but while so occupied never face the intruder. Between rounds of croaking, when perched in a tree, it pulls and twists at surrounding twigs, and hammers with its bill the branch beneath its toes. The same bird when perched has a habit of jerking upward and outward the folded wings to the accompaniment of each croak, a motion reminiscent of, but different to, the wing flapping of a cawing rook.

When disturbed, the fledged young crouch, with beak and tail in line, on the flattened and befouled eyrie, and save for the flicker of the nictitating membrane, or third eyelid, across the dark, bluish tinted eye, betray no sign of life.

In the possession of that great sense of curiosity common to infant creatures, young ravens prove no exception when they first wander away without parental care. One day, after visiting an eyrie which the young had recently left, I lay stretched out on my back on a distant heatherslope. After I had lain motionless for some time, two birds, which proved to be the newly flown young, rose from the hillside opposite, and headed towards me. Overhead, within short gunshot, they circled for a long time,

twisting and turning their heads as they surveyed me from every quarter. The continuous chorus of yaps and gurgling cries which they exchanged, was weird in the extreme, until perhaps concluding that I had not lain long enough to be palatable, they silently drifted away. Toward evening I was sketching their birthplace when they came to roost, and heedless of the warnings from their anxious parents aloft, they pitched on near-by boulders, and again subjected me to close scrutiny; their natural caution possibly over-ridden by astonishment.

On another occasion I was quartering a bare Pennine summit, on a sweltering July day, when two young ravens swung up the slope, and alighted on the plateau. Instead of rising when they saw me they took a few steps forward and craning their necks in apparent interest stayed to watch me pacing backwards and forwards; only when I made a direct approach did they discreetly sail off into space.

Some individuals can be quite aggressive when their young are in apparent danger. I once fell in with a family party in which one of the youngsters was very uncertain on the wing, and lingered after the others were in the air. When I gave chase, one of the parents, no doubt the female, flew back, and barking with rage, dashed round within a yard or two of my head until her offspring had fluttered to the crag's edge, from where it planed out over the valley.

Two instances will show the alarming effect of the raven's presence on birds of even close relationship. A large party of rooks was feeding on the Crossfell slope when a deep note heralded the approach of a pair of ravens, flying high along the range. The birds of "ill omen" were no sooner overhead than the rooks rose in a body, and emitting a babel of cries, flew helter skelter down the slope to the shelter of their fell-foot rookery.

Again, on one of the many Lakeland "Raven Crags," the stock of nesting jackdaws was creating the usual commotion during an inspection of their nest holes. A pair of ravens, heard long before they were visible, came flying from the east. When they passed over the crag in their course, the outcry of the jackdaws ceased with striking suddenness, and heedless of human intruders, they dived with one accord for their various nesting holes.

Towards evening in late spring, ravens are sometimes seen flying into the Skiddaw group from the east. A pair thus travelling may have been unfortunate in their nesting ventures, and for the time being, at least, return to their home crags to roost. It is well-known that ravens regularly flight between the Lake hills and Eastern fells; when on passage they travel at a great height, and their voices can be heard long before they themselves are visible as specks against the sky.

After the nesting season they gather in numbers, and frequent certain crags as communal roosting places. In June, 1925, Mr. Ritson Graham and I located one of these roosting places at the head of a Pennine dale. On that date three birds left the crag, and it was very evident that a greater number frequented it. At the end of September we again visited this favoured haunt, and early in the day disturbed two birds from the fresh carcase of a sheep, which was lying with its neck broken at the foot of a straight limestone face. Appearances pointed rather suspiciously to the animal having been helped in its descent. Of all creatures, a fell sheep would be least likely to step accidently over the edge of a sheer crag.

As we approached the gathering place from a fell top above, there rose up before us, with a babel of croaks and barks, no fewer than twenty-seven ravens. This number must have collected together from a considerable area, and their presence fully confirmed the conclusion we had previously drawn from few birds and many signs. In view of the before-mentioned passing to and fro, a proportion of the birds would no doubt be drawn from the Lake hills.

It will be evident to all that in the sister counties at any rate, the raven is not the rapidly decreasing species often described, and though some of the old haunts are no longer tenanted, there need be little fear that a museum will ever become the only place to see one.

THE LEPIDOPTERA OF CUMBERLAND.

PART IV. (MOTHS).

(Continued from Vol. III., page 69).

By George B. Routledge, F.E.S.

(*Read December 13th*, 1923; *December 4th*, 1924; *and January 7th*, 1926).

This part concludes the list of Moths taken in Cumberland. The groups dealt with in this part include the (1) *Pyralidae, Pterophoridae, Orneodidae*, (2) *Tortricidae*, (3) *Tineidae*.

In the list of Cumberland species it will be noticed that some are not yet recorded as having been found in Scotland.

Many species recorded as having been taken in Westmorland and Scotland have not yet been noted for Cumberland, and should probably be found here. Many species are recorded in *Stainton's Manual* as occurring in the "Lake District," but the *Manual* does not specify whether they were taken in North Lancashire, Westmorland or Cumberland.

In the list of Moths given at the end of this list as occurring in the British Isles, the number is only approximate.

In Parts I., II. and III. of our previous lists, we had the benefit of the early records of the late Mr. T. C. Heysham in *Stephen's Illustrations*, published in 1827-34, but he apparently did not collect the groups dealt with in Part IV.

The References to Meyrick's "Brit. Lepidoptera," are to the Second Edition, 1928.

PYRALIDES.

Aglossa pinguinalis, L. Sometimes common in stables, May, June, July and August. Hayton and Tarn Lodge (G.B.R.) Carlisle (F. H. Day). Keswick (G. Wailes, Steph. Illust., iv., p. 23).

Pyralis farinalis, L. Carlisle, in flour mills and stables (F. H. Day).

Scoparia ambigualis, Tr. Common in June and July. Tarn Lodge, Hayton, Hayton Moss, Gelt Wood (G.B.R.). Carlisle district and Kingmoor (F. H. Day). Keswick (G. Wilkinson, E.M.M., xxxv., p. 84). Keswick and Drigg (F. H. Day). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Scoparia basistrigalis, Knaggs. Local, forewings broader than in **S. ambigualis.** Borrowdale, Keswick (F. H. Day), also near Keswick (H. A. Beadle, Entom., xxv., p. 219).

Scoparia cembrae, Haw. Local. Carlisle (F. H. Day). Scale Hill (G. Wilkinson, Ent. Rec., xix., p. 224.)

Scoparia dubitalis, Hüb. **pyralella,** Hub. and Stt. Occurs in May and June. Hayton, Hayton Moss, Cowran Cut and Tarn Lodge (G.B.R.). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Scoparia murana, Curt. Occurs in June, July and August on tree trunks and walls. Tarn Lodge, Hayton, Hayton Moss (G.B.R.). Carlisle and Keswick (F. H. Day). Not uncommon in Cumberland (G. Wilkinson, E.M.M., xxxiv., p. 86). Barrett's Brit. Lep., ix., p. 322. Var. **ingratella,** Hub. Carlisle (F. H. Day).

Scoparia mercurella, L. Common; June, July and August at rest on walls. Hayton, Tarn Lodge, &c. (G.B.R.).

Scoparia crataegella, Hüb. Not uncommon in Cumberland (G. Wilkinson, E.M.M., vol. xxxiv., p. 86). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Scoparia truncicolella. Stt. Wreay and Kingmoor (F. H. Day). Scale Hill, common on Scotch fir trunks (G. Wilkinson, Ent. Rec., xix., p. 224). Common in woods in Cumberland (G. Wilkinson, E.M.M., xxxiv., p. 86). Barrett's Brit. Lep., ix., p. 325.

Scoparia atomalis, Dbld. Eskdale in 1887 (H. H. Corbett, Ent. Rec., vii., p. 83). This species is very like a small **S. ambigualis,** but the costa is more rounded, the forewing is slightly narrower, and the elbowed line less indented than in normal **S. ambigualis.** Cumberland, locally common on mountains (Barrett's Brit. Lep., ix., p. 315). Its most southern localities in England are at Longridge, near Preston, and the Blackhills, Yorkshire.

Nomophila noctuella, Schiff ; **hybridalis,** Hub. Occurs in June, July, August, September. Hayton, Hayton Moss, Tarn Lodge (G.B.R.). Kingmoor (F. H. Day, Ent. Rec., xi., p. 276). Lazonby Fell, Long Moss, Baron Wood (H. Britten).

Pyrausta purpuralis, L. Occurs in June, July and August. Tarn Lodge, Hayton, &c. (G.B.R.). Cross Fell and Wan Fell (H. Britten). Styhead (M. C. Dixon, Ent. Rec., xiv., p. 49). Abundant on Silloth sandhills (F. H. Day). Seascale (G.B.R.).

Pyrausta ostrinalis, Hub. Only recorded in Stainton's Manual, ii., p. 138, from Keswick. This species is found more commonly in the southern half of England ; it also occurs in Scotland.

Herbula cespitalis, Schiff. Occurs in May, June and July ; not uncommon where *Plantago lanceolata* and *P. major* grow. Tarn Lodge, Hayton Moss (G.B.R.). Orton (F. H. Day). Cross Fell, in June (H. Britten).

Ennychia (Pyrausta) cingulata, L. ; **cingulalis,** Schiff. Local, Styhead (M. C. Dixon, Ent. Rec., xiv., p. 49). Near Keswick (H. A. Beadle, Entom., xxv., p. 219). Keswick (Stainton's Manual, ii., p. 139). Cumberland (Barrett's Brit. Lep., ix., p. 177).

Ennychia (Pyrausta) nigrata, Scop. ; **anguinalis,** Hub. Cumberland (Meyrick's Brit. Lep., p. 429). Has been recorded from Westmorland (Barrett's Brit. Lep., ix., p. 179). More often found in the southern counties. Not recorded from Scotland.

Eurrhypara (Spilodes) urticata, L.; **urticalis,** Schiff. Locally common in some districts. Tarn Lodge, one specimen, July 9th, 1901 (G.B.R.). Carlisle district (F. H. Day).

Scopula (Botys) lutealis, Haw. Common in July. Hayton, Tarn Lodge, &c. (G.B.R.). Orton, Wreay, Durdar, Kingmoor, Keswick, Seascale (F. H. Day). Great Salkeld (H. Britten). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Scopula (Botys) olivalis, Schiff. Hayton, Tarn Lodge, Gelt Wood, Wetheral (G.B.R.). Wreay, Kingmoor (F. H. Day). Occurs in June and July.

Scopula (Botys) prunalis, Schiff. Occurs in July in and near woods. Hayton, Hayton Moss, Tarn Lodge (G.B.R.). Carlisle district (G. Wilkinson).

Botys fuscalis, Schiff. Common in meadows in May and June. Tarn Lodge, Hayton Moss, Newton Reigny Moss (G.B.R.). Carlisle district, Kingmoor, Keswick, Silloth, Seascale (F. H. Day).

Pionea (Botys) forficalis, L. Occurs in gardens in June, July and August. Hayton, Tarn Lodge (G.B.R.). Carlisle district, common (F. H. Day). Great Salkeld (H. Britten). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Hydrocampa nymphaeata, L.; **nymphaealis,** Schiff. Occurs near ponds in June and July. Heads Nook (G.B.R.). Black Dub, Carlisle (F. H. Day). Great Salkeld (H. Britten). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Hydrocampa stagnata, Don.; **stagnalis,** Gn. Common round the margins of ponds. Black Dub, near Carlisle (F. H. Day). Great Salkeld, July 7th, 1899 (H. Britten).

PTEROPHORI (PLUME MOTHS).

Chrysocoris festaliella, Hub. Hayton Moss, one specimen, June 11th, 1911 (G.B.R.). Kingmoor (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85).

Platyptilia (Gillmeria) ochrodactyla, Hub.; **dichrotactylus,** Muhl. Tarn Lodge, July 24th, 1908 (G.B.R.). Carlisle district and Kingmoor (F. H. Day). Keswick (H. A. Beadle, Tutt's Brit. Lep., v., p. 235).

Platyptilia (Gillmeria) bertrami, Rossl.; **pallidactyla,** Haw. Local. Cowran Cut, early in July (G.B.R.). Carlisle, amongst yarrow (F. H. Day, Tutt's Brit. Lep., v., p. 250). Great Salkeld (H. Britten). Keswick, common on the marshes at Derwentwater and at the head of Bassenthwaite (H. A. Beadle, Tutt's Brit. Lep., v., p. 250). In the Ent. Rec., iii., p. 33, and xiii., p. 129, J. W. Tutt writes: "A species of **Platyptilia** has recently occurred on Ragwort in Aberdeenshire and in Cumberland closely allied to **P. pallidactyla (bertrami),** will it turn out to be this latter species, or is it something new to science?"

Platyptilia gonodactyla, Schiff. Hayton, one specimen, August 24th, 1892, Bewcastle (Tutt's Brit. Lep., v., p. 218, G.B.R.). Carlisle (Tutt's Brit. Lep., v., p. 218; Ent. Rec., xi., p. 276, F. H. Day). Carlisle district, larvae found plentifully feeding in the flowers of Coltsfoot (*Tussilago farfara*) in May, and at Wreay (G. Wilkinson, E.M.M., xxxv., p. 84).

Amblyptilia acanthodactyla, Hub.; **punctidactyla,** Haw. Hayton Moss, one specimen, August 14th, 1901 (G.B.R.). Todhills, Orton, Kingmoor, Bolton Fell (F. H. Day). Wan Fell, May 22nd, 1898; Baron Wood, August 28th, 1897 (H. Britten). Keswick (H. A. Beadle, Ent. Rec., vii., p. 89).

Amblyptilia cosmodactyla, Hub.; **calodactyla,** F. Keswick; (H. A. Beadle, Tutt's Brit. Lep., v., p. 297). Rare in Scotland.

Mimaeseoptilus (Adkinia) bipunctidactyla, Haw. Occurs in July and August. Tarn Lodge, Hayton Moss (Tutt's Brit. Lep., v., p. 357, G.B.R.). Carlisle (Tutt's Brit. Lep., v., p. 357, F. H. Day). Keswick (Tutt's Brit. Lep., v., p. 357, H. A. Beadle). Var. **plagiodactylus,** Haw. Carlisle district (Victoria History, p. 134).

Mimaeseoptilus (Stenoptilia) pterodactylus, L.; **fuscus,** Retz. Occurs in July and August. Tarn Lodge, Cowran Cut (G.B.R.). Great Orton, Wreay, Kingmoor, Durdar (F. H. Day, and Tutt's Brit. Lep., v., p. 383). Great Salkeld (H. Britten). Keswick, common (Tutt's Brit. Lep., v., p. 383, H. A. Beadle).

Oedematophorus lithodactylus, Tr. Rare. Kingmoor (G. Wilkinson). Not recorded from Scotland.

Leioptilus (Hellinsia) osteodactylus, Zell. Gelt Wood (G. Wilkinson). Cumberland (Barrett's Brit. Lep., ix., p. 393). Seems only to have been recorded from Dumbartonshire, Scotland.

Leioptilus (Pselnophorus) brachydactylus, Tr. Cumberland, Mr J. B. Hodgkinson had a specimen which was the second specimen taken in England by a working Collector in Cumberland (Barrett's Brit. Lep., ix., p. 396 ; Ent. Rec., iii., p. 63 ; Meyrick's Brit. Lep., p. 456). This specimen was afterwards in the collection of the Rev. H. Burney. Two specimens have been recorded from Glen Tilt, Aberdeenshire.

Aciptilia pentadactyla, L. Apparently rare in the county. Two specimens near Carlisle (Victoria History). Little Salkeld, one specimen, June 29th, 1895 (H. Britten). Drigg and Lazonby (F. H. Day). This species is very local in Lancashire, and not recorded from Scotland.

Alucita (Orneodes) hexadactyla, Staud Cat ; **polydactyla,** Hub. Common in houses, Hayton, Tarn Lodge (G.B.R.). Carlisle, Kingmoor, Drigg (F. H. Day). Cumberland (Barrett's Brit. Lep., ix., p. 410). Appears in August, September and October ; after hybernating appears in April and May.

CRAMBI (Grass Moths), &c.

Platytes cerussellus, Schiff. Apparently rare. Keswick, 1895 (H. A. Beadle, Ent. Rec., vii., p. 89). Found in the South of England, and not recorded from Scotland.

Crambus falsellus, Schiff. Uncommon, occurs on walls and trees in July and August. Tarn Lodge, July 25th, 1917 ; July 5th—22nd, 1918 (G.B.R.). Great Corby, July and August, 1906 (J. E. Thwaytes).

Crambus pratellus, L. Generally common in May and June. Hayton, Hayton Moss, Tarn Lodge, Gelt Wood (G.B.R.). Carlisle, Kingmoor, Silloth, Seascale (F. H. Day). Wreay, Dean (G. Wilkinson, E.M.M., xxxv., p. 84 ; Ent. Rec., xix., p. 223). Great Salkeld (H. Britten). Keswick (H. A. Beadle, Entom., xxv., p. 219.).

Crambus ericellus, Hub. Found on the mountains. Honister (G. Wilkinson, Ent. Rec., xix., p. 224). Styhead and Honister Crag (F. H. Day). Keswick (Ent. Rec., vii., p. 17), at Green Crag, Borrowdale, middle to end of June (H. A. Beadle, Ent. Rec., v., p. 226). Great Gable (G. Dawson, E.M.M., xxx., pp. 113-114). Cumberland on Great Gable and mountains in the Keswick district (Barrett's Brit. Lep., x., p. 84). Cumberland, in June (Steph. Illust., iv., p. 321) ; (H. Goss, E.M.M., xxxvii., p. 227) ; (Meyrick's Brit. Lep., p. 406) ; (Wood's " Index Entomologicus," p. 215).

Crambus sylvellus, Hub. ; **adipellus,** Tr. Very local and easily overlooked. Bolton Fell, June 26th, 1897 (G. Wilkinson, E.M.M., xxxiv., p. 86). Bolton Fell (F. H. Day, Ent. Rec., xi., p. 226). Not recorded from Scotland, or from Durham and Northumberland.

Crambus pascuellus, L. Locally common in damp meadows and marshy spots, occurs in June and July. Hayton, Hayton Moss, Tarn Lodge, Gelt Wood (G.B.R.). Todhills Moss (F. H. Day). Baron Wood (H. Britten).

Crambus furcatellus, Zett. Restricted to mountains. On grassy slopes between Sprinkling and Sty Head Tarns, June 21st, 1865 (E. M. Geldart, E.M.M., ii., p. 184). On Cumbrian mountains, flies freely at the end of June about 7 a.m. to 9 a.m. (G. Wilkinson, Ent. Rec., xxii., p. 34). Keswick (H. A. Beadle, Ent. Rec., vii., p. 17 ; Entom., xxv., p. 219). Sprinkling Tarn and Honister Pass (M. C. Dixon, Ent. Rec., xiv., p. 49). " In England only known to occur on Skiddaw and other mountains in Cumberland, Westmorland and North Lancashire, in Wales upon Snowdon," (Barrrett's Brit. Lep., x., p. 93). Skiddaw (Stainton's Manual, ii., p. 183). On the mountains of Cumberland in July, Mr. J. F. Stephens received a fine series of varieties from Mr. Marshall (Steph. Illust., iv., p. 324).

Crambus margaritellus, Hub. Occurs on mosses and marshy places in August. Hayton Moss (G.B.R). Carlisle, Great Salkeld (F. H. Day, Ent. Rec., xi., p. 226). Baron Wood, August (H. Britten). Near Keswick (H. A. Beadle, Entom.,

xxv., p. 219). Eel Tarn and St. Bees (P. J. Barraud, Entom., xl., pp. 67, 68). Cumberland (Barrett's Brit. Lep., x., p. 95). Not known to occur in the South of England.

Crambus myellus, Hüb. Local. Flies freely during the day, abounds in a bog near Keswick (Rev. E. C. Dobree Fox, Ent. Rec., iii., p. 140). Keswick (F. H. Day). First recorded in 1868 from Aberdeen. Cumberland is its most southern habitat; not recorded from Durham and Northumberland.

Crambus perlellus, Scop. Widely distributed, occurs in June and July. Tarn Lodge, Hayton Moss (G.B.R.). Near Keswick (H. A. Beadle, Entom., xxv., p. 219). St. Bees (P. J. Barraud, Entom., xl., p. 68). Var. **warringtonellus,** Stt. Occurs with the type form.

Crambus selasellus, Hüb. Cumberland (Meyrick's Brit. Lep., p. 412). This is rather a local species, found in the South of England, and occurring in Yorkshire and at Monk Hezleden, Durham, not recorded for Scotland.

Crambus tristellus, F. Very common in July and August. Hayton, Tarn Lodge (G.B.R.). Carlisle, Kingmoor, Silloth, Seascale (F. H. Day). Wreay (G. Wilkinson, E.M.M., xxxv., p. 84). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Crambus geniculeus, Haw. Occurs in July and August. Silloth and Lazonby Fell (F. H. Day, Ent. Rec., xi., p. 276).

Crambus culmellus, L. Very common in June and July. Hayton, Hayton Moss, Tarn Lodge (G.B.R.). Carlisle, Kingmoor, Keswick, Lazonby, Seascale (F. H. Day, Ent. Rec., xi., p. 276). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Crambus hortuellus, Hüb. Common in June. Hayton, Tarn Lodge (G.B.R.). Orton, Kingmoor, Cummersdale, Drigg (F. H. Day). Wreay (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld, Bowness Flow (H. Britten). Near Keswick (H. A. Beadle, Entom., xxv., p. 219).

Eromene ocellea, Haw. Two specimens were captured by Mr. C. Eales at Silloth, June 27th 1885. "The title of this species to be considered British and *of British extraction* is extremely doubtful." (Barrett's Brit. Lep., x., p. 69).

ANERASTIIDAE AND PHYCITIDAE.

Anerastia lotella, Hüb. Occurred in great plenty in 1828 on the coast of Cumberland, in June (Steph. Illust., iv., p. 315, and Humphrey and Westwood's Brit. Moths, vol. ii., p. 234; recorded as **Araxes miniosella,** Germ.). Also in Wood's Index Entomologicus, p. 213. It also occurs in Scotland.

Ephestia elutella, Hüb. Hayton Moss, July 23rd, 1910; Tarn Lodge, July 5th, 1911, and July 12th, 1912 (G.B.R.). Cumberland under **E. semirufa,** Haw. (Meyrick's Brit. Lep., p. 388). Rare in Scotland.

Ephestia passulella, Barr. Carlisle in outhouses (F. H. Day). Not recorded from Scotland.

Ephestia kuhniella, Zell. Carlisle (J. Dalton). Abundant in flour mills (F. H. Day). Carlisle, bred April 3rd, 1898 (G. Wilkinson, E.M.M., xxxv., p. 83). This species first appeared in Europe in 1877, being found at Halle, in Germany, by Dr. Kuhn of that place. It reached England about 1887, and was found at Stony Stratford, Bucks.

Cryptoblabes bistriga, Haw. A single specimen beaten out of birch, near Carlisle, June, 1897 (G. Wilkinson, E.M.M., xxxiv. p. 86). Not recorded in Scotland.

Plodia interpunctella, Hüb. Not uncommon in some of the Carlisle Mills (F. H. Day). First taken in England in 1847, in London, by Mr. Edwin Shepherd. No record for Scotland.

Phycis (Salebria) fusca, Haw. Cumwhitton Moss, June 8th, 1918 (G.B.R.). Todhills, Orton, Bowness Moss (F. H. Day). Wan Fell, July 8th, 1900 (H. Britten). This species frequently appears on heaths when the heather has been burnt.

Dioryctria abietella F.; **decuriella,** Hub. Lazonby Fell, July 30th, 1899 (G. Wilkinson). Newby Cross (J. B. Hodgkinson, Ent. W. Intell., vi., p. 156, recorded under **Nephopteryx abietella**). Cumberland, rare (Barrett's Brit. Lep., ix., p. 415).

GALLERIIDAE.

Galleria mellonella, L. Found among old beehives. Great Salkeld (F. H. Day). Larva feeds on the Honeycomb, preferring that of the previous year.

Aphomia sociella, L. ; **colonella,** L. Occurs in June, July and August. Hayton, Tarn Lodge, came frequently to light (G.B.R.). Great Salkeld, May 28th, 1900 (H. Britten). St. Bees (P. J. Barraud, Entom., xl., p. 68). Larva found in the nests of Bumble Bees. The nests are attacked between the middle of June and August, and the moth searches for them at night.

TORTRICES.

Tortrix podana, Scop. St. Bees, July, 1906 (P. J. Barraud, Entom., xl., p. 68).

Tortrix xylosteana, L. Occurs in July and August. Hayton Moss, Heads Nook, Brampton, Great Salkeld (G.B.R.). Orton, Kingmoor, Durdar (F. H. Day).

Tortrix sorbiana, Hüb. Carlisle (Victoria History, i., p. 135). Not recorded from Scotland or Northumberland.

Tortrix rosana, L. Occurs in July, Hayton (G.B.R.). Stanwix and Wreay (F. H. Day).

Tortrix (Pandemis) heparana, Schiff. Occurs in June and July. Common. Hayton Moss (G.B.R.). Carlisle in gardens, Kingmoor, Durdar and Orton (F. H. Day).

Tortrix (Pandemis) ribeana, Hüb. Common in June and July. Tarn Lodge, Hayton Moss, Gelt Wood (G.B.R.). St. Bees (P. J. Barraud, Entom., xl., p. 68). Carlisle (F. H. Day).

Tortrix (Pandemis) corylana, F. In July and August. Kingmoor, Orton (F. H. Day).

Tortrix (Lozotaenia) unifasciana, Dup. Common, June, July, August. Tarn Lodge, Hayton Moss, Gelt Wood (G.B.R.). Carlisle, Kingmoor (F. H. Day).

Tortrix (Heterognomon) viburniana, F. On heaths and mosses in July and August. Castle Carrock, Hayton Moss (G.B.R.). Cummersdale (F. H. Day, Ent. Rec., xi., p. 276). Very common on Lazonby Fell and Bolton Fell (Victoria History, p. 135).

Tortrix (Heterognomon) palleana, Hüb ; **icterana,** Froel. Common in June and July. Cowran Cut, Fenton (G.B.R.). Abundant on steep slopes of Cowran Cut to the East of How

Mill. (Victoria History). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85). Workington, larvae found on *Plantago lanceolata* (G. Wilkinson, Ent. Rec., xix., p. 212).

Tortrix (Heterognomon) viridana, L. On the wing in July and August. Common in Brampton district (G.B.R.). Carlisle district, common (F. H. Day).

Tortrix (Lophoderus) ministrana, L. On the wing in May and June. Tarn Lodge, Hayton Moss, Gelt Wood, Great Salkeld (G.B.R.). Cummersdale, Kingmoor, Durdar, Orton, (F. H. Day). Var. **ferrugana,** Hub., and var. **subfacsiana,** Steph. occurring.

Tortrix (Heterognomon) forsterana, F. On the wing in July. Hayton Moss (G.B.R.). Carlisle in July (Ent. Rec., xi., p. 276). Durdar, Orton, Kingmoor (F. H. Day). Wan Fell (H. Britten).

Amphisa gerningana, Schiff. On mountain heaths and mosses in July. Castlecarrock Fell, July, 1892 (G.B.R.). Taken freely on Kingmoor, July, 1900, by G. Wilkinson (Victoria History, p. 135). Cumberland (Barrett's Brit. Lep., x., p. 210).

Amphisa prodromana, Hub. Occurs in April and May. Carlisle, Orton (F. H. Day, Ent. Rec., xi., p. 193). Carlisle (G. Wilkinson, Ent. Rec., xix., p. 212). Castlecarrock Fell (G.W., Entom., xxxii., p. 214). Rare near Carlisle, but occurs more freely among heather right to the summit of Cumrew Fell (1,500 feet) in the Pennines (Victoria History, p. 135).

Leptogramma literana, L. Appears in the autumn, and again in the spring after hybernation. Hayton, Tarn Lodge (October 5th, 1916), Faugh (G.B.R.). Orton, Durdar, Newby Cross (F.H.D.). Great Salkeld (H. Britten). Carlisle district (J. E. Thwaytes, Entom., xxxii., p. 48).

Peronea sponsana, F. Appears in September, October and November. Hayton, Hayton Moss, Tarn Lodge, Heads Nook (G.B.R.). Carlisle and Orton (F. H. Day).

Peronea rufana, Schiff. Not uncommon. Orton, Newby Cross (F. H. Day).

Peronea mixtana, Hüb. Appears in the autumn, and after hybernation in March and April. Tarn Lodge (G.B.R.). Durdar and Newby Cross (F. H. Day). Taken on heaths (G. Wilkinson, E.M.M., xxxiv., p. 86). Wan Fell, in April (H. Britten).

Peronea schalleriana, L. Found in August and September among sallows. Tarn Lodge, Hayton Moss (G.B.R.). Kingmoor, Orton, Cummersdale (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld (H. Britten).

Peronea comparana, Hüb. Appears in September. Tarn Lodge, Hayton Moss (G.B.R.). Orton, Great Salkeld (F. H. Day). Great Salkeld, Baron Wood (H. Britten).

Peronea perplexana, Barr. Tarn Lodge, Hayton Moss in September (G.B.R.). Orton, Durdar (F. H. Day).

Peronea variegana, Schiff. Appears in August, September and October. Tarn Lodge, beaten out of *Cotoneaster* (G.B.R.). Carlisle district and Kingmoor (F. H. Day). Carlisle, in August, very variable (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld (H. Britten). Vars. **cirrana,** Curt., **albana,** Westw., **borana,** Haw., occur in the county.

Peronea cristana, F. Scarce, taken at sallow bloom in the spring after hybernation. Orton, Sebergham (F. H. Day).

Peronea hastiana, L. Scarce. Morton, near Carlisle (F. H. Day). Wan Fell, April 8th, 1900. Great Salkeld, bred September 6th, 1899 (H. Britten).

Peronea ferrugana, Tr. Appears in August, September and October. Hayton Moss (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Peronea caledoniana, Steph. Mountain species. Castlecarrock Fell, August 10th, 1892 (G.B.R.). Cumberland mountains (Barrett, Brit. Lep., x., p. 243).

Peronea aspersana, Hüb. Not uncommon. Gelt Wood (G.B.R.). Orton, Kingmoor (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Baron Wood (H. Britten).

Rhacodia (Teras) caudana, F. Not uncommon by beating in August and September. Tarn Lodge, Hayton Moss (G.B.R.).

Durdar, Orton, Kingmoor, Wetheral (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld (H. Britten). Very variable species.

Dictyopteryx contaminana, Hüb. Common in whitethorn hedges in the autumn. Hayton Moss, Tarn Lodge (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Cummersdale, Kingmoor, Durdar, Wreay (F. H. Day). Very variable species.

Dictyopteryx loeflingiana, L. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Kingmoor, Orton (F. H. Day). Eskdale, July, 1906 (P. J. Barraud, Entom., xl., p. 68).

Dictyopteryx holmiana, L. Rather common near Maryport (Victoria History, p. 135). St. Bees, July, 1906 (P. J. Barraud, Entom., xl., p. 68).

Dictyopteryx bergmanniana, L. Appears in July. Tarn Lodge, Hayton (G.B.R.). Orton, Cummersdale (F. H. Day).

Dictyopteryx forskaleana, L. In July, August and September. Tarn Lodge (G.B.R.). One at Wetheral, 1900 (Victoria History, p. 135). Cumberland (Barrett's Brit. Lep., x., p. 204). Common in the Southern parts of England; no reliable record for Scotland.

Argyrotoxa (Dictyopteryx) conwayana, F. Appears in June. Tarn Lodge (G.B.R.). Carlisle, scarce (Victoria History, p. 135). Great Salkeld (H. Britten).

Ptycholoma lecheana, L. Appears in June and July. Hayton Moss, Gelt Wood, Edmond Castle (G.B.R.). Durdar, Orton (F. H. Day). Not uncommon near Carlisle.

Ditula (Brachytaenia) semifasciana, Haw. Occurs sparingly in July and August. Hayton Moss (G.B.R.). Carlisle district (F. H. Day). Cumberland (Barrett, Brit. Lep., x., p. 347). Apparently no record for Scotland.

Penthina corticana, Haw.; **picana,** Froel. In May and June among birch. Hayton Moss (G.B.R.). Durdar (F. H. Day).

Penthina betulaetana, Haw. Occurs among birch trees in August. Hayton Moss (G.B.R.). Orton, Durdar, Kingmoor (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Penthina sororculana, Zett. ; **praelongana,** Gn. Among birch in June. Hayton, Tarn Lodge (G.B.R.). Carlisle (G. Wilkinson). Cumberland (Barrett, Brit. Lep., x., p. 364).

Penthina pruniana, Hüb. Appears in June. Hayton, one specimen, June 15th, 1890 (G.B.R.). Durdar, Wreay (F. H. Day). Common amongst sloe (Victoria History, p. 135).

Penthina variegana, Hüb. Occurs in June and July. Tarn Lodge (G.B.R.).

Penthina dimidiana, Sodof. Scarce on Bowness Moss (Victoria History, p. 135). Cumberland (Barrett, Brit. Lep., x., p. 372).

Penthina marginana, Haw. ; **oblongana,** Haw. One specimen taken near Carlisle (Victoria History, p. 136).

Hedya aceriana, Dup. Appears in July and August. Carlisle (F. H. Day). Rare in the North of England ; no record for Scotland.

Hedya dealbana, Frol. In June and July among sallows. Orton (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85).

Spilonota incarnatana, Hüb. On Coast of Cumberland, recorded under **Spilonota amoenana,** Hub. (S. J. Wilkinson's Tortrices, p. 75). Cumberland (Barrett, Brit. Lep., ix., p. 19). No record for Scotland.

Spilonota trimaculana, Haw. ; **suffusana,** Zell. Appears in June and July. Tarn Lodge, Hayton Moss (G.B.R.). Durdar (F. H. Day).

Spilonota rosaecolana, Dbld. Occurs in June and July. Tarn Lodge (G.B.R.).

Pardia tripunctana, Schiff. In May and June. Hayton, Tarn Lodge (G.B.R.). Orton, Kingmoor, Durdar, Wreay (F. H. Day).

Aspis uddmanniana, L. Uncommon. Cummersdale (F. H. Day). Carlisle, bred from bramble, May 20th (G. Wilkinson, E.M.M., xxxv., p. 84).

Sericoris cespitana, Hüb. Cumberland, taken in June and July (Humphrey & Westwood, Brit. Moths, ii., p. 146).

Sericoris rivulana, Scop.; **conchana,** Hub. Local; occurs in July. Hayton Moss (G.B.R.). Orton (F. H. Day). Newby Cross, July 17th (G. Wilkinson, E.M.M., xxxv., p. 84). Cumberland (Barrett, Brit. Lep., xi., p. 60).

Sericoris urticana, Hüb. Common in June and July. Hayton Moss (G.B.R.). Orton, Blackwell, Great Salkeld, Kingmoor. (F. H. Day, Ent. Rec., xi., p. 276).

Sericoris lacunana, Dup. Very common in July and August. Tarn Lodge, Hayton Moss, &c. (G.B.R.) Kingmoor (F. H. Day). Newby Cross (G. Wilkinson, E.M.M., xxxv., p. 84).

Sericoris irriguana, H-S. Occurs in the mountains. Helvellyn, 1874 (J. C. Wassermann, Entom., viii., p. 19). No other English locality, but occurs in Scotland.

Sericoris micana, Hüb. Found in July. Hayton Moss (G.B.R.). Orton (G. Wilkinson, Ent. Rec., xix., p. 273, also see note by Mr. Eustace R. Banks, Ent. Rec., xxi., pp. 236-7 and 294). Carlisle district in meadows (F. H. Day, Ent. Rec., xi., p. 276). Cumberland (Barrett, Brit. Lep., xi., p. 52). Females are smaller than the males in this species.

Mixodia schulziana, F. Found on mosses, mountain heaths and moors in July and August. Gelt Wood, Hayton Moss (G.B.R.). Carlisle, not scarce among heather (G. Wilkinson, E.M.M., xxxv., p. 84). Bolton Fell, Lazonby Fell, Bowness Moss (F. H. Day). Long Moss (H. Britten). Keswick (H. A. Beadle, Ent. Rec., vii., p. 17; Entom., xxv., p. 219). Eskdale, July, 1906 (P. J. Barraud, Entom., xl., p. 68). Cumberland, splendid forms from the mountains of Cumberland recorded under **Orthotaenia bentleyana** (Steph. Illust., iv., p. 179); (Humphrey & Westwood's Brit. Moths, ii., p. 171; Wood's Index Entomologicus, p. 165; Barrett's Brit. Lep., xi., p. 49).

Mixodia palustrana, Zell. Cumberland, said to occur along the Cheviots (Barrett's Brit. Lep., xi., p. 50). In Scotland, much more widely distributed.

Euchromia (**Orthotaenia**) **rufana,** Scop. Cumberland (Entomologists Annual, 1864, p. 126; E.M.M., xi., p. 30; Meyrick's Brit. Lep., p. 574, under **Argyroploce rufana,** Scop.). Ap-

parently first noticed in this country about the year 1863 in Westmorland and North Lancashire by Mr. J. B. Hodgkinson. No record from Scotland.

Orthotaenia antiquana, Hüb. Tarn Lodge, July 9th, 1914 (G.B.R.). Carlisle district (F. H. Day).

Orthotaenia ericetana, Westw. Tarn Lodge, July 20th, 1911 (G.B.R.). Carlisle district (F. H. Day).

Cnephasia (Lozotaenia) musculana, Hüb. Not uncommon in May and June. Gelt Wood, Hayton Moss (G.B.R.). Orton, Newby Cross, Kingmoor (F. H. Day). Great Salkeld (H. Britten).

Sciaphila abrasana, Dup. Taken on the Cumberland Moors by Mr. W. Thompson, of Stony Stratford (C. G. Barrett, E.M.M., 1883, xx., p. 238). Cumberland (Meyrick's Brit. Lep., (1st Edition), p. 540; Barrett, Brit. Lep., x., p. 272). No record for Scotland.

Sciaphila conspersana, Dougl.; **perterana,** Gn. Found in rough meadows. Tarn Lodge, June 5th, 1910 (G.B.R.). Orton (F. H. Day). Carlisle (G. Wilkinson).

Sciaphila subjectana, Gn.; **incertana,** Tr. Common in June and July. Tarn Lodge, Cowran Cut (G.B.R.). Kingmoor, Great Salkeld (F. H. Day). Carlisle (G. Wilkinson, E.M.M. xxxv., p. 84).

Sciaphila virgaureana, Tr. Occurs in July and August. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Sciaphila pascuana, Hüb. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Sciaphila chrysanthemana, Dup. Carlisle (F. H. Day).

Sciaphila (Olindia) hybridana, Wilk. Tarn Lodge, June 7th, 1898 G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxiv., p. 86). Great Salkeld, June, 1906 (H. Britten). Cumberland (Barrett, Brit. Lep., x., p. 276).

Sciaphila octomaculana, Haw. Orton (F. H. Day). Not known in the South; scarce in Lancashire and Cheshire; more frequent in Yorkshire, Westmorland, Durham and Northumberland. In Scotland more plentiful.

Sciaphila penziana, Wood; **bellana,** Curt. Found in the mountain districts in June and July. Keswick, July, 1856 (W. Greenip, Ent. W. Intell., i., p. 165). Keswick, August, 1903 (H. A. Beadle, Ent. Rec., xv., p. 341). Cockermouth and Keswick (C. G. Barrett, E.M.M., 1883, xx., p. 243.) Confined to the North of England; more plentiful in Scotland.

Capua favillaceana, Hüb. Flies in the afternoon sunshine about and over trees in woods in May and June. Gelt Wood, Hayton Moss (G.B.R.). Orton (F. H. Day).

Clepsis rusticana, Tr. Occurs in May and June. Tarn Lodge, Hayton Moss, Cowran Cut (G.B.R.).

Bactra lanceolana, Hüb. Common in damp places in June and July. Hayton Moss, Cumwhitton Moss (G.B.R.). Kingmoor, Cummersdale, Great Salkeld (F. H. Day).

Phoxopteryx (Anchylopera) unguicella, L. Not uncommon on heaths in May and June. Gelt Wood, Hayton Moss (G.B.R.). Orton, Newby Cross (F. H. Day). Wan Fell, Great Salkeld (H. Britten).

Phoxopteryx (Anchylopera) uncana, Hüb. Found in various places on the hills in Cumberland (G. Wilkinson, E.M.M., xxxiv., p. 86). Bowness Moss (F. H. Day). Also a heath species, but scarce (Victoria History, p. 136).

Phoxopteryx (Anchylopera) biarcuana, Steph. On mosses and heaths in June. Hayton Moss (G.B.R.). Kingmoor (F. H. Day). Found on heaths on the hills (G. Wilkinson, E.M.M., xxxiv., p. 86).

Phoxopteryx (Anchylopera) myrtillana, Tr. Occurs in May and June on heaths. Kingmoor (F. H. Day). Cumberland (Barrett, Brit. Lep., xi., p. 119).

Phoxopteryx (Anchylopera) lundana, F. On grassy banks in May, June, also in August; generally not uncommon. Hayton Moss, Fenton, Cowran Cut (G.B.R.). Orton, Kingmoor, Durdar, Keswick (F. H. Day). Carlisle, August 8th (G. Wilkinson, E.M.M., xxxv., p. 85). Great Salkeld (H. Britten).

Phoxopteryx (Anchylopera) mitterbacheriana, Schiff. In May and June, sparingly in woods. Wreay Woods (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Found on the hills (G.W., E.M.M., xxxiv., p. 86). Wan Fell, August 3rd, 1899 (H. Britten).

Grapholitha (Steganoptycha) ramella, L.; **paykulliana,** Wilk. Very common on birch trees in July and August. Hayton Moss (G.B.R.). Orton, Kingmoor, Wreay (F. H. Day). Carlisle district (G. Wilkinson, E.M.M., xxxv., p. 84). Long Moss (H. Britten).

Grapholitha (Lithographia) nisella, Clerck. Orton (F. H. Day). Carlisle, August 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Grapholitha (Steganoptycha) nigromaculana, Haw. In July and August. Scale Hill (G. Wilkinson, Ent. Rec., xix., p. 224). Silloth (G. Wilkinson). One taken at Silloth in 1892 on a head of ragwort (Victoria History, p. 136).

Grapholitha (Lithographia) subocellana, Don.; **campoliliana,** Tr. In May and June. Hayton Moss, &c. (G.B.R.). Orton, Durdar (F. H. Day).

Grapholitha (Steganoptycha) trimaculana, Don. Appears in June and July. Cumrew Fell, June 28th, 1905; Tarn Lodge, July 25th, 1909 (G.B.R.). Carlisle (G. Wilkinson, E.M.M. xxxiv., p. 86).

Grapholitha (Lithographia) penkleriana, Fisch. Appears in August and September; not very common. Tarn Lodge (G.B.R.). Cummersdale, Orton (F. H. Day). Baron Wood, Wan Fell, Long Moss (H. Britten).

Grapholitha (Steganoptycha) obtusana, Haw. Cumberland (Barrett, Brit. Lep., xi., p. 82). Not recorded from Scotland.

Grapholitha (Stenanoptycha) naevana, Hüb. Locally common. Hayton Moss, August 1st, 1910 (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Common near Lazonby (Victoria History, p. 136).

Phloeodes tetraquetrana, Haw. Occurs in May and June, common in and near woods. Castlecarrock, Hayton Moss (G.B.R.). Orton, New y Cross (F. H. Day). Carlisle, in woods (G. Wilkinson, E.M.M., xxxiv., p. 86).

Phloeodes immundana, Fisch. Upperby, Carleton (F. H. Day). Carlisle, in damp spots among alder; larvae common in January in alder catkins (G. Wilkinson, E.M.M., xxxiv., p. 86; xxxv., p. 83). Cumberland (Barrett, Brit. Lep., xi., p. 98).

Phloeodes crenana, Hüb. Near Keswick, April 8th (G. Wilkinson, E.M.M., xxxv., p. 83). Threlkeld, near Keswick (G. W., Entom., xxxii., p. 190). Rare; one specimen taken by Mr. G. Wilkinson at Threlkeld, and one at Sebergham (Victoria History, p. 136). Cumberland (Barrett, Brit. Lep., xi., p. 100).

Hypermecia (Steganoptycha) angustana, Hüb. Carlisle district (F. H. Day).

Hypermecia (Steganoptycha) cruciana, L. Carlisle district (F. H. Day). These last two species are kept separate in "Genitalia of the Tortricidæ" (Pierce & Metcalfe).

Batodes angustiorana, Haw. Occurs in June and July. Castlecarrock, Tarn Lodge (G.B.R.). Great Salkeld (H. Britten).

Paedisca (Cartella) bilunana, Haw. Found among birch trees in June and July. One specimen was taken on a birch trunk near Carlisle in 1896 (Victoria History, p. 136).

Paedisca (Steganoptycha) rubiginosana, H.-S. Scarce in fir plantations in May and June. Orton (F. H. Day). Carlisle, beaten singly from fir in May (G. Wilkinson, E.M.M., xxxiv., p. 86). Durdar, beaten out of a fir, May 20th (G.W., E.M.M., xxxv., p. 84). Cumberland (Barrett, Brit. Lep., xi., p. 81).

Paedisca (Poecilochroma) corticana, Hüb. Generally abundant in oak woods, July to October. Tarn Lodge, Hayton Moss, Gelt Wood, Nunnery Walks (G.B.R.). Upperby, Kingmoor, Wreay, Orton (F. H. Day). Great Salkeld (H. Britten). Very variable species.

Paedisca (Poecilochroma) occultana, Dougl. Occurs in July in larch woods. Tarn Lodge, July 21st, 1900 (G.B.R.). Wan Fell, Great Salkeld (H. Britten).

Paedisca solandriana, L. Appears in July and August, sometimes not uncommon in and near woods, variable species. Tarn Lodge, Hayton Moss (G.B.R.). Orton, Kingmoor (F. H.

Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Wan Fell, Baron Wood, Long Moss (H. Britten). Vars. **parmatana** Fisch.; **sinuana,** Hüb.; **trapezana,** F. occur.

Ephippiphora (Halonota) similana, Hüb. Appears in August and September. Hayton Moss (G.B.R.). Carlisle district (F. H. Day, Ent. Rec., xi., p. 277). Great Salkeld, Baron Wood (H. Britten).

Ephippiphora (Halonota) cirsiana, Zell.; **luctuosana,** Dup. Appears in June and July; common amongst rough herbage. Hayton Moss (G.B.R.). Orton, Kingmoor (F. H. Day). Watendlath, May 23rd, 1896 (H. A. Beadle, Ent. Rec., ix., p. 91). Dean (G. Wilkinson, Ent. Rec., xix., p. 223).

Ephippiphora (Halonota) pflugiana, Haw.; **scutulana,** Tr. Common amongst rough herbage in June. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle, Orton, Gelt Wood, Kingmoor (F. H. Day). Carlisle in marshy meadows (G. Wilkinson. E.M.M., xxxv., p. 86). Dean (G.W., Ent. Rec., xix., p. 223),

Ephippiphora (Halonota) brunnichiana, Schiff. Common in June amongst its food plant, coltsfoot, Gelt Wood (G.B.R.). Carlisle, Wreay (F. H. Day).

Ephippiphora (Halonota) turbidana, Tr. Carlisle, amongst *Tussilago petasites* (sic) June and July (S. J. Wilkinson, British Tortrices, p. 100). Carlisle (Stainton's Manual, ii., p. 212). Cumberland (Barrett, Brit. Lep., xi., p. 149).

Ephippiphora (Halonota) foenella, L. Cumberland, rarely (Barrett, Brit. Lep., xi., p. 150).

Ephippiphora (Halonota) trigeminana, Steph. Found among ragwort in May, June and July. Tarn Lodge, Hayton Moss, Cowran Cut (G.B.R.). Great Salkeld (H. Britten). Silloth (G. Wilkinson). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Olindia (Anisotaenia) ulmana, Hüb. Rare; one taken flying at Heads Nook, July 4th, 1911 (G.B.R.).

Coccyx (Asthenia) cosmophorana, Tr. Carlisle, flies in the morning sunshine (F. H. Day, Ent. Rec., xi., p. 276). Carlisle (Entom., xxix., p. 68; Ent. Rec., vii., p. 192). Cumberland (Barrett, Brit. Lep., xi., p. 173).

Coccyx (Asthenia) strobilella, L. Specimens bred from spruce fir cones from Great Salkeld, May, 1913 (G.B.R.). Gelt Wood (G. Wilkinson).

Coccyx (Asthenia) splendidulana, Gn. Found amongst oak trees. Orton (F. H. Day). Carlisle, in woods (G. Wilkinson, E.M.M., xxxiv., p. 86). Great Salkeld, May 25th, 1900 (H. Britten).

Coccyx (Asthenia) argyrana, Hüb. Found on oak trunks in May and June. Tarn Lodge, Gelt Wood, Fenton (G.B.R.). Orton, Kingmoor, Upperby (F. H. Day). Great Salkeld (H. Britten).

Coccyx tedella, Clerck. In June among spruce firs. Gelt Wood (G.B.R.). Carlisle district (F. H. Day). Great Salkeld (H. Britten).

Coccyx distinctana, Wilk. Durdar (F. H. Day). Armathwaite, near Carlisle, one specimen in 1886 (J. B. Hodgkinson, Entom., xix., p. 245).

Coccyx (Asthenia) vacciniana, Zell. Found in June. Hayton Moss, Gelt Woods (G.B.R.).

Heusimene (Asthenia) fimbriana, Haw. Orton (F. H. Day). Carlisle, one specimen beaten from oak (G. Wilkinson, E.M.M., xxxiv., p. 86). Cumberland (Barrett, Brit. Lep., xi., p. 179).

Pamplusia mercuriana, Hüb. ; **monticolana,** Wilk. On the moors and hills of Cumberland (Barrett, Brit. Lep., xi., p. 198).

Retinia turionana, Hüb. Carlisle, Orton, Durdar (F. H. Day, Ent. Rec., xi., p. 276). Carlisle, larvae and pupae from shoots of fir (G. Wilkinson, E.M.M., xxxv., p. 84).

Retinia pinivorana, Zell. Occurs in June. Hayton Moss, June 26th, 1913 (G.B.R.). Orton, Durdar (F. H. Day). Carlisle, among fir trees (G. Wilkinson, E.M.M., xxxiv., p. 86). Great Salkeld, June 14th, 1900 (H. Britten). Cumberland (Barrett, Brit. Lep., xi., p. 40).

Carpocapsa splendidana, Hüb. Among oaks. Carlisle in oak woods (G. Wilkinson, E.M.M., xxxiv., p. 86). Cumberland under **C. splendana,** Hüb. (Barrett, Brit. Lep., xi., p. 157).

Stigmonota dorsana, F. Local, flying in the sunshine, May and June. Fenton (G.B.R.). Carlisle, on railway banks, near Wreay (F. H. Day, Ent. Rec., xi., p. 276). Cowran Cut, Little Salkeld (F.H.D.). Cumberland (Barrett, Brit. Lep., xi., p. 227).

Stigmonota coniferana, Ratze. On Scotch fir. Gelt Wood, June 27th, 1892 (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxiv., p. 86).

Stigmonota perlepidana, Haw. Not uncommon in May. Fenton (G.B.R.). Wreay, on railway banks (F. H. Day, Ent. Rec., xi., p. 276). Orton, Kingmoor (F.H.D.).

Stigmonota internana, Gn. Carlisle district (F. H. Day). Carlisle taken early in May, flying in the sunshine over *Ulex europaeus*. Cumberland (Barrett, Brit. Lep., xi., p. 237).

Stigmonota nitidana, F. In oak woods. Carlisle, in woods (G. Wilkinson, E.M.M., xxxiv., p. 86). Cumberland (Barrett, Brit. Lep., xi., p. 242).

Stigmonota regiana, Zell. Found in June and July. Tarn Lodge, July 17th, 1919; June 22nd, 1923 (G.B.R.). How Mill (J. E. Thwaytes). Great Salkeld (F. H. Day). Cumberland, taken near Carlisle by G. Wilkinson (Barrett, Brit. Lep., xi., p. 244).

Dichrorampha petiverella, L. Appears in June, July and August. Tarn Lodge, Cowran Cut (G.B.R.). Carlisle district (F. H. Day). Great Salkeld (H. Britten).

Dichrorampha (Lipoptycha) plumbana, Scop. Appears in May and June. Tarn Lodge, Fenton, Cowran (G.B.R.). Carlisle district (F. H. Day).

Dichrorampha (Lipoptycha) saturnana, Gn. Wreay (G. Wilkinson, Entom., xxxii., p. 214). Carlisle district, railway banks at Wreay (F. H. Day, Ent. Rec., xi., p. 276). Cummersdale (F.H.D.).

Dichrorampha plumbagana, Tr. July. Tarn Lodge, Hayton Moss (G.B.R.).

Dichrorampha acuminatana, Zell. In June and July. Tarn Lodge (G.B.R.).

Dichrorampha tanaceti, Sta.; **herbosana,** Barr. Tarn Lodge, July, 1910 (G.B.R.). Carlisle, very common (G. Wilkinson,

E.M.M., xxxiv., p. 86). Railway banks near Wreay (F. H. Day, Ent. Rec., xi., p. 276). Kingmoor, Orton (F.H.D.). Cumberland (Barrett, Brit. Lep., xi., p. 260).

Pyrodes rhediella, Clerck. Scarce, flying in the sunshine. Carlisle, Allonby, Cross Fell (F. H. Day). Great Salkeld, May 27th, 1900 (H. Britten). Hayton Moss (G.B.R.)

Catoptria (Grapholitha) ulicetana, Haw. Abundant in May, June and July. Hayton, Hayton Moss, Tarn Lodge, Gelt Wood (G.B.R.). Carlisle district, abundant, Kingmoor (F. H. Day). Great Salkeld (H. Britten). Dean (G. Wilkinson, Ent. Rec., xix., p. 223).

Catoptria (Grapholitha) hypericana, Hüb. Common in June and July. Tarn Lodge, Cowran Cut (G.B.R.). Carlisle district (F. H. Day). Eskdale (P. J. Barraud, Entom., xl., p. 68). No record for Durham, Northumberland or Scotland.

Catoptria cana, Haw. In June, July and August. Tarn Lodge, Hayton Moss, Gelt Wood, Cowran Cut (G.B.R.). Carlisle, Kingmoor (F. H. Day). Cross Fell, June 26th, 1900 (H. Britten). Watendlath, May 23rd, 1896 (H. A. Beadle, Ent. Rec., ix., p. 91). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Catoptria scopoliana, Haw. Carlisle, July 26th, on banks of River Caldew in some numbers (G. Wilkinson, E.M.M., xxxv., p. 84).

Trycheris aurana, F.; **mediana,** Hüb. In June and July, common. Tarn Lodge, Fenton, Cowran Cut, Heads Nook (G.B.R.). St. Bees, July, 1906 (P. J. Barraud, Entom., xl., p. 68).

Symaethis pariana, Clerck. Recorded from the Lake District in Stainton's Manual (Victoria History, p. 136).

Symaethis oxyacanthella, L.; **fabriciana,** L. Occurs in May, June and September. Common among nettles. Tarn Lodge, Heads Nook, Newton Reigny Moss (G.B.R.). Carlisle district, Kingmoor (F. H. Day). Little Salkeld (H. Britten).

Eupoecilia nana, Haw. Not uncommon in June. Hayton Moss, Tarn Lodge (G.B.R.). Newby Cross (F. H. Day). Armathwaite, near Carlisle (J. B. Hodgkinson, Entom., xix., p. 245). Cumberland (Barrett, Brit. Lep., x., p. 316).

Eupoecilia atricapitana, Steph. Scarce. Tarn Lodge, May 26th, 1912 (G.B.R.). Carlisle (F. H. Day).

Eupoecilia (Conchylis) maculosana, Haw. Carlisle, among flowers of *Agraphis nutans* (F. H. Day, Ent. Rec., xi., p. 276). Wreay (G. Wilkinson, Entom., xxxii., p. 214). Cumberland (Barrett, Brit. Lep., x., p. 279).

Eupoecilia angustana, Hub. Common on moors in June, July and August. Tarn Lodge, Hayton Moss, Gelt Wood, Cowran Cut (G.B.R.). Orton, Bolton Fell, Bowness Moss (F. H. Day). Newby Cross, July 17th (G. Wilkinson, E.M.M., xxxv., p. 84). Little Salkeld (H. Britten).

Eupoecilia ciliella, Hüb. Locally common in May, June and August. Tarn Lodge, Newton Reigny Moss (G.B.R.). Newby Cross, Kingmoor (F. H. Day). Carlisle, common end of April and in May (G. Wilkinson, E.M.M., xxxiv., p. 86). Wan Fell (H. Britten). Cumberland (Barrett, Brit. Lep., x., p. 313).

Xanthosetia zoegana, L. Local, in July and August. Cowran Cut (G.B.R.). Carlisle (F. H. Day). St. Bees (P. J. Barraud, Entom., xl., p. 68).

Xanthosetia hamana, L. Commoner than the last species. May, June and July. Tarn Lodge, Cowran Cut (G.B.R.). Carlisle, in meadows, Cummersdale, Orton (F. H. Day).

Lobesia reliquana, Hub. ; **permixtana,** Hüb. Orton (F. H. Day). Carlisle, in woods (G. Wilkinson, E.M.M., xxxiv., p. 86). Cumberland (Barrett, Brit. Lep., xi., p. 249).

Argyrolepia hartmanniana, Staud. ; **baumanniana,** Schiff. Orton (F. H. Day). Tarn Lodge, June, 1928, common among Devil's Bit Scabious (G.B.R.).

Argyrolepia zephyrana, Tr. Cumberland (Meyrick's Brit. Lep., p. 487, under **Phalonia zephyrana**). Not recorded in Scotland.

Argyrolepia badiana, Hüb. Cumberland (Barrett, Brit. Lep., x., p. 328.)

Argyrolepia cnicana, Dbld. Found in marshy places in June and July. Hayton Moss (G.B.R.). Cummersdale (F. H. Day). Cumberland (Barrett, Brit. Lep., x., p. 329).

Conchylis (Lozopera) straminea, Haw. Common in meadows, May, June and July. Tarn Lodge, Cowran Cut (G.B.R.). Orton (F. H. Day). St. Bees (P. J. Barraud, Entom., xl., p. 68). Cumberland (Barrett, Brit. Lep., x., p. 324).

Aphelia (Ablabia) osseana, Scop.; **pratana,** Hüb. On rough ground in June and July. Hayton, Hayton Moss, Tarn Lodge, Bewcastle (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Tortricodes (Cheimatophila) hyemana, Hüb.; **tortricella,** Hüb. Common in March and April; the male exceedingly active in the day-time. Hayton, Hayton Moss, Tarn Lodge, Gelt Wood (G.B.R.). Carlisle, Kingmoor, Keswick, Great Salkeld (F. H. Day). Carlisle, abundant, March 26th (C. Eales, Ent. Rec., iii., p. 115).

TINEAE.

Lemnatophila (Chimabache) phryganella, Hüb. Appears in October. Hayton, Tarn Lodge (G.B.R.). Carlisle (F. H. Day).

Exapate congellatella, Clerck.; **gelatella,** L. In October and November. Carlisle, in October (G. Wilkinson, E.M.M., xxxv., p. 84).

Diurnea (Chimabache) fagella, F. At rest on tree trunks in March and April. Hayton, Hayton Moss, Tarn Lodge, Gelt Wood, &c. (G.B.R.). Carlisle, Kingmoor, Great Salkeld, Keswick (F. H. Day). Very dark forms are also taken.

Epigraphia steinkellneriana, Schiff. Not uncommon in lanes in April and May. Tarn Lodge (G.B.R.). Orton, Durdar (F. H. Day). Orton, Carlisle, beaten from hawthorn, May 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Talaeporia tubulosa, Retz.; **pseudo-bombycella,** Hüb. Cumberland (Tutt's Brit. Lep., ii., p. 228).

Psychoides (Teichobia) verhuellella, Stt. Cumberland (Meyrick's Brit. Lep., p. 832).

Diplodoma marginepunctella, Steph.; **herminata,** Tutt. Keswick (G. Wilkinson). Cumberland (Tutt's Brit. Lep., ii., p. 154.)

Ochsenheimeria birdella, Curt.; **mediopectinellus,** Haw. Scarce, Tarn Lodge, August 12th, 1912 (G.B.R.). Newby Cross, July 17th (G. Wilkinson, E.M.M., xxxv., p. 84).

Scardia (Tinea) picarella, Clerck. Rare. Hayton Moss, June 7th, 1911 (G.B.R.). Great Salkeld, June 7th, 1911 (G.B.R.). Great Salkeld, June 7th, 1906 (H. Britten).

Scardia (Tinea) cloacella, Haw. Common in June and July. Tarn Lodge, Hayton Moss, Gelt Wood, &c. (G.B.R.). Carlisle district common, Kingmoor (F. H. Day). Great Salkeld (H. Britten).

Scardia (Tinea) arcella, F. Carlisle, a single specimen beaten out of hazel (G. Wilkinson, E.M.M., xxxiv., p. 86). Carlisle district, by beating along hedge-rows after sunset. (F. H. Day, Ent. Rec., xi., p. 276).

Blabophanes (Monopis) rusticella, Hüb. Common in birds' nests in May, June and July. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle (F. H. Day). Little Salkeld (H. Britten).

Tinea (Trichophaga) tapetzella, L. Common in houses in June, July and August. Hayton, Tarn Lodge (G.B.R.). Carlisle (F. H. Day).

Tinea misella, Zell. Common. Tarn Lodge, July, 1899 (G.B.R.). Carlisle, very common in a stable in the town (G. Wilkinson, E.M.M., xxxiv., p. 86).

Tinea pellionella, L. In houses in June and July. Tarn Lodge (G.B.R.). Carlisle (F. H. Day).

Tinea fuscipunctella, Haw. In houses, August and September. Tarn Lodge (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxiv., p. 86).

Tinea pallescentella, Stt. Carlisle, in houses (F. H. Day). Probably an introduced species from abroad.

Tinea lapella, Hüb. Scarce in May and June. Tarn Lodge, Hayton Moss (G.B.R.). Durdar (F. H. Day).

Tinea semifulvella, Haw. Not uncommon in July. Hayton, Hayton Moss, Tarn Lodge, (G.B.R.).

Tineola biselliella, Hml. Carlisle, in houses (G. Wilkinson, E.M.M., xxxiv., p. 86).

Lampronia (Incurvaria) quadripunctella, Steph.; **morosa,** Zell. Carlisle, June 17th, 1902 (G. Wilkinson).

Lampronia (Incurvaria) luzella, Hüb. Wreay, Orton (F. H. Day). Cumberland (Meyrick's Brit. Lep., p. 840.).

Lampronia (Incurvaria) praelatella, Schiff. Carlisle district (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Lampronia (Incurvaria) rubiella, Bjerk. Common in June. Tarn Lodge, Gelt Wood (G.B.R.). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Incurvaria (Lampronia) tenuicornis, Stt. Orton, June 14th, 1902 (G. Wilkinson).

Incurvaria muscalella, F. Along hedgerows in May. Tarn Lodge Fenton (G.B.R.). Carlisle, Orton, Kingmoor (F. H. Day). Flimby, near Maryport, amongst hawthorn (G. Wilkinson, Ent. Rec., xix., p. 212).

Incurvaria (Lampronia) oehlmanniella, Tr. Occurs in June on heaths. Cumrew Fell, June 11th, 1912; June 16th, 1914 (G.B.R.). Orton (G. Wilkinson).

Micropteryx (Eriocephala) calthella, L. Common in June in flowers of *Caltha palustris*, &c. Tarn Lodge, Hayton Moss, Gelt Wood, Newton Reigny Moss (G.B.R.). Carlisle, Kingmoor, Great Salkeld, Keswick (F. H. Day). Carlisle, common in mosses (G. Wilkinson, E.M.M., xxxiv., p. 87; xxxv., p. 84; Entom., xxxii., p. 137). Cumberland (Tutt's Brit. Lep., i., p. 144).

Micropteryx (Eriocephala) seppella, F.; **aruncella,** Scop. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85). Wreay, swept on a weedy railway bank (F. H. Day, Ent. Rec., xi., p. 276). Cumberland (Tutt's Brit. Lep., i., p. 151).

Micropteryx (Eriocephala) mansuetella, Zell. Newbiggin Wood, near Carlisle (F. H. Day, Ent. Rec., xi., p. 276).

Micropteryx (Eriocephala) aureatella, Scop.; **allionella,** F. Common in damp woods. Tarn Lodge, Hayton Moss, Gelt Wood (G.B.R.). Orton, Durdar, Kingmoor (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxiv., p. 87; Entom., xxxii., p. 137). Baron Wood (H. Britten). Cumberland (Tutt's Brit. Lep., i., p. 159).

Micropteryx (Eriocephala) thunbergella, F. Cumberland (Tutt's Brit. Lep., I., p. 155).

Micropteryx (Eriocrania) purpurella, Haw. Common on birch. Carlisle, Orton, Kingmoor (F. H. Day). Orton (G. Wilkinson, E.M.M., xxxiv., p. 87 ; xxxv., p. 83 ; Entom., xxxii., p. 137). Near Carlisle (J. B. Hodgkinson, Entom., xxv., p. 71).

Micropteryx (Eriocrania) caledoniella, Griffith. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 83 ; Entom., xxxii., p. 137). Kingmoor (F. H. Day). Near Carlisle, taken freely by J. B. Hodgkinson (Entom., xxv., p. 71) and C. Eales. **M. caledoniella,** Griffith, seems to be a synonym of **M. purpurella.**

Micropteryx (Eriocrania) semipurpurella, Steph. Common in April on birch. Hayton, Hayton Moss, Orton (G.B.R.). Carlisle and Orton (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxiv., p. 87 ; xxxv., p. 83 ; Entom., xxxii., p. 137). Near Carlisle (J. B. Hodgkinson, Entom., xxv., p. 71).

Micropteryx (Eriocrania) unimaculella, Zett. Common in April. Hayton Moss, Orton (G.B.R.). Carlisle, Kingmoor, Orton (F. H. Day). Carlisle district (G. Wilkinson, E.M.M., xxxiv., p. 87 ; xxxv., p. 83).

Micropteryx (Eriocrania) sparmanella, Bosc. Common in Carlisle district (G. Wilkinson, E.M.M., xxxiv., p. 87 ; xxxv., p. 83 ; Entom., xxxii., p. 137). Near Carlisle (J. B. Hodgkinson, Entom., xxv., p. 71).

Micropteryx (Eriocrania) subpurpurella, Haw. Common in May. Tarn Lodge, Hayton Moss, Gelt Wood, Orton (G.B.R.). Carlisle, Kingmoor, Orton (F. H. Day). Carlisle district (G. Wilkinson, E.M.M., xxxv., p. 83 ; Entom., xxxii., p. 137).

Micropteryx (Eriocrania) sangii, Wood. Not uncommon. Kingmoor (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 83 ; Entom., xxxii., p. 137). Near Carlisle (J. B. Hodgkinson, Entom., xxv., p. 71).

Nemophora swammerdamella, L. Carlisle, Kingmoor, Great Salkeld, Keswick (F. H. Day). Carlisle (G. Wilkinson, Ent. Rec., xix., p. 212). Baron Wood, June 4th, 1899 (H. Britten)

Nemophora schwarziella, Zell. Common in May and June. Hayton, Hayton Moss, Tarn Lodge, Gelt Wood (G.B.R.). Orton (F. H. Day). Great Salkeld (H. Britten).

Nemophora pilella, F. Anthorn, June, 1902 (G. Wilkinson).

Adela fibulella, Schiff. Not uncommon in May and June. Tarn Lodge, Cowran Cut (G.B.R.). Great Salkeld, June 11th, 1900 (H. Britten).

Adela rufimitrella, Scop. Not uncommon. Carlisle, in a marshy place on *Cardamine pratensis* (G. Wilkinson, E.M.M., xxxiv., p. 87). Wreay (G.W., Entom., xxxii., p. 214). Carlisle, Wreay Wood (F. H. Day, Ent. Rec., xi., p. 276).

Adela (Nemotois) degeerella, L. In woods, scarce. Orton (F. H. Day). Cumberland (Meyrick's Brit. Lep. p. 843).

Adela viridella, Scop. Common in May and June. Hayton, Hayton Moss, Gelt Wood (G.B.R.). Carlisle, Kingmoor, Orton, Durdar (F. H. Day). Carlisle (G. Wilkinson, Ent. Rec., xix., p. 212). Baron Wood (H. Britten).

Nemotois cupriacellus, Hüb. Cumberland (Meyrick's Brit. Lep., p. 842).

Swammerdammia combinella, Hüb.; **apicella,** Don. Occurs in June. Tarn Lodge (G.B.R.). Carlisle district (F. H. Day).

Swammerdammia caesiella, Hüb. Occurs in June. Tarn Lodge, Hayton Moss (G.B.R.). Orton, Blackwell (F. H. Day). Carlisle district, in woods (G. Wilkinson, E.M.M., xxxiv., p. 86).

Swammerdammia pyrella, Vill. Occurs in June. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle, one specimen (F. H. Day). Carlisle, in woods (G. Wilkinson, E.M.M., xxxiv., p. 86).

Hyponomeuta (Yponomeuta) padellus, L. Occurs in July and August. Tarn Lodge (G.B.R.). Grinsdale, Cummersdale (F. H. Day). Keswick (M. C. Dixon, Ent. Rec., xiv., p. 49). Little Salkeld (H. Britten).

Hyponomeuta (Yponomeuta) cognatellus, Hüb. Wetheral (G. Wilkinson, Victoria History, p. 137).

Aneyschia (Ethmia) funerella, F. Cumberland, Lake District (Stainton, Nat. Hist. Tineina, xiii., p. 262). (Meyrick's Brit. Lep., p. 742).

Prays curtisellus, Don. Tarn Lodge, July 6th, 1900 (G.B.R.). Var. **rustica,** Haw. Wreay Woods (F. H. Day).

Plutella cruciferarum, Zell.; **maculipennis,** Curt. Sometimes common in June, August and September; the well-known

"Diamond Back Moth." Hayton, Hayton Mooss, Tarn Lodge. Injurious to crops in 1914 in Cumberland (G.B.R., Entom., xlvii., p. 225). Kingmoor (F. H. Day). Carlisle district (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld (H. Britten).

Plutella porrectella, L. Common in June, August and September. Tarn Lodge (G.B.R.). Carlisle (F. H. Day).

Plutella dalella, Stt. Lake District, common (Stainton's Manual, ii., p. 312, and Victoria History, p. 137).

Cerostoma vittella, L. Not uncommon in July and August. Tarn Lodge (G.B.R.). Wreay (F. H. Day). Carlisle, among elms close to the town (G. Wilkinson, E.M.M., xxxiv., p. 87).

Cerostoma radiatella, Don. In and near woods, July, August and September. Tarn Lodge, Hayton Moss (G.B.R.). American Wood, Carlisle (F. H. Day). Great Salkeld (H. Britten).

Cerostoma costella. F. Common in woods, July and August. Hayton Moss, Gelt Wood, Cowran (G.B.R.). Orton (F. H. Day). Carlisle, August 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Harpipteryx (Cerostoma) scabrella, L. Carlisle (F. H. Day). Carlisle, in woods among crab (G. Wilkinson, E.M.M., xxxiv., p. 87). Great Salkeld, September 8th, 1899 (H. Britten).

Harpipteryx (Cerostoma) nemorella, L. Orton (F. H. Day). Carlisle, August 8th (G. Wilkinson, E.M.M., xxxiv., p. 84).

Harpipteryx (Cerostoma) xylostella, L. Common in July and August. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle, Orton, Kingmoor (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Orthotaelia sparganella, Thunb. Cummersdale, near ponds (F. H. Day).

Phibalocera (Carcina) quercana, F. Not uncommon in and near woods in July, August and September. Hayton, Tarn Lodge, Gelt Wood (G.B.R). Carlisle, Orton (F. H. Day). Baron Wood, July 30th, 1899 (H. Britten).

Exaeretia allisella, Stt. First noticed in the North of England in Yorkshire and Cumberland (Stainton, Nat. Hist. Tineina, xiii., p. 328). Cumberland (Meyrick's Brit. Lep., p. 676).

Depressaria costosa, Haw. Occurs in August. Tarn Lodge (G.B.R.). Newby Cross, Orton (F. H. Day). Carlisle, pupae were taken in their white webs on furze, July 11th (G. Wilkinson, E.M.M., xxxv., p. 84).

Depressaria flavella, Hüb.; **liturella,** Schiff. Occurs in July. Tarn Lodge (G.B.R.). St. Bees, July, 1906 (P. J. Barraud, Entom., xl., p. 68).

Depressaria umbellana, Steph. Kingmoor, Upperby (F. H. Day). Carlisle, bred from furze (G. Wilkinson, E.M.M., xxxv., p. 84). Lake District of Cumberland (Stainton, Nat. Hist. Tineina, vi., p. 66).

Depressaria assimilella, Tr. Common amongst broom in June and July. Carlisle, Kingmoor, Orton (F. H. Day). Carlisle, larvae common between united twigs of broom (G. Wilkinson, E.M.M., xxxv., p. 84).

Depressaria atomella, Hüb. Occurs in August. Hayton, August 24th, 1891 (G.B.R.).

Depressaria arenella, Schiff. Occurs in May, June, August and September. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle (F. H. Day). Carlisle, hybernated specimens were met with in February (G. Wilkinson, E.M.M., xxxv., p. 83). Great Salkeld (H. Britten).

Depressaria alstroemeriana, Clerck. Carlisle (F. H. Day).

Depressaria liturella, Hüb.; **hypericella,** Tr. Occurs in July, Carlisle (F. H. Day).

Depressaria conterminella, Zell. In July. Hayton, July 12th, 1892 (G.B.R.).

Depressaria ocellana, F. Carlisle, Orton, March 13th, 1899 (F. H. Day, Ent Rec., xi., p. 193). Carlisle, hybernated examples in February (G. Wilkinson, E.M.M., xxxv., p. 83).

Depressaria yeatiana, F. Hayton, May 19th, 1892 (G.B.R.).

Depressaria applana, F. Very common in August, September, October and November. Tarn Lodge (G.B.R.). Kingmoor, Keswick (F. H. Day). Carlisle, hybernated examples in February (G. Wilkinson, E.M.M., xxxv., p. 83). Great Salkeld, April, 1900 (H. Britten).

Depressaria ciliella, Stt. In August, September and October. Hayton, Tarn Lodge (G.B.R.).

Depressaria pimpinellae, Zell. In September and October. Lake District of Cumberland (Stainton, Nat. Hist. Tineina, vi., p. 152).

Depressaria badiella, Hüb. Carlisle (F. H. Day). Great Salkeld, August, 1899 (H. Britten).

Depressaria heracliana, De Geer. In April, May, September and October. Not uncommon. Hayton, How Mill, Tarn Lodge (G.B.R.). Carlisle district (F. H. Day). Carlisle, in October (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld (H. Britten).

Gelechia ericetella, Hüb. Common on heaths in May and June. Hayton Moss, Gelt Wood (G.B.R.). Kingmoor, Durdar, Orton, Bolton Fell (F. H. Day). Carlisle among heather (G. Wilkinson, E.M.M., xxxv., p. 84). Dean (G.W., Ent. Rec., xix., p. 223).

Gelechia mulinella, Zell. In July. Carlisle, bred from furze (G. Wilkinson, E.M.M., xxxv., p. 84).

Gelechia sororculella, Hüb. Carlisle, in marshy meadows and heaths (G. Wilkinson, E.M.M., xxxiv., p. 87 ; xxxv., p. 84).

Gelechia longicornis, Curt. ; **virgella,** Thunb. Cumrew Fell, June 11th, 1912 (G.B.R.). Orton (F. H. Day). Carlisle district from amongst heather (G. Wilkinson, E.M.M., xxxv., p. 84).

Gelechia solutella, Zell. Uncommon. Cumrew Fell, June 11th, 1912, among heather (G.B.R.).

Bryotropha terrella, Hüb. Common in meadows in June and July. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle district (F. H. Day).

Bryotropha desertella, Dougl. Appears in July. Tarn Lodge, Hayton Moss, Seascale (G.B.R.). Common on the sandhills at Silloth (F. H. Day).

Bryotropha politella, Stt. In July. Hayton Moss, Sty Head Tarn (G.B.R.). Carlisle district, in marshy meadows and woods (G. Wilkinson, E.M.M., xxxiv., p. 87). Skiddaw, in great plenty (J. B. Hodgkinson, Ent. E. Intell., vi., p. 156).

Bryotropha senectella, Zell. Silloth (F. H. Day).

Bryotropha affinis, Dougl. Very common on a mossy wall on the road between Carlisle and Blackwell (F. H. Day, Victoria

History, p. 138). **Gelechia confinis,** Dougl. & Stt., seems to be a dark northern form, taken at Armathwaite by (J. B. Hodgkinson, Victoria History, p. 138).

Lita acuminatella, Sircom. In June. Hayton Moss (G.B.R.).

Lita viscariella, Stt. Carlisle district. Three specimens taken from a bed of nettles (G. Wilkinson, E.M.M., xxxiv., p. 87).

Lita aethiops, Westw. Common in May where the heather has been burnt. Tarn Lodge (G.B.R.). Cumrew Fell, Bowness Moss, Carlisle district, on open heaths, May 15th (G. Wilkinson, E.M.M., xxxiv., p. 87). Cumberland, Lake District (Stainton, Nat. Hist. Tineina, ix., p. 224).

Lita maculea, Haw. Occurs at Silloth (G. Wilkinson).

Lita fraternella, Dougl. Occurs in July and August. Tarn Lodge (G.B.R.). Carlisle (F. H. Day).

Lita junctella, Dougl. Hayton Moss, March 22nd, 1897 (G.B.R.).

Lita hubneri, Haw. Hayton Moss, July 6th, 1911 (G.B.R.).

Lita marmorea, Haw. Silloth (G. Wilkinson).

Teleia proximella, Hüb. Occurs in June, July and August. Tarn Lodge, Hayton Moss, Gelt Wood (G.B.R.). Kingmoor (G. Wilkinson).

Teleia notatella, Hüb. Carlisle, in marshy meadows and heaths (G. Wilkinson, E.M.M., xxxiv., p. 87).

Teleia vulgella, Hüb. Common at Sty Head Pass (G. Wilkinson).

Teleia scriptella, Hüb. Gelt Wood, July 16th, 1902 (G.B.R.).

Teleia dodocella, L. Carlisle district, among firs in the woods (G. Wilkinson, E.M.M., xxxiv., p. 87).

Teleia triparella, Zell. Anthorn, June 21st, 1902 (G. Wilkinson).

Nannodia stipella, Hüb. ; var. **naeviferella,** Dup. Carlisle (G. Wilkinson). Cumberland, Lake District (Stainton, Nat. Hist. Tineina, ix., p. 254). Only the var. **naeviferella** occurs in Britain.

Ergatis (Aristotelia) ericinella, Dup. Hayton Moss, August 14th, 1910 (G.B.R.). Orton (F. H. Day). Carlisle, on open heaths (G. Wilkinson, E.M.M., xxxiv., p. 87).

Monochroa (Aristotelia) tenebrella, Hüb. Cowran, June 10th, 1910 (G.B.R.). Anthorn, June 21st, 1902 (G. Wilkinson).

Anacampsis (Stomopteryx) anthyllidella, Hüb. Sty Head, July 3rd, 1900 (F. H. Day).

Tachyptilia (Anacampsis) populella, Clerck. Orton, Durdar (F. H. Day). Carlisle, July 26th (G. Wilkinson, E.M.M., xxxv., p. 34).

Brachycrossata (Acompsia) cinerella, Clerck. Occurs in June and July, common. Hayton, Hayton Moss, Tarn Lodge (G.B.R.). Carlisle district (G. Wilkinson, E.M.M., xxxv., p. 84).

Chelaria hubnerella, Don. ; **conscriptella,** Hub. In August and September, among old birches. Hayton Moss (G.B.R.). Orton (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Anarsia spartiella, Schrk. On commons and waste land. Newby Cross, Kingmoor (F. H. Day). Carlisle, on heaths among the woodlands (G. Wilkinson, E.M.M., xxxiv., p. 87).

Sophronia parenthesella, Haw. ; **semicostella,** Hüb. In July and August. Hayton Moss (G.B.R.).

Sophronia humerella, Schiff. One specimen near Carlisle (Victoria History, p. 138).

Pleurota bicostella, Clerck. Common on many of the heaths in June and July. Castlecarrock, Hayton Moss, Gelt Wood (G.B.R.). Orton, Kingmoor, Bolton Fell (F. H. Day). Bolton Fell, very common (G. Wilkinson, E.M.M., xxxiv., p. 86).

Dasycera sulphurella, F. Hayton Moss, May 30th, 1918. Wreay (F. H. Day, Ent. Rec., xi., p. 276). Great Salkeld, June 1st, 1901 (H. Britten).

Oecophora (Borkhausenia) minutella, L. Carlisle (F. H. Day).

Oecophora (Cataplectica) fulviguttella, Zell. ; **flavimaculella,** Stt. Common amongst *Umbelliferae*, Orton (F. H. Day). Carlisle. August 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Oecophora (Borkhausenia) subaquilea, Stt. Orton, one specimen (F.H.D., Victoria History, p. 138).

Oecophora (Borkhausenia) fuscesens, Haw. Occurs in July and August. Tarn Lodge (G.B.R.). Carlisle, in the town, but not common (G. Wilkinson, E.M.M., xxxiv., p. 87).

Oecophora (Borkhausenia) pseudospretella, Stt. In July, August, and September. Very common in the County.

Oecophora (Schiffermuelleria) trisignella, Zell.; **tripuncta,** Haw. Cummersdale, July 12th, 1900 (G. Wilkinson).

Endrosis fenestrella, Stt.; **lactella,** Schiff. Common in the County, both indoors and in the open.

Butalis (Scythris) grandipennis, Haw. Orton (G. Wilkinson). Carlisle, larva common on furze in May, feeding gregariously in webs (F. H. Day, Ent. Rec., xi., p. 194).

Butalis (Scythris) fusco-cuprea, Haw. Carlisle (G. Wilkinson).

Butalis fuscoaenea, Haw. Carlisle (F. H. Day). Cumberland (Meyrick, Brit. Lep., p. 686).

Amphisbatis incongruella, Stt. Cumberland (Meyrick's Brit. Lep., p. 669).

Pancalia lewenhoekella, L. Cumberland, taken in June (Humphrey & Westwood, Brit. Moths, ii., p. 216). Var. **latreillella,** Curt. Cumberland, in June (H. & W. Brit. Moths, ii., p. 216).

Acrolepia betulella, Curt. Cumberland, taken at the beginning of August (Humphrey & Westwood, Brit. Moths, ii., p. 248).

Glyphipteryx fuscoviridella, Haw. In May and June; common in meadows. Tarn Lodge, Hayton Moss, Fenton (G.B.R.). Orton, Kingmoor (F. H. Day). Wreay (G. Wilkinson, E.M.M., xxxv., p. 84). Dean (G.W., Ent. Rec., xix., p. 223).

Glyphipteryx thrasonella, Scop. Not uncommon in June. Hayton Moss (G.B.R.). Carlisle (F. H. Day).

Glyphipteryx haworthana, Steph. Cumberland, Lake District (Stainton, Nat. Hist. Tineina, xi., p. 250).

Glyphipteryx equitella, Scop. Cumberland, Lake District (Stainton, Nat. Hist. Tineina, xi., p. 260).

Glyphipteryx fischeriella, Zell. Tarn Lodge, June 3rd, 1910 (G.B.R.). Orton (F. H. Day and G. Wilkinson).

Perittia obscurepunctella, Stt. Not uncommon in woods. Orton, Wreay, Carlisle, May 7th (F. H. Day, Ent. Rec., xi., p. 193). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85).

Heliozela sericiella, Haw. Orton, May 24th, 1902 (G. Wilkinson).

Heliozela resplendella, Stt. Cumberland, Lake District (Stainton, Nat. Hist. Tineina, xi., p. 294).

Argyresthia ephippella, F. Tarn Lodge, August 9th, 1894 (G.B.R.). Carlisle (F. H. Day). Carlisle (G. Wilkinson,

E.M.M., xxxv., p. 84 ; Entom., xxxii., p. 190). Cumberland (Meyrick's Brit. Lep., p. 733).

Argyresthia nitidella, F. Abundant on hawthorn hedges in July and August. Tarn Lodge (G.B.R.). Kingmoor (F. H. Day). Great Salkeld (H. Britten).

Argyresthia semitestacella, Curt. Common. Kingmoor (F. H. Day). Orton, Carlisle August 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Argyresthia albistria, Haw. Carlisle (F. H. Day). Carlisle, August 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Argyresthia conjugella, Zell. In June. Tarn Lodge, Hayton Moss (G.B.R.). Orton, Wreay, Kingmoor (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Argyresthia semifusca, Haw. In July. Tarn Lodge, Hayton Moss (G.B.R.). Cumberland (Meyrick, Brit. Lep., p. 732).

Argyresthia retinella, Zell. In June and July. Tarn Lodge, Hayton Moss (G.B.R.). Orton (F. H. Day, Ent. Rec., xi., p. 277). Carlisle, from birch (G. Wilkinson, E.M.M., xxxv., p. 84).

Argyresthia curvella, Stt. ; **cornella,** F. In June and July. Tarn Lodge, Hayton Moss (G.B.R.).

Argyresthia sorbiella, Tr. Tarn Lodge, June 26th, 1911 (G.B.R.).

Argyresthia pygmaeella, Hüb. Common amongst sallows in July. Hayton Moss (G.B.R.). Durdar, Kingmoor (F. H. Day).

Argyresthia goedartella, L. Common in July and August. Tarn Lodge, Hayton Moss, Gelt Wood (G.B.R.). Cummersdale (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld (H. Britten).

Argyresthia brockeella, Hüb. Common in June and July. Hayton Moss, &c. (G.B.R.). Orton, Kingmoor (F. H. Day).

Cedestis farinatella, Dup. Orton, common amongst fir (G. Wilkinson, E.M.M., xxxiv., p. 87).

Ocnerostoma piniarella, Zell. Orton, Newby Cross (F. H. Day). Carlisle, common among fir (G. Wilkinson, E.M.M., xxxiv., p. 87).

Gracilaria alchimiella, Scop.; **swederella,** Thnb. Common in woods in June. Tarn Lodge, Hayton Moss, Gelt Wood, &c. (G.B.R.). Carlisle, Lazonby, Baron Wood, Kingmoor (F. H. Day).

Gracilaria stigmatella, F. Hayton Moss, September 25th, 1910 (G.B.R.). Burgh-by-Sands (Victoria History, p. 139).

Gracilaria stramineella, Stt.; **elongella,** L. Wreay (Victoria History, p. 139). Carlisle, varies much and into beautiful forms; not uncommon among birch in damp woods (G. Wilkinson, E.M.M., xxxiv., p. 87; xxxv., p. 85; Entom., xxxii., p. 190). Orton (F. H. Day). Great Salkeld, September 10th, 1899 (H. Britten).

Gracilaria semifascia, Haw. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Gracilaria tringipennella, Zell. Fenton, July 17th, 1910 (G.B.R.). Carlisle, not common (G. Wilkinson, E.M.M., xxxiv., p. 87).

Gracilaria syringella, F. Common in May, July and August. Tarn Lodge, &c. (G.B.R.). Carlisle (F. H. Day).

Coriscium (Acrocercops) brongniardellum, F. Cumberland (Meyrick's Brit. Lep., p. 784).

Coriscium cuculipennellum, Hüb. Cumberland (Meyrick's Brit. Lep. p. 790).

Ornix anglicella, Stt. Orton (F. H. Day).

Ornix betulae, Stt. In June. Tarn Lodge, Hayton Moss (G.B.R.)

Ornix torquillella, Zell. In June and July. Hayton Moss (G.B.R.). Durdar (F. H. Day).

Ornix scoticella, Stt. Carlisle district (Victoria History, p. 139).

Ornix loganella, Stt. In May and June. Tarn Lodge, Hayton Moss (G.B.R.). Orton (F. H. Day). Carlisle, common in woods (G. Wilkinson, E.M.M., xxxiv., p. 87).

Ornix guttea, Haw. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84; Entom., xxxii., p. 190).

Coleophora alcyonipennella, Koll. Workington, larval cases found May 16th on *Centaurea nigra* (Knapweed) (G. Wilkinson, Ent. Rec., xix., p. 212).

Coleophora melilotella, Scott.; **frischella,** L. Wreay, May 30th, 1903 (G. Wilkinson).

Coleophora pyrrhulipennella, Zell. Common on heaths. Orton, Kingmoor, Durdar, Bowness Moss (F. H. Day). Carlisle, cases taken by sweeping heath, May 1st (G. Wilkinson, E.M.M., xxxv., p. 84).

Coleophora albicosta, Haw. Carlisle, from furze, May 15th (G. Wilkinson, E.M.M., xxxv., p. 84).

Coleophora currucipennella, Zell. Carlisle (G. Wilkinson).

Coleophora discordella, Zell. Cases found May 15th on *Lotus corniculatus*, at Workington (G. Wilkinson, Ent. Rec., xix., p. 212 ; E.M.M., xliii., p. 186 ; Entom., xl., p. 190).

Coleophora genistae, Stt. Carlisle, bred May 23rd (G. Wilkinson, E.M.M., xxxv., p. 84). Larva on *Genista anglica* (Petty Whin) at Kingmoor (G. Wilkinson, E.M.M., xxxiv., p. 188 ; Entom., xxxi., p. 174).

Coleophora caespititiella, Zell. Common amongst rushes. Hayton Moss, June 7th, 1911 (G.B.R.). Carlisle district, Kingmoor, &c., (F. H. Day). Carlisle, cases swarmed wherever the common rushes were growing in January (G. Wilkinson, E.M.M., xxxv., p. 83).

Coleophora apicella, Stt. ; **lineolea,** Haw. Tarn Lodge, June 28th, 1912 ; Hayton Moss, June 16th, 1912 (G.B.R.).

Coleophora laricella, Hüb. Common on larch trees. Orton, Thirlmere, Latrigg (F. H. Day). Carlisle (Ent. Rec., viii., p. 172).

Coleophora fuscedinella, Zell. Kingmoor, Orton, Durdar, &c. (F. H. Day). Carlisle (Ent. Rec., viii., p. 172 ; E.M.M., xxxii., p. 215).

Coleophora gryphipennella, Bouche. Upperby (F. H. Day). Workington, cases from rose in March, Carlisle (G. Wilkinson, Ent. Rec., xix., p. 212).

Coleophora olivaceella, Stt. Armathwaite, near Carlisle, cases attached to the trunk of trees above *Stellaria holostea*, larvae feed up in the autumn, and retire to tree trunks for refuge during the winter " (J. H. Threlfall, Entom., xiv., p. 136). " Larvae found in June, 1886, at Armathwaite " (J. B. Hodgkinson, Entom., xix., p. 245).

Coleophora lutipennella, Zell. Hayton Moss, July 12th, 1911 (G.B.R.).

Coleophora limosipennella, Dup. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84 ; Entom., xxxii., p. 190).

Batrachedra praeangusta, Haw. Locally common. Orton, Cummersdale (F. H. Day). Carlisle, in profusion upon two sallow trees, sitting amongst the lichen on their trunks (G. Wilkinson, E.M.M., xxxiv., p. 87 ; xxxv., p. 84).

Laverna (Mompha) lacteella, Steph. Carlisle (F. H. Day). Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Laverna (Mompha) epilobiella, Schrk. ; **fulvescens,** Haw. Kingmoor, 1900 (G. Wilkinson). Cumberland, Lake District (Stainton, Nat. Hist. Tineina, xi., p. 188).

Laverna atra, Haw. ; **hellerella,** Dup. Carlisle district (F. H. Day). Carlisle, common in hedges (G. Wilkinson, E.M.M., xxxiv., p. 87).

Chrysoclista (Mompha) schrankella, Hüb. Hayton Moss, June, 1903 (G.B.R.).

Chrysoclista aurifrontella, Hüb. Carlisle District (F. H. Day).

Anybia langiella, Hüb. ; **epilobiella,** Roem. Cumberland (Meyrick's Brit. Lep., p. 653).

Elachista gleichenella, F. Cumberland, Lake District (Stainton, Nat. Hist. Tineina, iii., p. 192).

Elachista magnificella, Tgstr. Hayton district (Mrs. M. G. Routledge). Great Corby, larvae on *Luzula* (J. B. Hodgkinson, Ent. Rec., ii., p. 62).

Elachista apicipunctella, Stt. Carlisle, common in damp woods (G. Wilkinson, E.M.M., xxxiv., p. 87). Orton, June 7th, 1902 (G. Wilkinson).

Elachista albifrontella, Hüb. In June and July. Tarn Lodge, Hayton Moss (G.B.R.). Carlisle district, Kingmoor, &c. (F. H. Day).

Elachista atricomella, Stt. Carlisle, in damp woods (G. Wilkinson, E.M.M., xxxiv., p. 87).

Elachista luticomella, Zell. ; **flavicomella,** Stt. Tarn Lodge, July 20th, 1903 (G.B.R.). Carlisle, August 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Elachista kilmunella, Stt. Hayton Moss, June 26th, 1910 (G.B.R.). Sty Head, July 2nd, 1900 (G. Wilkinson).

Elachista cinereopunctella, Haw. Lake District of Cumberland (Stainton, Nat. Hist. Tineina, iii., p. 182).

Elachista trapeziella, Stt. In June. Great Corby (J. B. Hodgkinson, Ent. Rec., ii., p. 62).

Elachista nigrella, Haw. Lazonby, &c. (Victoria History, p. 139).

Elachista humilis, Zell. ; **obscurella,** Stt. Easby, near Brampton, May 28th, 1910 (G.B.R.). Carlisle (Victoria History, p. 139).

Elachista zonariella, Tgstr. Carlisle, in damp woods (G. Wilkinson, E.M.M., xxxiv., p. 87).

Elachista rhynchosporella, Stt. ; **albidella,** Tgstr. Lazonby (Victoria History, p. 139).

Elachista eleochariella, Stt. Hayton Moss, June 26th, 1910 (G.B.R.).

Elachista biatomella, Stt. Carlisle (F. H. Day).

Elachista rufocinerea, Haw. Very common in May. Tarn Lodge, Newton Reigny Moss (G.B.R.). Carlisle (F. H. Day, Ent. Rec., xi., p. 193). Kingmoor, Keswick (F.H.D.). Workington (G. Wilkinson, Ent. Rec., xix., p. 212).

Elachista subalbidella, Schl. ; **ochreella,** Stt. Tarn Lodge, in June (G.B.R.).

Elachista argentella, Clerck. ; **cygnipennella,** Hüb. Tarn Lodge, Hayton Moss (G.B.R.). Kingmoor (F. H. Day). Carlisle (G. Wilkinson, Ent. Rec., xix., p. 212). Little Salkeld, in June (H. Britten).

Tischeria complanella, Hüb. Not uncommon, in June. Hayton Moss (G.B.R.). Orton (F. H. Day).

Lithocolletis roboris, Zell. Cockermouth, April 27th, 1856 (C. S. Gregson, Ent. W. Intell., i., p. 44).

Lithocolletis amyotella, Dup. Carlisle District (G. Wilkinson).

Lithocolletis irradiella, Stt. ; **lautella,** Zell. Common on oak. Kingmoor (F. H. Day). Carlisle, bred (G. Wilkinson, E.M.M., xxxv., p. 83).

Lithocolletis pomifoliella, Zell. ; **blancardella,** F. Tarn Lodge, May, 1911 (G.B.R.). Orton (F. H. Day). Flimby, amongst hawthorn (G. Wilkinson, Ent. Rec., xix., p. 212).

Lithocolletis coryli, Nic. Cumberland, Lake District (Stainton, Nat. Hist. Tineina, ii., p. 114).

Lithocolletis faginella, Zell. ; **triguttella,** Stt. Bunker's Hill, near Carlisle (F. H. Day). Workington from beech (G. Wilkinson, Ent. Rec., xix., p. 212).

Lithocolletis ulmifoliella, Hüb. Gelt Wood (F. H. Day).

Lithocolletis, spinolella, Dup. Kingmoor, on sallow (Victoria History, p. 139).

Lithocolletis quercifoliella, Zell. Fenton, May, 1911 (G.B.R.). Orton (F. H. Day). Carlisle, bred (G. Wilkinson, E.M.M., xxxv., p. 83).

Lithocolletis messaniella, Zell. Upperby, on beech (Victoria History, p. 139).

Lithocolletis corylifoliella, Haw. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Lithocolletis viminiella, Stt. Carlisle, August 8th (G. Wilkinson, E.M.M., xxxv., p. 84).

Lithocolletis alnifoliella, Dup. ; **alniella,** Zell. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 84).

Lithocolletis heegeriella, Zell. Common in Carlisle district (F. H. Day). Carlisle, bred (G. Wilkinson, E.M.M., xxxv., p. 83).

Lithocolletis cramerella, F. Common on oak. Fenton, May 11th (G.B.R.). Carlisle district (F. H. Day). Carlisle, bred (G. Wilkinson, E.M.M., xxxv., p. 83).

Lithocolletis emberizipennella, Bouche. Orton, July 7th, 1902 (G. Wilkinson). Cumberland, Lake District (Stainton, Nat. Hist. Tineina, ii., p. 308).

Lithocolletis tristrigella, Haw. Orton (Victoria History, p. 139).

Lithocolletis trifasciella, Haw. Cumberland, Lake District (Stainton, Nat. Hist. Tineina, ii., p. 292).

Lyonetia clerkella, L. **clerckella,** Tr. Great Salkeld, specimens bred September, 1913 (G.B.R.). Grinsdale, July, 1900 (G. Wilkinson).

Cemiostoma (Leucoptera) spartifoliella, Hüb. Common on broom. Durdar, Kingmoor, Orton (F.H.D., Ent. Rec., xi., p. 194). Carlisle, pupae from broom, July 11th (G. Wilkinson, E.M.M., xxxv., p. 84).

Cemiostoma (Leucoptera) laburnella, Stt. Common amongst Laburnums. Tarn Lodge, May (G.B.R.). Bunker's Hill, Wetheral, Dalston (F. H. Day). Carlisle, in pupae state,

July 11th, from Laburnum (G. Wilkinson, E.M.M., xxxv., p. 84). Great Salkeld, September 14th, 1899 (H. Britten). Stanwix (P.A. & D.A.J. Buxton, Ent. Rec., xxii., p. 71).

Cemiostoma (Leucoptera) scitella, Zell. Durdar and Belle Vue, near Carlisle (Victoria History, p. 140).

Opostega salaciella, Tr. Tarn Lodge, July 11th (G.B.R.). Sty Head, July 3rd, 1900 (G. Wilkinson).

Opostega crepusculella, Zell. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85). Near Cummersdale (Victoria History, p. 140).

Bucculatrix nigricomella, Zell. ; var. **aurimaculella,** Stt. Lake District of Cumberland (Stainton, Nat. Hist. Tineina, vii., p. 28). Cumberland (Meyrick, Brit. Lep., p. 814).

Bucculatrix cidarella, Zell. Lake District of Cumberland (Stainton, Nat. Hist. Tineina, vii., p. 42). Cumberland (Meyrick's Brit. Lep., p. 816).

Nepticula atricapitella, Haw. Carlisle (Victoria History, p. 140).

Nepticula anomalella, Goze. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85).

Nepticula floslactella, Haw. Carlisle (Victoria History, p. 140).

Nepticula subbimaculella, Haw. Orton, June 14th, 1902 (G. Wilkinson).

Nepticula salicis, Stt. Carlisle, amongst sallow, May 1st (G. Wilkinson, E.M.M., xxxv., p. 84 ; Entom., xxxii., p. 190).

Nepticula argentipedella, Zell. Carlisle (G. Wilkinson, E.M.M., xxxiv., p. 87 ; Entom., xxxii., p. 190).

Nepticula angulifasciella, Stt. Carlisle (G. Wilkinson, E.M.M., xxxv., p. 85).

Nepticula aeneofasciella, H—S. Carlisle (G. Wilkinson, E.M.M., xxxiv., p. 87 ; Entom., xxxii., p. 190).

Nepticula aurella, F., Stt. Workington, in mines from bramble (G. Wilkinson, Ent. Rec., xix., p. 212).

ADDENDA TO PART II.

Additional Information.

Porthesia similis, Fues.; **auriflua,** F. Six specimens were taken at Drigg on the South-West Coast of Cumberland, between July 8th and July 24th, 1921 (F. H. Day, Entom., liv., September, 1921, p. 219).

Calocampa vetusta, Hb. One specimen, Tarn Lodge, October 6th, 1926 (G.B.R.), also one specimen Nov. 13th, 1928.

New to Cumberland List.

Hydroecia crinanensis, Burrows. Taken by the Rev. H. D. Ford, near Carlisle. This species was first discovered in Scotland near the Crinan Canal, and was added to the British list in 1908 as new to science.

Plusia moneta, F. One specimen at light at Alston, August 15th, 1926. George Bolam (Entom., lx., p. 102). Presented to Carlisle Museum.

SUMMARY OF CUMBERLAND LEPIDOPTERA.

	No. of Species.	
	In Britain.	*In Cumberland*
Rhopalocera	68	43
Sphinges (Hawk Moths)	17	14
Sesiidae (Clear Wings)	15	6
Xygaenidae (Burnets and Foresters)	10	4
Bombyces, Hepialus, Prominents, &c.	105	57
Noctuae and Thyatiridae	344	214
Geometridae	280	204
Pyralidae, Pterophoridae, &c.	196	63
Tortrices	348	155
Tineina, including **Psychidae**	767	242
	2150	1002

SOME NOTES ON THE MINERALS OF CALDBECK FELLS.

By F. H. Day, Jun., B.Sc.

(*Read March* 13*th*, 1924, *Revised September* 30*th*, 1927).

It is now over thirteen years since a paper on a mineralogical subject appeared in these Transactions. In Vol. II., Mr. J. W. Branston gave, in his paper "The Minerals of Cumberland," a general account of the more important and interesting of the minerals occurring in our county. Since that date, however, any published work on the subject has appeared elsewhere. This is no doubt due to the fact that, as far as I am aware, there has been no active mineralogist resident in the district. At the present time very much the same state of affairs may be said to exist. The Caldbeck Fells have locally the popular reputation of being quite fabulously rich in minerals, but, although some of the mines are themselves actually visible from Carlisle itself, little interest appears to be taken in them, and I much regret that during the last five years I have never had the opportunity of comparing notes with any local worker. Bearing in mind this apparent apathy, I have therefore tried, as far as possible, to put forward these notes in such a way that they may be of interest to the general reader, and have avoided anything in the nature of a compendium of localities. Instead, I have dealt separately with the various mines, and have also given a few short, historical notes.

In order to familiarise the reader with the general conditions existing in the area under consideration, a brief outline of the geography and geology of the district will perhaps not be out of place. For the purpose of this paper, the Caldbeck Fells may be taken to include the area immediately south of Caldbeck and

north of Skiddaw Forest, the Caldbeck—Troutbeck road forming the eastern boundary, and the western extremity being in the neighbourhood of Braefell, and the high ground to the south of it. The whole of this area is mountainous, and a considerable portion of it has an altitude which exceeds 1,500 feet. The vegetation is usually very sparse, with an almost complete absence of trees. The general outline of the fells is also rather tame, so that, on the whole, the scenery of the area is not very pleasing. The most striking feature is the rocky mass of Carrock Fell, on the eastern side, with its curious angular shape, which makes it easily visible all over the low country in the Carlisle plain. Carrock Fell joins by a long ridge of high ground to the central mountainous mass of the fells, the chief eminences of which are High Pike, Great Lingy and Knott, the last (2,329 feet) being the highest point in the area. To the mineralogist, the most interesting feature is the number of deep valleys and smaller "gills," which radiate from the central part of the mass. On the south side there are several tributaries of the River Caldew, which penetrate into the highest part of the fells about Knott. These are Wiley Gill, Burdle Gill and Grainsgill with its two branches, Arm o' Grain and Brandygill. Passing round to the north side of Carrock, we find another drainage area in which the small becks of Dry Gill and Driggeth unite to form Carrock Beck.

On the eastern side of the fells there are fewer streams, the only ones of note being Potts Gill, north of High Pike, and a small beck which flows out of Sandbeds. The remaining streams fall into what we may call the Roughten Gill drainage area. Immediately south of Fellside, the Dale Beck, or "Howk," has a well formed valley cutting deeply into the hills, and showing distinct evidences of glaciation. On the eastern side its first tributary of importance is Hay Gill, whose branches, called Long Grain and Short Grain, run up into High Pike. Higher up is a small valley called Birk Gill, and at the head of the valley are Clints Gill, Roughten Gill itself, with "Thief Gills," and Silver Gill. On the western side of the main valley there is Swinburn Gill, with its small offshoot, Red Gill.

The geology of the Caldbeck Fells is of great interest, and directly and indirectly has formed the subject of numerous scientific papers and memoirs. Only a very brief outline will be given here. The southern portion of the mountain mass comes into the Skiddaw Slate Series. These rocks may be seen exposed in Burdle and Wiley Gills and at the head of Swinburn Gill. In no case are they anything like the black slate of Skiddaw and Saddleback, but approximate more to the gray, flaggy types. At the junction of Grainsgill and the Caldew is an outcrop of Skiddaw granite, modified in its northern portion to the peculiar acid rock called griesen. In the neighbourhood of the Caldew valley and Grainsgill the Skiddaw grits are in a highly metamorphosed condition. Immediately to the north of the Skiddaw Slates comes the extensive group of rocks which constitutes the varied intrusive masses of Carrock Fell. These rocks comprising the well-known granophyre, gabbro and diabase in their various modifications, may be regarded as making up the backbone of the mountain mass, for the axis of the highest land practically coincides with the axis of these rocks. The northern portion of the Fells is made up of volcanic rocks belonging to the Eycott Hill group of the Borrowdale series. In Dry Gill is the well known exposure of fossiliferous shales of Carodocian age. The older rocks are surrounded by an outer belt of carboniferous rocks, into which none of the mineral veins are known to penetrate. On the other hand veins occur in all of the older rocks, and it thus seems reasonable to suppose that they are at any rate of Pre-Carboniferous age. The igneous rocks are generally regarded as belonging to the newer suite of Lake District rocks, and, therefore, probably of Devonian age, and it seems likely that the veins are of this age also.

In most cases there are no very good exposures either of rocks or veins on the upper ground ; it is when the rocks have been excavated by the streams that their mineral contents are made visible, and thus nearly all the interesting localities for minerals are in one or other of the numerous " gills," which have been described above. Therefore in giving an account of the mines and minerals, I shall consider in order each of the " gills "

above referred to, commencing with the two in the Skiddaw Slates—Wiley Gill and Burdle Gill. In both of these gills the general conditions are much the same, and their veins run in about the same direction, and are probably associated with each other. No real mining operations have been conducted at either place, and on the whole their mineralogy is not of great interest. The veins are much weathered at the surface, and are principally filled with red ferruginous "rider." In Burdle Gill there is a central rib of manganese ore, and this is also found to some extent at Wiley Gill and at Knott. The ore is an impure form of pyrolusite with much admixed quartz. I have obtained also some psilomelane, showing the well-known botryoidal structure. A little barytes also occurs, together with crystallised quartz. According to Goodchild, the mineral pharmacosiderite, an arsenate of iron, occurs in the ferruginous rider in Burdle Gill. I have searched several times without success, but there is a specimen stated as being from this locality in the South Kensington collection. I might here mention some outcrops at the head of Brandy Gill and Arm o' Grain Gill, which have the same general appearance as those at Burdle Gill, and which also contain some impure pyrolusite or psilomelane, but no other minerals of interest. These outcrops also may be perhaps associated with the Burdle and Wiley Gill veins.

We now come to what is perhaps the most interesting of all the localities in the fells, that is to say, to the group of veins which are exposed in Grainsgill, Brandy Gill, and their immediate vicinity. The chief geological features here are the modified Skiddaw granite called griesen, the metamorphosed Skiddaw slate rocks surrounding it and a dark basic gabbro, exposed near by on the southern flank of Carrock Fell. The various veins penetrate all of these rocks, but their connection with the griesen is undoubtedly the most intimate. There are three or four strong veins exposed here, and one of them is upwards of four feet wide, so that it is likely that prospecting miners were attracted to the spot in very early times. It is on record that the first mining adventurer in the Caldbeck Fells was Lord Wharton, in the sixteenth century, but no details as to the extent

of his operations seem to be available, except that the locality was Brandy Gill. It is not till quite recent times that we find any record of mining operations here, and it seems probable that no real mining was done until the place was opened out about 1854 by John Emmerson. Jonathan Otley, the old geologist, in one of his letters to Professor Sedgwick, briefly mentions the occurrence; he says, referring to a Mr. C. H. Wright:—

"He is living chiefly at Swineside, engaged by a Mr. Emmerson in superintending about thirty workmen driving levels into the mountain on the north of the River Caldew. The chief product, I believe, is Wolfram. They have met with a little lead and copper, but little of anything is yet brought to market."

These workings on the large "Emmerson vein" do not appear to have been productive, and were abandoned in a short time. I believe I am correct in stating that the large water wheel erected at the mine was eventually transferred to the Bobbin Mill at Caldbeck, where it still remains. The mine appears to have been neglected for a long time, and probably very little was done until it was taken up by a company some years before the war, and worked for tungsten ores. During the war, when the demand for tungsten was great, this mine was in its greatest state of activity. Since then the plant has been removed, and there does not appear to be any prospect of mining on a large scale being carried on in the near future.

The principal veins of Brandy Gill and its vicinity are essentially quartz veins carrying, as a rule, small amounts of a number of metalliferous minerals. A large amount of the quartz is of the compact, milky variety common in most mines, but where cavities or "lough holes" occur in the veins, it is often well crystallized. Fairly well formed crystals, over six inches long, are not uncommon, and one which I procured for the Carlisle Museum was about fourteen inches in length, and nearly twenty pounds in weight. These large crystals are invariably opaque, and usually much tarnished with iron oxide. Small crystals, which are fairly transparent, can sometimes be found, but there is a notable absence of clear rock crystal both

here and elsewhere in the Caldbeck Fells. It is of interest to note that quartz crystals in Brandy Gill often show well developed prism faces ; while those in other parts of the fells usually consist of clusters of pyramids only. The presence of quartz is to be expected in veins passing through a highly siliceous rock like griesen, and similarly mica, the other constituent of the rock, occurs also in the veins. The mica is muscovite, and it occurs generally lining the walls of the vein, where it is attached to the surrounding rock. The crystals are usually very small, and occasionally show a definite hexagonal cross section.

Occurring in much the same way as the mica is a thin layer of glittering flakes of molybdenite, just along the junction of the veinstone and the griesen. Larger flakes of this mineral often occur disseminated through the mass of the vein.

Perhaps the most sought for mineral at Brandy Gill is tetradymite, a telluride of bismuth, and small specks and spangles of it are quite common, though large masses with a well-crystallized form are rare. The sulphide bismuthine and the native metal also occur, but I do not think either is as common as the telluride. The most abundant metallic minerals are wolfram and mispickel, both of which often occur in quite large masses, not as a rule exhibiting any well marked crystalline form. Wolfram is the black, shining tungstate of iron and manganese, and it is not infrequently accompanied by the calcium tungstate scheelite, which is generally quite well crystallized, the crystals being a light yellowish brown colour. The scheelite occurred in sufficiently large amounts to be worked along with the wolfram. Small amounts of tungsten oxide, formed by decomposition of the wolfram, are also found in the form of yellowish incrustations.

The arsenical pyrites, or mispickel, usually associated in semi-granular masses, with more or less ordinary pyrites, is a tin white metallic-looking mineral, which was worked to a small extent in conjunction with the separation of the tungsten ores for the sake of its arsenic content. In some parts of the vein this mineral has undergone partial oxidation, and has been

converted into the interesting greenish mineral scorodite, an arsenate of iron. Below is an analysis of this mineral which I carried out :—

Water	13.8
Gangue	15.15
Iron oxide	29.48
Arsenic oxide	41.64

There is a portion of the vein exposed a short distance below Brandy Gill waterfall, which is particularly rich in this mineral. Another mineral of interest which occurs quite commonly in the veins, and generally close to the wall of the vein, is the phosphate and fluoride of calcium called apatite. This occurs in small but well-formed crystals, pale green in colour in most cases, but sometimes yellowish and even almost colourless. Corundum is also a mineral which has occurred in the neighbourhood of Brandy Gill, though I have not personally come across it. There is a small vein running across Poddy Gill, which yields quite nice specimens of the mineral schorl, a variety of tourmaline.

All the above-mentioned minerals are very characteristic of the Brandy Gill area, and it is interesting to note that several of them—notably the apatite, molybdenite and tourmaline, are typical pneumatolytic minerals, that is to say, substances deposited by the agency of vapours. An examination of the veins themselves, and the intimate way in which they are united to the surrounding griesen, certainly suggests that their origin is closely connected with that of the igneous rock itself, and that they were probably formed during the later stages of the cooling down of the rock magma from which the Skiddaw granite and griesen originated. If this is the case, a study of these veins, where they pass through the surrounding rocks of Carrock Fell, might be of some assistance in determining the age of these relative to the Skiddaw granite.

In addition to the minerals mentioned above, a number of others also occur which are, however, to be found in most parts of the area, for instance, galena, barytes, calcite and blende, but are of more interest in connection with some of the other veins.

It is interesting to note that a small lead-bearing vein crosses the various Brandy Gill veins at right angles, and that the mineral wulfenite occurs sparingly in the various veins, probably as a result of interaction between the molybdenite they contain, and some lead compounds derived from this or other similar veins. The veins of Brandy Gill can be traced for some distance up the stream, but they are eventually lost under the peaty ground, which caps the higher part of the fell, and I do not think they can be regarded as having been proved for any greater distance.

Leaving now this very prolific ground, we must pass right round the base of Carrock Fell to its eastern side before any mineral outcrops of interest are encountered. Here will be found the relics of the old mine of Carrock End. These workings are on a copper-bearing vein, which can be traced round as far as Dry Gill Beck, where it is well exposed. It seems probable that these workings are those of which there is an old record, dated 3rd October, 1794, as follows :—

"A large copper vein had been discovered on the north side of Carrock mountain. Trials had formerly been made at several places. It is five feet wide, and the copper worth £30—£40 per ton. It is supposed that two workmen got £80 worth one afternoon last week. The present lessees are William Rowe & Co., of Liverpool. We have since heard that this vein has not turned out as well as was expected."

It seems hard to believe that the vein was really as rich as is suggested here, but from an examination of the old heaps, it is at any rate evident that the ore, copper pyrites, was of good quality.

A specimen, according to my analysis, contained :—

Copper	30.18
Iron	31.05
Sulphur	30.19

The vein contains a good deal of soft, clayey matter, with but little hard quartz, and the copper ore appears to be the only metallic mineral of any importance.

We now come to the interesting veins which are well exposed round about the head of Dry Gill. These veins consist principally of quartz, and as they are harder than the country rock, which consists for the most part of the soft Dry Gill Shales, they frequently stand out prominently on the hillside. The primary minerals in the veins have evidently been galena and some manganese ore, and there is also a little barytes, but the lead now exists chiefly in the form of the arsenate called mimetite or campylite, a mineral of quite rare occurrence elsewhere, so that Dry Gill is a well-known hunting ground for mineralogists. These veins were formerly worked to a small extent for the sake of their lead, probably about the same time as Driggeth was being also worked, and it was at this time that the best specimens of mimetite were obtained. Quite good hand specimens can, however, still be got by searching over the old mine refuse, and even of the vein itself in situ, but these are usually small and spoilt by weathering. The mimetite usually occurs on quartz associated with the manganese ore psilomelane and frequently some barytes, and its shining barrel-shaped crystals are very characteristic. I think it can be definitely said that Dry Gill is the only locality in the fells where it occurs. Crossing over now to the south-eastern part of High Pike, we come to an area which has been, generally speaking, much more productive to the miner than any of the foregoing. It embraces two mines which, as they have been driven on the same set of veins, may well be considered together. These are Driggeth, in the valley of Carrock Beck, and Sandbeds, a little further north. The mine at Driggeth appears to have been first opened out by a Mr. Rowe, evidently with a certain amount of success, as a level was driven for a distance of 25 fathoms, and a smelt mill erected, traces of which still exist. An old record, dated 1794, runs as follows :—

"William Rowe, Esq., is said lately to have discovered, on the south side of High Pike, a rich vein of lead ore, which at about three feet below the surface runs for at least a mile 18 ins. thick, and even seems to increase. Levels are now driving, and a smelt mill erecting, and if these works succeed, as there is reason to hope they may, it will be a very great encouragement for new attempts on the copper mines at Hay Gill."

A few years later work must have ceased, but the mine was reopened again in 1810, and worked for some years by Messrs. Richards and Lowry and others. Lead ore was raised at the rate of about two hundred tons per annum, and as some of this lead contained up to 62 ozs. of silver per ton, the mine must have been profitable. It gave employment at this time to from thirty to forty miners. The mine changed hands in 1822, and for the next twelve years appears to have been worked at a loss. In 1834-49 it was run by a John Barrett, and then from 1849 by Messrs. Brocklebank and Jeffrey, who in the course of eight years raised 1,950 tons of ore (lead and copper), and employed thirty-five men and fifteen boys.

The returns for this mine for the year 1858 are as follows :—

Lead Ore	241	tons
Silver	3,300	ozs.
Copper	8	tons

After this time there was a dwindling in the activity of the mines generally, but both Driggeth and Sandbeds were being worked on and off until within twenty years ago. Sandbeds has been fairly extensively developed, but has not been worked since about 1906. Last summer (1926), I had the opportunity of seeing some work of a prospecting nature being carried out in one of the upper levels. Very little mining was actually done, but in the course of a few days, two men had been able to extract several hundredweights of lead ore, which at least shows that the mines are by no means exhausted. The veins of Driggeth and Sandbeds contain galena and zinc in about equal amounts, but as the blende is usually associated with barytes, it cannot be profitably extracted, and no doubt many tons of zinc ore lie for this reason unreclaimed on the dump heaps. The copper occurs mostly in the upper part of the mine chiefly as chalcopyrite, but small amounts of malachite occur, and the copper and lead and zinc are often intermingled and decomposed. A specimen of a dull, blackish mineral from this locality, which I analysed, had the following composition :—

Zinc	64.02
Copper	3.6
Sulphur	10.42
Iron	2.46

which suggests that it is a mixture of partially oxidised zinc and copper sulphides. Decomposition products of lead are not very common, but small amounts of pyromorphite occur. A pale blue coating, consisting, I believe, of calamine or carbonate of zinc may also be found in small amounts. Some of the veins contain considerable amounts of barytes, and as we proceed north round the face of High Pike, barytes becomes the dominant mineral, and at Potts Gill, where what is probably an extension of these veins crops out, it has been mined fairly successfully for a number of years. Considering this group of veins as a whole, it can be said that generally speaking there is an absence of notable amounts of secondary minerals—a fact which distinguishes them from the numerous veins of the Roughten Gill area.

We now reach the numerous veins which crop out in the western portion of the fells. These veins have yielded copper, lead and zinc ores in considerable amounts, but in addition they are characterised by the remarkable number of complex secondary minerals, which have been produced by decomposition of the primary sulphides. Historically, these mines are also interesting, as it appears they were first worked by the German miners, who settled in Keswick in the reign of Queen Elizabeth. The names of the various workings are on record, but they cannot be identified with any of the present mines, but it is generally supposed that the " old men " carried out operations at Roughten Gill, Hay Gill and Red Gill. Mining was carried on by Germans in 1566 and 1568, and at this time the ore, when raised, was apparently taken over the fells to Keswick, where in those days a smelting mill was in operation. It does not appear that much more was done at Roughten Gill until the beginning of the last century, when in 1822, and for eight years, work was being done by a company of miners. In 1830, a Mr. J. Dickinson, of Alston, purchased one-quarter of the shares, and drove another level for a distance of three hundred fathoms. At this time the mine was in a flourishing condition. About four hundred tons of ore per annum were being raised, and a profit of £9,000 was realised during the years 1835-45. In 1860, the mine was being worked by seventy men and boys. Five hundred to six hundred

tons of ore per annum were being raised, and levels had been driven to a length of half-a-mile and a depth of one hundred fathoms. The returns for 1858 were as follows :—

Lead Ore.	Silver.	Copper.
507 tons 4 cwts.	10,140 ozs.	45 tons 1 cwt.

After this time the activity of the mine began to fall off, and it was worked very little after 1880, except for barytes and umber, and then only in a small way. It is probable that both Hay Gill, Red Gill and Silver Gill were worked conjointly with Roughten Gill, but to a much less extent. In more recent years operations on a small scale were being carried out at Red Gill. At the present time none of these mines are being worked, and there does not appear to be any prospect of mining being taken up again in this part of the fells. Considering now the various mines in more detail, and commencing with Hay Gill, a level has been driven at this place for some distance on the vein which was a copper-bearing vein. The ore would no doubt be chiefly chalcopyrite, but also perhaps some "cupreous manganese," a variety of psilomelane containing some copper which is not uncommon here. Except for the open level, there is little evidence of the extent of the old workings. Coming now to Roughten Gill itself, the mines were worked on several veins, but the most prolific were those running in an east and west direction. Levels have been driven low down at the base of the hill, and also at Thief Gills. The quartz in the vein is milky white and mostly massive, but also occurs crystallised. In one of the veins, which crops out high up in Iron Crags, I came across a pocket lined with well-grown pyramids upwards of three inches wide, but apart from this, I have not noticed any large crystals such as are found at Brandy Gill. A considerable amount of chalcedony occurs mixed with ordinary crystalline quartz in Roughten Gill, but not in Red Gill. Dolomite is rather abundant and often dark coloured. Barytes occurs, but not so abundantly as at Driggeth. The primary metallic minerals which occur in notable amounts are galena, zinc blende and chalcopyrite. The zinc appears never to have been worked, the only ores extracted being those of lead and copper. The

most interesting feature of Roughten Gill, however, is the number of secondary minerals derived from the above, and it will be interesting to consider each of them in turn. The lead ore has given rise, partly by oxidation, and partly, perhaps, by action of mineral solutions in the vein, firstly to anglesite, the sulphate. This, however, is rare. The carbonate cerussite has been also formed, and small specimens are not difficult to come across, but by far the most abundant mineral of this class is pyromorphite, the phosphate and chloride of lead, which often occurs beautifully crystallised, and was actually mined and smelted as an ore of lead. Good hand specimens of this mineral can still be obtained on the dump heaps. Exactly how the pyromorphite has been formed is not quite clear, but as the surrounding rock Carrock Fell gabbro contains appreciable amounts of the phosphate apatite, it is at any rate conceivable that phosphate bearing solutions from this source have acted on the galena, and converted it into pyromorphite. It is often possible to find masses of granular pyromorphite, which on breaking are found to contain a kernel of unchanged galena. In the case of copper, an even greater variety of secondary products has been formed. In the first place by oxidation the sulphate brochantite has been formed. This, however, is rare. Equally rare is the complex sulphate and carbonate caledonite and more common, especially at Red Gill, the beautiful blue mineral, linarite, a complex carbonate and sulphate of copper and lead. The carbonate of copper, malachite, is quite common ; sometimes in good, though small crystals. The silicate of copper, chrysocolla, is also quite common in small amounts, both at Red Gill and Roughten Gill. Finally by complete oxidation to the oxide, small amounts of the black mineral, tenorite or melaconite, have been formed.

Coming now to zinc, this has given rise firstly, to its carbonate calamine in small amounts, as a powder blue incrustation or coating. With copper there is the double carbonate aurichalcite, which, however, is rare, occuring in the form of pale green crystals or coatings. Another rather rare mineral which, however, must have been fairly abundant at Roughten Gill, is the silicate of zinc hemimorphite. This is rather a pretty mineral,

which, owing to a trace of copper, has usually a sky blue colour. I recently came across some nice specimens of this mineral on the old heaps. In addition to these minerals, manganese occurs as psilomelane, and iron as umber, and there are a few other minerals of less interest. At Red Gill, the conditions are very similar to those at Roughten Gill, but the various minerals in the veins are very much mixed up in small quantities. I have, for instance, noted in a small hand specimen of the veinstone from Red Gill, the following minerals :—galena, chalcopyrite, cerussite, linarite, chrysocolla, malachite, limonite and quartz. This shows the remarkable way in which the mineral contents of the veins have been intermingled and also, of course, why the extraction of the various minerals is so difficult as to be generally unprofitable.

This completes the circuit of the fells, but one or two outcrops on High Pike are of interest. On the southmost side of this mountain is an outcrop of a white kaolin like mineral akin to china clay, but scarcely in sufficient amount to be of commercial value. Deposits of umber have also been worked to a small extent about here.

In conclusion, it may be remarked that on the whole the days of fruitful hunting in the Caldbeck Fells have gone by for the mineralogist. There are still specimens to be found, but one is obliged largely to fall back on the old dump heaps, which are now, of course, much weathered. For this reason the mineral specimens from this district in various museums and collections are of special interest and value, because it seems probable that the conditions under which they were obtained will not again recur. Although, of course, interesting finds may be made from time to time, it would appear that the most valuable work in future will consist in a study of the veins themselves, with a view to establishing the relation they bear to each other and the surrounding rocks, and in perhaps explaining in a definite way the mode of origin of the remarkable variety of minerals they contain.

LOCAL WILDFOWL
(DUCKS AND GEESE).

By Ritson Graham.

(Read January 21st, 1926).

The following brief observations of the habits and occurrences of Geese and Ducks are from notes collected during the years 1923-4 and 5, and refer chiefly to autumn and winter visitations of these birds to the Upper Solway and neighbouring inland waters.

I am indebted to Mr. E. Blezard for numerous notes on many of the species, particularly with regard to their distribution on the Scotch side of the Firth.

The appearance of Grey Geese to the Solway continues to be a marked annual feature in our avifauna, of interest alike to the sportsman and naturalist, as also is the arrival of numerous species of Ducks, both divers and surface feeders, to our inland tarns and loughs; the latter also contributing a may-be precarious though eagerly accepted "gist" to the waiting marsh-gunners, who endeavour to intercept their passage at flight time from lough to coast or vice-versa.

With regard to the predominance of species of Grey Geese on the Solway, it will be interesting to refer to the late Eric B. Dunlop's notes under Grey-lag Goose in his paper, "Lakeland Ornithology," in Vol. III. of the Carlisle Natural History Society's Transactions, where it will be observed he says that at that time the Grey Lag was in a fair way towards becoming the most numerous goose of the district.

Now—12 years later—though many Grey Lags still visit the Solway, they are seldom at any period to be observed in as great a numbers as their congeners, the Pink-footed Geese. This applies to the English side of the Firth only, for I am informed by Mr. E. Blezard and others that thousands of Grey Lags arrive in October on the Blackshaw and Ruthwell marshes, on the Scotch side.

Returning to the Grey Geese of the Burgh and Rockcliffe marshes, we find by October, hundreds or thousands, according to weather conditions, of Pink-footed have arrived, and are still congregating on the marshes, or on the long stretches of sand which separates these grass covered areas from the channels, but no sooner have they accumulated here in strength than movement still further South begins, birds dribbling off in parties of from 20 to 40 or 60 individuals. The direction now taken is South-East, inland over Carlisle, and in line with, or a little to the East of the Petteril valley. As an instance of the above, I have notes of pink-footed geese passing over in this direction almost daily between the 8th and 16th of October, 1925. This departure of pink-footed geese from the Solway was apparently not always the regular feature that it has now become, local marshmen and wildfowlers attribute it to the recent practice of stocking the marshes with winter grazing sheep.

The grey lags, on the other hand, do not leave the English side of the Solway to the same extent as the pink-footed, and though skeins of the former are occasionally observed passing down the Firth, their flight is probably not continued far beyond our own shores. Therefore, whilst the pink-footed are becoming fewer as winter advances the grey lags are becoming more numerous, or at least their numbers are being maintained.

An estimate of the numbers of the above two species throughout the season can only be approximate, and to estimate it by the number and species of birds shot may be misleading, for it will be readily understood that between the arrival of the pink-footed in October, and their gradual departure which immediately follows, is not conducive to a great number being obtained by the fowlers, whereas the grey lags, which in October are not present in numbers comparable to those of pink-footed species,

and, as indicated above, do not leave our side of the Firth to any great extent, are, therefore, subject to the attacks of gunners, ashore and afloat, throughout the whole season.

After the turn of the year, February or March, many of the pink-footed geese return by the way of the Solway on their journey North, and are again attended to by the fowlers, but with the advent of March (the official close time for these fowl) geese cease to appear in our game dealers shops, and estimates based on birds obtained is interrupted or closed altogether.

It must not be inferred from the above that all our pink-footed geese leave the Solway, for a regular winter stock, often amounting to several hundred birds, may be observed constantly frequenting the Solway area, hundreds, never-the-less, have departed, probably within a few days of their arrival, and it may be noted that hard weather tends to lessen the remaining winter stock. The foregoing is, briefly, more or less the general behaviour of the two predominating species of grey geese as I have found it during the recent half-dozen winters which I have observed their visitations to the Solway.

Other features of our local wildfowl to which I might call attention are the further increase and regularity in the nesting of the shoveler, and the yearly increasing numbers of pochards to be met with on our inland waters from September onwards.

These and other items of interest I will mention under the headings of the birds concerned, commencing with the :—

Grey Lag Goose.—Apart from the general distribution of this goose on the Solway, a small flock is habitually found to be frequenting the marsh at Long Newton.

Mr. Blezard's records contain notes of skeins of 6—10 and 14 birds being observed there on October 5th, 1925, also five days later, i.e., October 10th, a string of 20, and a further party of eight were noticed to leave this marsh.

A similar flock was observed to be following here during the winter of 1924-5.

Mr. H. Russell, of Newton Holme, possesses a pinioned bird of this species, a female, which was obtained from the neighbouring marsh.

I first saw this bird on March 5th, 1923, and was informed by the owner that although his bird was mated with a domestic gander, and laid a clutch of eight eggs during the latter half of April each year, they had up to now proved to be infertile, however, during the early summer of 1924, when I next saw this Grey Lag, she was accompanied by a healthy brood of eight goslings ; the male bird having been changed in the meantime.

Other notes refer to observations of Grey Lag on various marshes and estuaries, but seldom on the Cumbrian side exceeding 30 birds in one flock, this contrasts with the Grey Lag, particularly in October, on the Blackshaw and Ruthwell marshes, where they often appear in thousands.

A further note here on the Grey Lags of the Blackshaw marshes, though somewhat out of the area to which this paper is limited, refers to many of the birds leaving this extensive marsh during the day, and flying inland to the neighbouring moss of Comlondon ; birds shot whilst returning from this moss were found to have their stomachs crammed with the brown seed tufts of rushes.

Bean Goose.—I have personally no recent note of this species within our area, but Mr. E. Blezard furnishes the information that two birds were shot out of a party of five at Redkirk, near Gretna, in December, 1922.

Pink-footed Goose.—Individuals of this species have been observed on or about our marshes on unusually late dates.

Mr. E. Blezard records flushing a Pink-footed Goose from the point of Rockcliffe marsh, on June 28th, 1923, which flew out seawards, not at all like a pricked bird, which he at first supposed it to be.

The same year (1923), I heard several Pink-footed Geese calling on the above marsh on May 5th. My earliest date of arrival that season was September 18th, when eleven birds were observed flying over the channel between Burgh and Rockcliffe marshes. On the 18th October, 1924, whilst on the marsh at Rockcliffe, I noticed many Pink-footed geese to be leaving, small detachments of from 8 or 10 to 20 birds lifting off the marsh, and travelling E. or S.E.

Appearing somewhat contradictory to the above is the arrival of flocks of pink-footed geese to this part of the Solway from an easterly direction, or a departure in like manner by the way of the Esk valley; these are no doubt the Solway winter residents going or returning inland for food and rest.

At the beginning of this season (1925), enormous flocks of pink-footed geese appeared on the upper Solway.

From the Burgh side of the Eden estuary, on October 11th, we observed a large flock thronging the opposite fore-shore of Rockcliffe marsh, which we estimated at 2,000 birds. A return visit on Ocober 16th showed a great reduction in numbers, though still several hundred geese were observed chiefly in small flocks.

Local residents affirm that the quantity of geese present during the latter half of September and the beginning of October, this year (1925), exceeded anything within living memory, but in consequence of the brief stay of the bulk of them, few were obtained.

Snow Goose.—A pair of these handsome geese were observed on the upper Solway, on April 5th, 1923, by Mr. E. Blezard. Whilst he was following up a wounded pink-foot on the marsh at Redkirk, he flushed the above two birds from below the marsh edge; they immediately lifted and settled on the marsh some little distance away. When next the snow geese took wing, they were joined by a party of five grey geese, and flew in the direction of Rockcliffe Marsh. My own experiences of snow geese in their Solway haunt was as recent as October 11th, 1925, when, accompanied by an experienced shore-shooter, we were observing the immense flocks of pink-footed geese, which were arranged before us on the sands between the marshes of Burgh and Rockcliffe, we, on the Burgh side that day, were privileged to witness as clear and extensive a view of grey geese as I have yet enjoyed. The fowl, all pink-footed were arranged, six to eight deep, for several hundred yards along the hard sand just below the brow edge of the opposite marsh.

It was during this pleasing view that we first became aware of the presence of snow geese.

Referring to my notes which were made that day, I find the following :—

" Whilst examining these (the ranks of pink-feet), I noticed a white bird amongst them, and going forward, 40 or 50 yards to the edge of the channel, I identified this bird, chiefly by its gait, size, etc., as a goose, and not a large gull as we at first supposed.

Whilst observing the movements of this white goose, which was noticeably more restless than its grey companions, constantly walking about within their ranks, threading its way in and out of thickly grouped grey geese, sometimes hidden from our view, at others plainly visible, the bright sun showing up its white figure distinctly.

When at length about half of this flock of pink-footed rose in the air, we found the white bird had left with them, we next discovered it flying in company with a number of greys out over the channel, and coming towards us. When about half way out, however, the flock turned, and now we observed a clear cut black margin down the outer edge of each wing of the white goose, thus showing itself an unmistakeable snow goose.

During this return flight we were not only able to see and clearly identify this stranger, but my companion spotted another similar bird flying from us at the outer edge of the pink-footed birds.

Although not yet certain of the identity of this second bird, we were able later to observe it amongst a resting string of Pink-feet, and several times during the course of an hour's observation we were able to discover the black wing-tips."

The snow geese were constantly more active when on the sand than the pink-footed geese ; on one occasion one of the snow geese deliberately walked through a long string of greys, and detached itself from the end, about 30 yards away. It was not alone long, however, for soon it was joined by four of the pink-feet, who settled down peacefully by the side of their white cousin.

It may be here remarked that the pink-footed geese did not at any time seem to take the slightest exception to the presence of the snow geese.

Brent Goose.—The only recent note I can find of this species is that of six being observed on the Gretna side of the River Esk, on April 8th, 1923.

Mr. Blezard, who observed the birds, says it was early morning, and the brents left the sands to fly into the marsh.

Barnacle Goose.—The barnacles, as is well-known, now chiefly restrict their winter visitations (so far as the Cumberland side of the Solway is concerned) to the marsh and vicinity of Newton Arlosh, or the neighbourhood of the estuaries of the Rivers Wampool and Waver. Also well-known to our local members is the occurrence of an albino of this species, which appeared here during the winter of 1924-5. A large number of barnacle often visit the Scotch side of the Solway, and on October 15th, 1925, the number observed frequenting the mouth of the River Lochar was estimated at 1,000 birds, but on the 19th of the month, the same observers failed to find a single barnacle goose here, all had gone.

This year (1925) the number of barnacle geese frequenting the Wampool estuary had, on October 24th, only reached 100 birds. Occasionally a few may be observed about our marshes during late spring or early summer, as on May 28th, 1925, when Mr. E. Blezard and I observed a party of three on the sand at the River Esk side of Rockcliffe Marsh.

Whooper Swan.—I may here refer to the appearance of the whooper swan in our area during the winter of 1924, and although I am not able to record any later occurrences of these stately fowl, a few particulars may be excused, particularly in view of the prolonged and favourable observations which were then possible on these always occasional visitors. The following is the date and number of whoopers

observed on each of the few occasions which I was able to visit the inland tarn which these birds frequented :—

Date (1924).		Number of birds.
Jan. 14th	..	10, all adults.
,, 20th	..	Do.
,, 29th	..	13, including one immature bird.
Mar. 2nd	..	12, immature absent.
,, 11th	..	15, all adults.
,, 24th	..	7 Do.

By the 29th of March all had left.

A few brief observations, the result of each visit, then we will leave the whoopers with the hope of further acquaintance to come.

January 14th (1924).—Ten birds. When first observed, the long, straight necks was the arresting feature ; on obtaining a nearer view, their general build and trim appearance on the water was noticeable, i.e., a long, torpedo-shaped body, with the wings kept tightly folded over the back, a clean-cut, elegant form, with every movement slow and dignified. Most of the birds were calling in a great variety of notes difficult to express, though distinctive enough when heard in chorus from these ten birds.

January 20th.—10 birds. An ideal day for observations, a clear sky, and the full effect of winter sunshine, the water of the tarn unruffled.

The " cobby" appearance of three or four mute swans, as compared with the whooper, was most noticeable to-day ; whoopers often feeding with heads and necks submerged and sterns raised.

Again much calling.

January 29th.—13 birds, including one brown immature to-day, an addition of two adults and one young bird ; the immature one seemed always anxious to rest, and when doing so (with neck laid over back, and head tucked into

upper plumage) would often lag behind the herd as they swam about the tarn, but on raising its head, and finding several yards separated it from its companions,it would swim quickly forward to join them, where it seemed welcome, none resenting its company. Again the usual calling from the company, particularly when a little alarmed.

March 2nd.—12 birds. The tarn almost covered with thin ice ; young bird absent.

The herd on this occasion seemed anxious to huddle together on the one large pool of unfrozen water, constantly keeping in close order.

Although I record a large amount of calling on each visit (this constant and continued wild music was a feature throughout the whole of the observations) I fail to find its equivalent in any other sound, the nearest approach I can think of, though only poor when compared with the real thing, is that sometimes uttered by a flock of domestic geese.

I find it stated in many works on ornithology that the head of this bird is thrown slightly forward or jerked when these notes are uttered. This I was not able to observe, no movement of the head was ever visible, and birds called with their heads held in almost any and every position. I distinctly heard one bird call out as its beak was almost touching the water.

March 11th.—15 birds, all adults. On this date I found that the company had received a further addition of three adults. Edges of tarn, and portion of water frozen.

Three of the birds were out of the water, and amongst the rushes which fringe the shore. These three birds showed to great advantage their very large size when standing on the bank. The call notes were often repeated, and likened almost to a gaggle.

The birds were chiefly engaged in feeding.

March 24th.—7 birds, adults. By this date eight of the swans had departed, leaving a smaller, though none the

less interesting party of seven. These seven birds were more scattered over the tarn than I had found them on any previous visit.

On this visit I found the dead body of a whooper in a ditch adjoining the tarn.

By the 29th of March (1924) all the whoopers had left.

Bewick's Swan.—An immature bird of this species was observed and shot at, though not obtained, as it rose from a pool on Burgh Marsh, during the winter of 1923.

Sheld-Duck.—A fairly abundant and conspicuous bird about the Solway and its vicinity, often straying far inland to nest on mosses, or about woods, particularly those woods providing thick undergrowth, such as heather, furze, etc.

Mr. J. Smith, of Drumburgh, who annually rears some of these ducks from eggs incubated by domestic fowls, had 40 under his care when I visited him on November 25th, 1923. These birds were then showing their russet and white, though only an indication of their future splendour, and displayed no ill-effects due to confinement, but followed their master on the sound of a whistle, with occasional instructions which they appeared to thoroughly understand.

Though these birds prefer to nest underground in rabbit burrows and the like, I have several instances of other sites being utilised, but darkness, or semi-darkness, seems to be essential.

The first sheld-duck's nest I ever found was in a covered-in drain, under a quiet, country road, others I have found amongst thick heather on our mosses, and under heaps of fallen branches in woods.

On the 12th of May, 1923, I roused a sheld-duck from the edge of a pool on Burgh Marsh, where I found she had laid a single egg.

In autumn family parties of sheld-ducks unite and frequent our estuaries, thus on August 4th, 1924 (Rockcliffe

Marsh) a party of 24, and another of 8, were observed flying up the Esk. The larger number were adults and birds of the year. Again, on July 31st, 1923, on Rockcliffe Marsh, a flock of from 30 to 50 were noted, flying high over the channel, and later alighting well out on the sand flats.

Ruddy Sheld-duck.—An entry here, though somewhat earlier in date than the most of this paper, but none the less interesting, is that of the Ruddy Sheld-duck shot during the winter of 1914 in the neighbourhood of Todhills, and now, fortunately, in the Carlisle Museum.

Mallard.—This is the best known duck of our area, becoming very numerous on the Solway and inland waters in autumn, from July to September, when large flocks, chiefly locally bred birds, may be observed about the pools and channels of the estuaries; whilst a similar gathering is noticeable at this season on the tarns and loughs. As the season advances, and during hard weather many mallard are shot which evidently have come from beyond our shores; these birds are often larger than the local ducks. As a single instance of the Solway gatherings of mallard, I quote the following:—August 24th, 1925, Rockcliffe Marsh, a large flock of mallard in the hannel off the marsh point estimated at 400 to 500 birds.

Of the autumnal flocks on the tarns, it will be sufficient to give a few observations from Monkhill Lough, and similar conditions prevail elsewhere.

MONKHILL LOUGH.

Sept. 4th, 1923.—Mallard fairly numerous 50—60 birds.
,, 18th ,, Over 100 mallard, many of these birds of the year.
Aug. 13th, 1924.—50 mallard, chiefly young birds.
,, 25th, 1925.—40—50 Mallard.

Tindale Tarn is also a favoured locality, hundreds of these ducks frequenting this water from August to early

spring. On several occasions I have found the remains of mallard on our marshes during autumn and winter, possibly the work of the peregrine falcon.

Mallard often nest early, and in a variety of situations. Nests containing eggs may be found in June, and I have a note of a female mallard being disturbed with her three or four days-old brood on April 25th, 1924. This occurred in Orton Woods, the youngsters being observed on a stagnant pool. The anxious mother soon appeared, and performed the usual " feigning " antics during which she constantly uttered a low quacking note to collect her brood, this low brood-collecting note I have heard uttered in a squeaking manner, and noted at the time as similar to that made by an unoiled door hinge.

Shoveler.—During recent years this duck has become more numerous as a nesting species within our area, and is consequently met with quite frequently, particularly in spring, both as adults returning to our tarns, etc., to breed, and in autumn in family parties about the marshes. Shovelers are also to be observed both on tarn and marsh in winter, as under :—

Jan. 4th, 1923.—Monkhill Lough, 4 birds (2 pairs).
,, 13th, ,, ,, ,, a pair.
Mar. 2nd, 1924.—Moorhouse Tarn, a pair.
Feb. 18th, 1925.—Monkhill Lough, a pair.

Regarding the nesting of the shoveler, our local records contain many entries, chiefly from the Solway Marshes, where undoubtedly a pair or two breed (or attempt to) annually, one brood at least got safely hatched on Burgh marsh during the summer of 1924. Mr. J. Waite, of Burgh, tells an interesting experience of parental care exhibited by a female shoveler, which he disturbed with her brood in the village of Burgh. She was conducting her brood (during the early morning hours) in the direction of the marsh, and was proceeding along the village road.

He observed her coming towards him, and as he drew near, the parent bird crossed the road and sought shelter

on the door step of the local doctor's residence. Here she huddled her brood carefully underneath her, and waited until the intruder had passed. Other nesting of this duck is reported from the vicinity of tarns near the Solway area and inland.

Farmers and others have informed me of nests of this species being exposed during grass cutting operations, the nests then (in June) containing eggs, and often situated well out in the centre of the fields ; other nests have been found in young corn, also in rough herbage which clothes the damp parts of many fields adjoining our loughs and tarns. In early May, 1925, I accompanied Mr. E. Blezard to the nest of a shoveler in an inland locality, a small area of rough, uncultivated land surrounding a large pool. This nest, on May 4th, 1925, contained three eggs, but on our return, a few days later, neither eggs, nest, or even a fleck of down was to be found.

However, on May 21st, 1925, a second shoveler's nest was found on the same ground containing six eggs, and a few days later the full clutch of ten were laid. Two pairs of shovelers had been known to frequent this locality during the spring of each of the three previous years.

I have also several notes of shoveler being observed on or about our marshes in spring, as under :—

Rockcliffe Marsh, May 24th, 1924.—pair (male and female).

Rockcliffe Marsh, May 29th, 1924.—Flushed drake from sheet of water, near marsh point ; flew over marsh and settled.

Shovelers frequenting our tarns in spring I quote as follows :—

MONKHILL LOUGH.

May 12th, 1923.—Pair flushed (male and female).
,, 17th, ,, Three pairs.
,, 31st, ,, Two males and one female.
June 7th, ,, Pair (male and female).

Occurrences in spring similar to the above could be quoted from most tarns and loughs, amd also from other marshes.

Undoubtedly the shoveler is on the increase, indeed I have heard Solway gunners and others say that this bird now nests as numerously as any other of our breeding ducks.

Pintail Duck.—Occurs often in autumn on the coast or on inland waters of our area. The local shore shooters often meet with a few from August until October, but they become scarcer after the last-named month, a circumstance which lends colour to the suggestion that these may be locally bred birds, and that after the first batches are thinned, they are not reinforced by others from afar, as many other wildfowl are, particularly mallard and teal. Also according to birds obtained, it would appear that the pintail is present here in family parties, four to six birds of the year being shot to one adult.

Mr. W. H. Mulcaster, of Burgh, obtained two pintails (birds of the year) on October 8th, 1925, another, in similar plumage, on the 11th; also on November 1st, 1925, he obtained a bird of this species, which from his description I took to be an adult female.

I observed a single example of this species on Monkhill Lough on October 18th, 1925. When first observed, this bird was feeding at the edge of the tarn, in company with four teal, and as I approached the pintail swam forward, and became hidden from view amongst rank vegetation. It was not again observed, although I flushed a party of wigeon from this spot, the pintail did not appear on the wing with them.

Teal.—This elegant little duck is well dispersed throughout our area as a nesting species, but becoming more numerous in autumn. At this season hundreds of teal frequent the Solway, and is the most numerous duck met with by the Solway gunners during August and September.

Mr. W. H. Mulcaster, of Burgh, an experienced and successful shore-shooter, has furnished me with a list of ducks shot by him during August and September, 1926.

Of the 93 birds which have fallen to his gun between the 1st of August and the 30th of September, 89 of them were teal, and the remaining four being made up with one shoveler and three pintails.

His best bag was that of September 11th, when 13 teal and one pintail were obtained. His average is approximately 4·45. I have also notes of large flocks of teal during autumn from various inland waters, one of which may be cited, October 20th, 1924, Bleaze Fell, flock of 24 or 26 teal on small pond here ; from 10 to 30 birds may be observed here on most days during autumn.

Of the many nesting occurrences and notes on nesting behaviour of teal, I select and briefly quote the following. April 27th, 1924, nest of teal on the pond on Bleaze Fell, the nest was built amongst rushes which grow thickly round the edge of this small tarn, and on this date the nest contained six eggs. By the first of May nine eggs were laid.

A second teal's nest was found in this district, on May 13th, 1925, containing 11 eggs ; this nest was built amongst low furze and heather, and was sheltered by a blackened and charred furze bush. I have many other observations referring to parent teal with broods from several other localities, chiefly quiet ponds or small tarns, where plenty of cover affords nesting sites and shelter for these shy birds and their broods.

The excited and fussy behaviour of the female teal is not necessarily confined to the period when she is responsible for her precious offspring, but may take place when an intruder approaches her nesting locality before nesting operations are in progress.

I have a note on the above as early as March 23rd, 1925. On this occasion a pair of teal were flushed from a known nesting locality, the male flying off at once, but the female stayed, and commenced to fly low over the water and towards me, calling loudly the while, often dropping into the water for a moment, to rise again and continue her low flight and anxious calling.

Teal are met with in winter on all our waters, including the smallest pools. Very handsome is the male at this season when observed daintily feeding by the tarn's margin accompanied by a few more sombre plumaged females.

Wigeon.—This is pre-eminently the winter duck of the district, appearing in large numbers on our " loughs " in October; though a few may arrive some weeks earlier.

As winter advances the birds continue to arrive until by mid-November, our tarns (particularly those near the Solway) have received their regular winter stock. These flocks, amounting to 200 or 300 birds on favoured waters, such as Monkhill Lough, betake themselves to the estuaries in the evenings, returning in the early morning to spend the day amongst the aquatic vegetation which clothes a large portion of these loughs. The low calls of the females amounting, in a flock of birds, to a constant babble, whilst the clear, long-drawn-out whistle of the males can be heard as one approaches their day-time haunts. This tell-tale music is eagerly listened for by the coast shooters, as they endeavour to locate the night-feeding wigeon on the mud flats.

A few wigeon often stay on our inlands waters until well into spring, as under :—

May 12th, 1923.—Monkhill Lough.—Five wigeon here yet.

,, 17th, ,, ,, ,, The small party of wigeon still here.

By the 31st of the month they had gone.

Mr. E. Blezard reports wigeon (about 12) on Tindale Tarn (an unusual locality) on April 6th, 1924.

Often before they leave us, many wigeon are paired; this is noticeable from February onwards.

During the winter of 1924-5, wigeon were later than usual in arriving, and did not at any time during that season reach their accustomed numbers. This year I observed the wigeon frequenting Monkhill Lough had made a change in their day-time resort. Previously the birds were to be

found frequenting the reed covered area at the South and East side of the lough. Now I constantly flush them from a similar environment, but at the west side of the water, where formerly few birds were to be found.

It may be worthy of mention that these hordes of wigeon, which congregate on our loughs and tarns, are not exclusively confined to nocturnal and coastal feeding, but may be occasionally observed feeding during the day, with heads and portions of neck submerged, now and then turning sterns upwards for deeper probes, a mode of feeding similar to that of the mallard.

Pochard.—This duck is essentially a winter visitor with us, and is yearly increasing in numbers.

My own experience suggests that double the number of these birds now visit us compared with observations made on the same waters half-a-dozen years ago. Whether this will be constant, or only a passing phase, only time and observation can decide.

I give the following summary from numerous notes regarding the numbers of pochard frequenting out inland tarns in winter, previous to the season of 1925-6 :—

1923.—Monkhill Lough.—6 to 8 pochards ferquenting this water from November until February.

,, Thurstonfield Lough.—8 or 10 pochards were the normal stock on this lough during this winter.

,, Talkin Tarn.—10 pochards were observed here on December 3rd, increasing to 15 by February.

,, Castle Carrock Reservoir.—7 pochards were counted here on December, the only visit paid to this locality during pochard occupation.

,, Tindale Tarn.—About 23 birds seem to be the regular number frequenting here during the season.

Total, say, 58 birds.

The approximate numbers for this season, up-to-date, are :—

1925.—Monkhill Lough.—16 pochard during November.

,, Thurstonfield Lough.—27 observed on one visit.

,, Talkin Tarn.—23 counted in November.

,, Castle Carrock Reservoir.—20 pochard from October 19th onwards.

,, Tindale Tarn.—Enormous flock on here on October 19th. I counted a flock composed entirely of pochards, which comprised 142 birds. Another flock, equally as large, and a little apart from the above, but with a sprinkling of tufted ducks amongst them ; perhaps a total of 250 pochards.

Total on all waters, 336

,, previous to 1925, 58.

The pochard has not yet been recorded as nesting in our area, though we have had pairs of birds stay well on into the spring, not particularly on these regular winter habitats, but on small and quiet pools which are thickly fringed with aquatic vegetation.

Referring to one of these likely nesting haunts, I have the following notes :—April 12th, 1924, three pochards flushed from a pool as above described, where no pochard are seen in winter. Three days later two pairs rose from this locality ; they flew round a few times and returned, occasionally one or more of the birds uttered a harsh, croaking note. Again, on 28th April, 1924, a pair of pochards were disturbed on this pond, and on this occasion they flew off at once, high.

The above may or may not indicate a tendency to nest here, nevertheless I hold the opinion that it is only a matter

of time before we can include the pochard amongst our nesting ducks.*

Of the many winter observations of these interesting birds, I must here forego, ex ept to remark that few of our winter wildfowl appear so strikingly handsome as the full dress males of this species, at they gather together on the water in compact groups, often quietly resting with their rich chestnut-coloured heads, darker breasts, and silvery upper parts reflected on the still water.

Pochards were exceptionally early in arriving at their winter quarters this year (1925), a party of about 20 birds were observed on Tindale Tarn on August 8th.

Tufted Ducks.—This elegant duck is well distributed throughout our area during autumn and winter, frequenting our loughs and tarns in parties from about six or eight, to as many as 50 birds. The larger parties are generally met with on the eastern tarns. The number of birds observed on the loughs in the Solway neighbourhood seldom exceeds 20. The circumstances regarding the first proved instance of the tufted duck nesting in the country are well-known, and except to mention that the birds continue to nest at one at least of the known localities, whilst a third and new nesting site discovered and was recorded by Mr. E. Blezard, I will pass on to a few observations of occurrences which suggest further nesting, or at least inspire hope in that direction. On May 20th, 1923, a pair of tufted ducks (male and female) were flushed from a reedy pond, where I had never previously

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* Mr. Graham's prognostication of this event, the nesting of the Pochard in the Solway area, has been fully verified by his finding, on the particular site described, in the spring of this year (1927), two nests of this species.

One nest, found on May 19th, contained two addled eggs, but a female and her brood were swimming near by. Later, on May 29th, a second nest was found, also containing two eggs. Two pairs, males and females, were seen on both occasions.—L.E.H.

observed this bird. When next I was able to revisit this locality (May 29th) I failed to find any trace of the tufted, but in such a situation wading is the only satisfactory method to decide whether these birds were nesting here or not. This takes time and patience, and I am short of both perhaps.

In the early summer of 1924, a solitary male tufted duck was observed on a pond near Cotehill, later in the year three immature birds were observed in this neighbourhood.

On July 25th, 1924, I observed an adult male tufted duck on the Lough at Monkhill; on September 28th a pair of fledglings were observed on the water here, and the dead body of a similar bird was picked up from the edge of the lough.

On our eastern waters I observed, in October, what I took to be family parties of tufted ducks. Two items from many will serve to illustrate this.

On October 22nd, 1924, Talkin Tarn, a party of six tufted ducks, including one adult male; rest immatures.

On the same day, on the reservior at Castle Carrock, were five tufted ducks. Again accompanying these was an adult drake.

These October parties are in evidence before the winter visiting birds have arrived, and a visit to any of these waters during November discloses a marked difference in the numbers, sexes, and ages of these tufted ducks. The first and last dates on which tufted ducks were observed on Monkhill Lough during 1924, are October 11th, when the first tufted was observed, a single adult drake, but by the 18th of the month 20 were on here, including many adult males. My latest date for 1924 was March 27th, when there was from 12 to 20 birds on the lough; sexes almost equal.

Amongst the tufted ducks which frequented Talkin Tarn during 1924 was an individual which regularly attached itself (during feeding times) to the small party of mute swans, which the boatmen attended to. This particular

tufted (a male) would swim stealthily alongside, partly concealed by the weiring of that part of the water edge where the swans were being fed. The moment the boatman withdrew, the duck would come boldly forward, and help himself to a share of the tit-bits thrown to the swans.

A few observations made in the diving of the tufted duck when in pursuit of food, shows an average of approximately 28 seconds below the surface of the water, and 15 seconds rest above, between each dive.

On one occasion I watched a party of these birds diving in an unfrozen pool when the rest of the tarn was covered with thin ice. I was much struck with the certainty which the birds showed in returning to the surface, for though they often went under the ice, they always came to the surface in this small ice-free pool.

Scaup Duck.—The scaup in our area is chiefly, though not exclusively, a bird of the tidal estuaries.

I have personally not met with many of these large ducks, either collectively nor yet as widely distributed individuals.

The largest number I have observed together was five on the Esk estuary, during the winter of 1922-3. I have also a note or two on scaup inland, i.e., a pair (male and female) on Moorhouse Tarn, on February 11th, 1923. This pair I observed from a distance of thirty yards, when the dark, glossy head and neck, and grey back of the male, and the white band at the base of the bill in the female were clearly seen.

On December 20th, 1923, I observed a single adult male scaup on the tarn at Moorhouse, the only other bird here that day, worthy of mention, was a solitary male tufted duck, a rather strange pair.

Mr. E. Blezard also notes scaup inland, as on October 16th, 1924, he observed a pair of these ducks frequenting Talkin Tarn ; they stayed here all that day. He also shot and immature example of this duck on a creek on Newton Marsh, on November 4th, 1924.

Goldeneye.—The beautiful goldeneye we observe regularly in winter on both estuaries and inland waters, also many are met with on the rivers, particularly Eden and Esk, above tidal influence.

The rattle made by these birds' pinnions as a few fly helter-skelter overhead on a sharp frosty day is distinctly audible, and a typical sound on a winter's afternoon on the marsh or by the side of one of our rivers. Often a large number may be observed gathered together on the shallows of the lower reaches of either Esk or Eden.

On December 16th, 1923, I observed such a party, comprising 32 birds, on the River Eden, a little above Castletown. The birds were not attempting to feed, but content to sport about on a shingly stretch of the river, over which a shallow but rapid current was passing.

When a party of goldeneyes are feeding, against the current, as they usually do, a common practice for the birds after having been under a few times is to allow the stream to carry them back a few yards, when the diving operations are again resumed, and the process repeated. This habit appears quite orderly and neat when accomplished by a number of birds together.

In many small flocks of goldeneyes adult drakes are scarce, yet I have, on the other hand, observed parties of five to seven or eight composed entirely of the beautiful black and white males. The reservoir at Castle Carrock is a favourite inland water for goldeneyes, a party of about eight or ten frequenting this place yearly.

Recently I have found goldeneyes regularly occurring on the lough at Monkhill. On the 1st of November, 1923, seven birds were on here, all apparently immatures.

Other notes on goldeneye refer to birds in parties of three or four up to small flocks of thirty, on most of our rivers, estuaries and tarns, from October until March. Seldom do these birds consort with other fowl, such as tufted ducks, pochards or wigeon, which often frequent the same waters.

Long-tailed Duck.—The only recent occurrence of this duck that I am aware of is that of an immature bird obtained on Rockcliffe Marsh on December 18th, 1924, as recorded by Mr. E. Blezard.

Common Scoter.—This duck, being essentially a salt-water species, usually frequents the lower reaches of the Solway, where often large flocks are to be observed during the winter months.

Occasionally storm-driven birds are met with inland or on the estuaries, and I am informed that probably half of the scoters sent into the city to be set up are victims of the recent and extending oil nuisance, the plumage of the birds being covered as with tar, and hindering, if not completely destroying both flight and feeding ability.

Of the saw-bills, I have occasional notes of the three species most frequently met with in our area, i.e., goosander, redbreasted merganser and smew, as under.

Goosander.—Whilst by the side of Moorhouse Tarn, on February 1st, 1925, five goosanders came flying in from a N.E. direction, and after a short flight above the tarn, they settled, and at once commenced to indulge in a mad frolic on and under the water, diving, splashing and bounding in a half flying, half swimming manner after each other, and covering a large stretch of water in a very short time.

Often all the birds would be under water together, but only for a second or two, when the playful chasing antics were again resumed. These activities continued for about 15 or 20 minutes, when it ceased as suddenly as it had commenced, and the five birds rose to depart as they had arrived in a high and rapid flight, leaving in a similar direction to that which they had come. This route would take them to any of the Upper Solway estuaries. Had this party of goosanders come for the express purpose of a splash and frolic in fresh water, and that being accomplished to return directly to their former habitat ? I had no reason to believe that the birds had either sighted or scented me, as several other fowl, including an adult male smew, remained

undisturbed on the water the whole time. I was well screened by a belt of willows which grow round the water's edge.

These five goosanders were all "red-headed" birds, i.e., either females or immature birds, the red bills and legs were plainly visible as they prepared to alight on the water, but subsequent behaviour afforded little opportunity for detailed observation.

Mr. E. Blezard has several notes on goosander on our estuaries, an interesting one being that of a pair of immature birds fishing on the Esk estuary, on April 8th, 1923. As a goosander came to the surface with a small fish or other tit-bit, a waiting lesser black-backed gull was observed to swoop down in the direction of the fisher and attempt to rob it of its prey. This procedure was continued for some time, but in the scrimmage which ensued, it was not clear which bird received the coveted morsel.

Red-breasted Merganser.—Only once have I met with this bird, the occasion being on the 8th February, 1924, when I surprised a male of this species as he was busy fishing in the River Esk below the Metal Bridge.

Noticing the bird dive, I hurried to the spot, and as he next appeared within a few yards from where I stood, I was able to notice the reddish-brown irregular breast-band, also the long head crest. This latter feature was always noticeable, though after the close-up view I was never again able to get within a hundred yards of this wary bird. After being disturbed, the bird proceeded rapidly down stream, and at a safe distance again commenced to dive. I calculated the time spent under water during diving to be just under a minute. When further alarmed by my following it down stream, the merganser would partly submerge its body in the water, and in this fashion swim swiftly off, finally diving to reappear some distance down stream. In this manner the bird travelled down the river for about threequarters of a mile, sometimes going over fifty yards under water.

Smew.—It would appear that the Smew is now met with more often than formerly. MacPherson, in his " Fauna of Lakeland," treats this bird as an irregular and uncertain winter visitor, to be observed chiefly singly, and at long intervals. The smew is certainly not a numerous winter visitor, or perhaps even a regular one, and it may be due to a few recent favourable seasons that this bird has been observed fairly frequently, and in considerable numbers since 1923. On January 20th, 1924, I fell in with a party of four smews on Moorhouse Tarn, all adult males. When first observed, the birds were engaged in a playful frolic, taking shallow dives, accompanied by much splashing in all directions; often a playful individual would disappear beneath a resting companion, to reappear at its further side.

This behaviour, with occasional rests, continued for some time. During the intervals the beautiful patterned black and white plumage was conveniently studied.

Again, on December 29th, 1924, I observed a pair of smews (male and female) on Monkhill Lough. The weather at this time having been wet and stormy, the waters of the lough were somewhat swollen and storm-tossed, nevertheless the smews appeared to be quite at home, commencing to dive with more business intent than the Moorhouse birds. Later the female smew joined forces with a tufted drake, and together this pair dived regularly and harmoniously. I timed this smew to be under water, during each dive, from fifteen to eighteen seconds, the tufted drake not more than ten seconds. The smew appeared to take a slight forward plunge prior to the dive.

On February 1st, 1925, I again observed a single adult male smew on Moorhouse Tarn, and during all the time I spent observing the numerous fowl on the tarn this bird continued diving.

Ths concludes a brief account of many pleasant experiences and happy memories in a favoured countryside, with its beautiful and interesting winter wild fowl. Long may such conditions continue to be available and appreciated by all who can and will.

THE ORTHOPTERA OF CUMBERLAND.

By G. B. Routledge, F.E.S.

(*Read March 24th*, 1927).

The Orthoptera are not a numerous Order in the British Isles. Thirty-one species are considered to be indigenous. Eight species are aliens, naturalized however, as shown by their breeding here ; there are also a number of casual visitors, imported with produce. In Cumberland we have records of 14 species.

DERMAPTERA.

FORFICULODEA (EARWIGS).

Labia minor, L. Found in June, August and September on the wing, not uncommonly. Tarn Lodge (Routledge) ; Carlisle, Great Salkeld (Day). The smallest of our British Earwigs.

Forficula auricularia, L. The commonest species of British Earwigs. Common in the County. Var. **forcipata,** Steph. Tarn Lodge, August 10th, 1917 (Routledge).

EUORTHOPTERA.

GRYLLODEA (CRICKETS).

Gryllus domesticus, L. Common Cricket. Walton, June 18th, 1903. Hayton (Routledge). Carlisle, found in old houses (Day). This species is found in old-fashioned fireplaces.

LOCUSTODEA (LONG-HORNED GRASSHOPPERS).

Phasgonura (Locusta) viridissima, L. Cumberland, recorded in *Stephen's Illustrations.*

Metrioptera (Platycleis) brachyptera, L. Common, Wan Fell, July 29th, 1900 (Day). England is the only part of the British Isles from which **M. brachyptera** has been recorded.

ACRIDIODEA (SHORT-HORNED GRASSHOPPERS).

Gomphocerus maculatus, Thunb. Common, Wan Fell, July 29th, 1900 (Day).

Stenobothrus (Omocestus) viridulus, L. Common, Tarn Lodge, Castlecarrock, Cumwhitton Moss (Routledge). Kingmoor, Great Salkeld (Day).

Stenobothrus (Omocestus) rufipes, Zett. Hayton Moss, one specimen taken July 11th, 1915 (Routledge).

Stenobothrus (Stauroderus) bicolor, Charp. Common, Tarn Lodge, Hayton Moss, Carlatton, Castlecarrock, Seascale (Routledge). Durdar, Wan Fell, Allonby, Silloth (Day).

Stenobothrus (Chorthippus) parallelus, Zett. Great Salkeld, Wan Fell (Day).

Tettix bipunctatus, L. Not uncommon, Hayton Moss, August 15th and 21st, 1915 (Routledge). Orton, September 22nd, 1900; Durdar (Day).

BLATTODEA (COCKROACHES).

Blattella (Phyllodromia) germanica, L. Carlisle, in flour mills (Day). An introduced species in Britain, living under artificial conditions.

Blatta orientalis, L. (Common Cockroach). Hayton, Castlecarrock (Routledge). Carlisle, abundant in old houses, also common in the sawdust pits at Denton Holme Timber Yard (Day). Also an introduced species.

Periplaneta americana, L. Abounds in a conservatory near Carlisle, (Science Gossip, August, 1890, p. 177; Naturalist, 1895, p. 49, Hilderic Friend). In greenhouses at Stanwix (Day). The largest of the cockroaches that breed in Britain. An introduced species.

CASUAL VISITOR.

***Panchlora viridis,** F. Pale green species, often imported in bananas, two specimens, Carlisle, April, 1923. Heads Nook, July 25th, 1926 (Routledge).

From their distribution in the British Isles, the following species might occur in Cumberland.

Anisolabis annulipes, Lucas. Has occurred in Cheshire (1916) and Derbyshire (1863), and Coatbridge in Lanarkshire (1910) in bakehouses.

Periplaneta australasiae, F. Recorded from Lancashire and Derbyshire, and several counties in Scotland as far north as Perthshire.

Gryllotalpa gryllotalpa, Lin. Known as the "Mole Cricket." Recorded from Lancashire, and a single example in 1899 taken at Kilmalcolm, in Renfrewshire.

Gryllus campestris, L. In North Staffordshire, and doubtfully recorded from Scotland.

Meconema thalassinum, De Geer. Recorded from Yorkshire, and recorded in 1809 and 1813 in Scotland.

Leptophyes punctatissima, Bosc. Recorded from Scotland, in Wigtownshire, in 1906.

Stenobothrus (Chortippus) elegans, Charp. Has occurred at Grange-over-Sands and Silverdale, Lancashire.

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* Specimens of green cockroaches have been frequently brought to me by fruiterers and others in Carlisle ; they may not, however, in all cases be referable to **P. viridis.** F.H.D.

THE HEMIPTERA-HETEROPTERA OF CUMBERLAND.

By Frank H. Day, F.E.S.

(*Read February* 14*th*, 1924. *Revised September* 30*th*, 1927).

This sub-order of insects, familiarly known as "bugs," is hardly a popular one, even with entomologists, and few of our local students of nature have collected or observed them. They are, however, of considerable interest. Many are insects of great beauty; while for strangeness of form and diversity of habit they are unsurpassed in the whole insect world. In the British Isles some 475 species have been found, of which 214 are in the present list recorded as occurring in Cumberland.

Considering that we have hitherto not had a local entomologist who has specialised in the **Hemiptera,** and that the records are based on the finds of Coleopterists as a sort of side-line to their more direct studies, this may be claimed to be a fairly creditable list. It is capable, however, of considerable extension, as there are still numerous species which, from their recorded British distribution, may be confidently expected to occur in Cumberland. In the preparation of this list, I have been helped by notes of captures from Messrs. H. Britten, J. Murray and G. B. Routledge, which I gratefully acknowledge, and at the same time I would like to place on record my obligations to the late E. A. Butler, B.A., B.Sc., F.E.S., for his willingly-given assistance in the identification of our captures. It is a source of pleasure to know that "Cumberland" is of frequent mention in our lamented friend's monumental work :—**"A Biology of the British Hemiptera —Heteroptera."**

Further references in literature to Cumberland **Hemiptera—Heteroptera** :—

Victoria History of Cumberland, 1900, pp. 141—142.—F.H.D.

E.M.M., 1902, p. 87, " Salda c-album Fieb. and vestita D. & S." —E. A. Newbery.

,, 1915, p. 313, " Bothynotus pilosus Boh. in Cumberland" —J. Murray.

,, 1915, p. 145, " Cumberland Hemiptera-Heteroptera."—J. Murray.

,, 1916, p. 66, ,, ,, ,,

,, 1916, p. 278, " Hemiptera in Cumberland."—H. Britten.

,, 1917, p. 251, " Two Additions to the List of British Hemiptera-Heteroptera."—E. A. Butler.

,, 1917, p. 183, " The Food-plant of Calocoris alpestris, Mey."—F.H.D.

,, 1917, pp. 112-113. " Cumberland Hemiptera-Heteroptera."—J. Murray.

,, 1918, p. 227, " Orthotylus virens, Fall."—F.H.D.

,, 1925, pp. 115-117, " Cumberland Hemiptera in 1924." —H. R. P. Collett.

,, 1925, p. 280, " Globiceps dispar, Boh., in Cumberland." —F.H.D.

,, 1926, p. 21, " Gerris asper, Fieb., in Cumberland."—F.H.D.

Naturalist, 1916, pp. 252-257, " Cumberland Hemiptera-Heteroptera."—F. H. D.

,, 1916, p. 349, ,, ,, —J. Murray.

,, 1917, p. 88, ,, ,, —J. Murray.

,, 1918, p. 92, ,, ,, —J. Murray.

,, 1918, p. 27, " Hemiptera-Heteroptera of West Cumberland."—J. Murray.

,, 1920, p. 16-18, " Cumberland Hemiptera-Heteroptera."—F.H.D.

,, 1920, p. 106, " Monanthia cardui, L."—J. Murray.

,, 1921, p. 400, " Strongylocoris luridus, Fall. in Cumberland."—J. Murray.

Naturalist, 1924, p. 50, "Ploiariola culiciformis, De G."—J. Murray.

,, 1926, pp. 181-182, "Hemiptera at Brayton, Cumberland."—J. Murray.

CYDNIDAE.

Sehirus biguttatus, L. In moss among heather in spring. Very local, our only locality being Ashness Wood, near Keswick, where it occurred freely in April, 1905, sparingly in 1910.

PENTATOMIDAE.

Peribalus vernalis, Wolff. One of the rarest British species. One specimen has been recorded from Borrowdale in Cumberland by the Rev. T. A. Marshall (E. Saunders, *Hemip.-Heterop., Brit. Isles, p.* 27).

Dolycoris baccarum, L. Apparently scarce. Mr. Murray and I have taken a few specimens, both larval and mature, at Seascale, on *Ononis*, in July.

Piezodorus lituratus, F. On furze, widely distributed and sometimes common. Occurs from spring to late autumn. Tarn Lodge, Gelt (G.B.R.), Wan Fell, Great Salkeld (H.B.), Thurstonfield on bramble (J.M.), Carlisle district, Skinburness, Anthorn, &c. (F.H.D.).

Pentatoma rufipes, L. Common on oak and birch. I have fed the larvae on the caterpillars of small white butterflies, and reared the mature bugs. Hayton Moss, Gelt, Edmond Castle (G.B.R.), Great Salkeld (H.B.), Wreay (J.M.), Carlisle, Durdar, Orton (F.H.D.).

Picromerus bidens, L. Locally common on heather and bramble. In June, 1918, I found a large number of young larvae clustered together on a spray of heather. The bronze lustre noted by Butler (*Biology*, p. 57), was very striking. These larvae fed greedily on

various lepidopterous caterpillars, and produced mature bugs in September. Prior Rigg (J.M.), Orton, Kingmoor (F.H.D.).

Rhacognathus punctatus, L. Local and scarce. There are only two records of its occurrence in Cumberland, the first from Durdar, 25th February, 1900, hibernating in moss among heather; the second, a larva in last instar at Cumwhitton Moss, on heather, 12th July, 1917, among *Halticid* beetles. I reared it to maturity by feeding it upon these insects.

Zicrona caerulea, L. Local and not very common. Occurs on heather or on the ground near by. I have found the larvae preying on *Halticid* beetles in June, and the perfect insects in July. Wan Fell (H.B.), Cumwhitton Moss (G.B.R., F.H.D.).

Acanthosoma interstinctum, L. On birch, fairly common. Baron Wood (H.B.), Orton, Burgh (J.M.), Cumwhitton Moss, Gelt (G.B.R.), Durdar, Great Salkeld, Keswick (F.H.D.).

Elasmostethus griseus, L. On birch, scarcer than the preceding. Baron Wood (H.B.), Orton (J.M.), Tarn Lodge, Gelt (G.B.R.), Great Salkeld, Durdar (F.H.D.).

COREIDAE.

Therapha hyoscyami, L. Recorded by Douglas and Scott (*Brit. Hemiptera*, p. 130) on thistles and *Ononis* at Ravenglass. The record has never been confirmed.

Myrmus miriformis, Fall. On the coast among rushes and coarse grasses, locally common at Drigg, in July, in the brachypterous state.

BERYTIDAE.

Neides tipularius, L. Scarce on the coast. I took one specimen at Seascale among marram grass, in July, 1910. Mr. Murray, in the same locality, in July, 1917, found a larva in the last instar.

Berytus minor, H.S. By sweeping low herbage and at the roots of grass, scarce. Great Salkeld (H.B.), Newby Cross (J.M.), Port Carlisle (F.H.D.).

,, **crassipes,** H.S. Scarce, one specimen from rushes at Anthorn, 2nd July, 1917 (J.M.), Silloth, Burgh (H.B.)

B. signoreti, Fieb., and **montivagus,** Mey, are recorded from Cumberland in error by Butler (*Biology*, pp. 129, 130).

Metacanthus elegans, Curt. Common on the coast under *Ononis*. Seascale, Drigg, Silloth.

LYGAEIDAE.

Nysius thymi, Wolff. Widely distributed, but rather scarce. Tarn Lodge (G.B.R.), Seascale (J.M.), Sandhills at Drigg, a few; Saddleback, 2,000 feet up, one specimen (F.H.D.).

Cymus glandicolor, Hahn. Common in marshy situations in June. Cumwhitton Moss (G.B.R.), Orton (J.M.), Hayton Moss, Bowness Moss, Newton Reigny Moss (F.H.D.).

Ischnorhynchus geminatus, Fieb. Our only record is from Wan Fell, where it has occurred on *Calluna* (H.B.).

Pamera fracticollis, Schill. Local. I have found it rather freely in May and June in *Sphagnum*, at Orton.

Macrodema micropterum, Curt. On bare places on heaths and commons. Not uncommon, but local. Cumwhitton Moss in June and July, Port Carlisle in August (F.H.D.).

Stygnocoris rusticus, Fall. Not very common. Taken by general sweeping. Burgh, Kelsick, Oulton Moss (J.M.). Orton, Durdar (F.H.D.).

,, **pedestris,** Fall. In moss, at roots of heather, etc., generally common, so localities need not be stated.

,, **fuligineus,** Geoffr. In dead leaves, cut grass, etc., less common than the last. Tarn Lodge (G.B.R), Great Salkeld, Armathwaite (H.B.), Burgh, Seascale, Gelt (J.M.), Silloth, Kingmoor (F.H.D.).

Peritrechus sylvestris, F. In dead leaves, moss, flood refuse, etc., common. Great Salkeld (H.B.), Tarn Lodge on hazel, in August (G.B.R.), Carleton, Cummersdale, Baron Wood (F.H.D.).

Trapezonotus arenarius, L. On heaths and sandhills, fairly common. Hayton Moss (G.B.R.), Ainstable, Gelt Woods (J.M.), Carleton, Cumwhitton Moss, Great Salkeld, Drigg (F.H.D.).

Drymus sylvaticus, F. In dead leaves, moss, etc., generally common in Cumberland.

,, ,, var. **ryei,** D. & S. Stainton, 25th April, 1914 (J.M.).

,, **brunneus,** Sahlb. Another very common species, so localities need not be detailed.

,, **piceus,** Flor. In wet *Sphagnum*, scarce. Castlecarrock Fell, 4th September, 1915 (J.M.), Newton Reigny Moss (H.B.), two specimens at Orton, 22nd April, 1906 (F.H.D.).

Scolopostethus grandis, Horv. Scarce, Grinsdale, one specimen, 21st April, 1917 (J.M.). I have a doubtful specimen taken in hedge clippings at Durdar, 24th March, 1923 (F.H.D.).

,, **affinis,** Schill. Rather scarce. Gelt Woods (G.B.R.). Grinsdale (J.M.), Carleton (F.H.D.)

,, **thomsoni,** Reut. Not uncommon. Cummersdale, Orton, Kelsick, by sweeping grass etc. (J.M.), Upperby, on toadflax, Durdar, in hedge clippings (F.H.D.).

,, **decoratus,** Hahn. Common on the ground below heather. Tarn Lodge in April and October (G.B.R.), Castle Carrock (J.M.), Wan Fell (H.B.), Orton, Durdar, Cumwhitton Moss, Baron Wood (F.H.D.).

Gastrodes ferrugineus, L. Common on coniferous trees. Great Salkeld, Wan Fell (H.B.), Tarn Lodge, Baron Wood (G.B.R.), Orton (F.H.D.).

TINGIDAE.

Acalypta cervina, Germ. Occurs in moss but infrequently. Carlisle, Newton Reigny Moss in September (F.H.D.).

,, **parvula,** Fall. In cut grass and moss and by sweeping, common. Bowness Moss, Great Salkeld (H.B.), Prior Rigg (J.M.), Durdar, Orton, Silloth, Seascale (F.H.D.).

Dictyonota tricornis, Schr. Recorded from Great Salkeld by Mr. Britten.

,, **strichnocera,** Fieb. On furze, also in moss, not uncommon. Great Salkeld (H.B.), Orton, Prior Rigg (J.M.), Wan Fell, Kingmoor, Durdar (F.H.D.).

Derephysia foliacea, Fall. In hedges and on low plants, not uncommon. Tarn Lodge, on hazel (G.B.R.), Ivegill, Prior Rigg (J.M.), Durdar, Orton, Great Salkeld, Anthorn (F.H.D.).

Monanthia cardui, L. On thistles, common. Great Salkeld (H.B.), Spa Well, Kirkbampton, Cummersdale (J.M.), Orton, Seascale, Silloth (F.H.D.).

,, **humile,** F. On aquatic plants, local. Thurstonfield in June, Newton Reigny Moss (F.H.D.).

ARADIDAE.

Aradus depressus, F. Mr. Routledge took a specimen at Tarn Lodge, 29th May, 1909, which is our only record.

HEBRIDAE.

Hebrus ruficeps, Th. Occurs in wet *Sphagnum*, local, but at times is met with in profusion in autumn. Orton, Newton Reigny Moss (F.H.D.).

GERRIDIDAE.

Hydrometra stagnorum, L. Ponds and backwaters of streams, often found in flood refuse in winter. Great Salkeld (H.B.), Stainton (J.M.), Upperby, Cummersdale (F.H.D.).

Microvelia reticulata, Burm. (**pygmaea,** Br. Cat.). Very local, but from its small size perhaps overlooked. I took it freely in the water-net at Orton, 12th May, 1917.

Velia currens, F. Very common on ponds, in ditches, and by the sides of streams. The developed form is rare, but has been taken on Wan Fell (H.B.), and on the margins of Ullswater (F.H.D.).

Gerris lateralis, Schum., v. **costae,** H.S. Common in Cumberland on ponds on the peat. Tarn Lodge, Hayton Moss (G.B.R.), Wan Fell (H.B.), Orton (J.M.), Bowness Moss, Bowscale Moss, Saddleback (F.H.D.).

,, **thoracicus,** Schum. Less frequently met with than the last, favouring ponds of clear water. Great Salkeld (H.B.), Burgh Marsh (J.M.), Silloth, Upperby, Blackwell (F.H.D.).

,, **gibbifer,** Schum. On both boggy and ponds of clearer water, fairly common. Oulton Moss, Burgh Marsh (J.M.), Wan Fell (H.B.), Hayton Moss (G.B.R.), Thurstonfield, Bowness Moss, Cumwhitton Moss, Bowscale Moss (F.H.D.).

,, **lacustris,** L. Quite the commonest **Gerris** in Cumberland, so that localities need not be given.

,, **odontogaster,** Zett. Not very common. Edenhall, Newton Reigny Moss (H.B.), Burgh Marsh, Thurstonfield (J.M.), Orton, Black Dub, Cumwhinton (F.H.D.).

,, **asper,** Fieb. Of this rare species I captured two specimens on Thurstonfield lough, 6th June, 1925. Their identity was confirmed by Mr. Butler.

,, **rufoscutellatus,** Ltr. Recorded from Carlisle by Edward Saunders (*Synopsis, Trans. Ent. Soc.*, 1876). There are no later records. It is one of the rarest British species.

,, **najas,** De G. Mentioned by Butler (*Biology, p.* 249) as occurring in Cumberland, but on enquiry I was unable to learn the source of the record.

REDUVIIDAE.

Ploiariola vagabunda, L. Of infrequent occurrence. Mr. Murray reports it from S. fir at Orton, 16th. September, 1916, and Mr. Britten from Great Salkeld.

,, **culiciformis,** De G. Not common, generally found in buildings in autumn and winter. Great Salkeld (H.B.), Carlisle (J.M. & F.H.D.). On December 12th, 1926, a specimen dropped on to my office desk from the ceiling.

Coranus subapterus, De G. Local and not very common. Occurs on the bare ground among heather, where its resemblance to a bit of dead twig is remarkable. Wan Fell (H.B.), Cumwhitton Moss (F.H.D. and G.B.R.).

Nabis major, Cost. Not uncommon on the sandhills at Seascale and Silloth, June to September. St. Bees Head, 19th July, 1926 (F.H.D.), Hayton Moss, 27th June, 1901 (G.B.R.).

,, **flavomarginatus,** Scholtz. Very common in grassy places in all districts.

,, **limbatus,** Dahlb. Another common species, for which localities need not be given.

,, **ferus,** L. Frequently captured by sweeping. Langwathby, Wan Fell (H.B.), Gelt, Cumrew Fell (G.B.R.), Orton, Kelsick (J.M.), Edenhall, Durdar, Kingmoor, Seascale, &c. (F.H.D.).

,, **rugosus,** L. Fairly common on hedge banks, etc. Oulton Moss, Sceughmire (J.M.), Upperby, Monkhill, Lazonby Fell, Seascale (F.H.D.).

,, **ericetorum,** Scholtz. Occurs among heather, not scarce. Baron Wood, Wan Fell (H.B.), Wigton (J.M.), Great Salkeld, Orton (F.H.D.).

SALDIDAE.

Salda pilosa, Fall. On the salt marshes of the Solway, May to August, rather scarce. Burgh (J.M.), Skinburness, Kirkbride, Bowness (F.H.D.).

Salda littoralis, L. Also a salt-marsh species, but occurring inland as well, not infrequent. Ullswater (J.M.), Banks of River Irthing (Bold), Thurstonfield, Anthorn, Newton Marsh, Bowness (F.H.D.).

,, **oculata,** Mull. I took two specimens in moss at Orton, 12th June, 1915, which I believe to be this species.

,, **morio,** Zett. Widely distributed, but scarce. Cross Fell (H.B.), Newton Reigny Moss, Grisedale Pike (F.H.D.).

,, **riparia,** Fall. Rare. Melmerby Fell (H.B.).

,, **scotica,** Curt. A common insect in summer by the sides of streams and lakes. Bewcastle, Edmond Castle (G.B.R.), Ullswater, Coombe Crags, Spa Well (J.M.), Gelt, Cummersdale, Nunnery, Easby (F.H.D.).

,, **orthochila,** Fieb. Usually on drier ground than others of the genus. Melmerby Fell (H.B.), Orton (J.M.), Gelt, Tarn Lodge, Castle Carrock (G.B.R.), Saddleback (F.H.D.).

,, **saltatoria,** L. Fairly common on muddy margins of streams and ponds. Great Salkeld (H.B.), Prior Rigg (J.M.), Carleton, Rockcliffe, Wetheral (F.H.D.).

,, **c-album,** Fieb. A common stream-side species. By the Irthing and Gelt, and in Nunnery Walks (G.B.R.), Great Salkeld, Ullswater (H.B.), River Caldew and Burgh (J.M.), Carleton, Monkhill, Skinburness, Seascale, Kingmoor, Skiddaw (F.H.D.).

,, ,, var. **vestita,** D. & S. Rivers Irthing and Gelt (G.B.R.), Seascale, Cumwhitton Moss Thurstonfield, Port Carlisle, &c. (F.H.D.)

,, **pallipes,** F. On mud in salt-marshes, common. Burgh, Rockcliffe, Kirkbride (J.M.), Skinburness, Anthorn, Newton Marsh (F.H.D.).

,, **lateralis,** Fall. Another salt-marsh species. Mr. Britten and I took it freely near Kirkbride, 4th September, 1910.

,, **cincta,** H.S. Common in damp situations. Grinsdale (J.M.), Great Salkeld (H.B.), Easby, Orton, Newton Reigny Moss, Edenhall, Thurstonfield (F.H.D.).

,, **cocksi,** Curt. Apparently scarce. Wan Fell (H.B.).

CIMICIDAE.

Cryptostemma alienum, H.S. Local. Occurs among shingle on the banks of streams. Great Salkeld (H.B.), River Liddell, at Penton, common 24th May, 1926, the insects jumping and flying about in a very agile way.

Cimex lectularius, L. A pest in dirty houses.

Lyctocoris campestris, F. Under haystacks, in barns, &c., common. Tarn Lodge (G.B.R.), Kelsick, Newby West, Gelt (J.M.), Langwathby (H.B.), Birdoswald, Durdar, Orton, Carleton, Saddleback (F.H.D.).

Piezostethus galactinus, Fieb. A few specimens taken by sweeping among mixed herbage. Great Salkeld, Carlisle (F.H.D.).

,, **cursitans,** Fall. By beating trees, scarce. Great Salkeld (H.B.).

Temnostethus pusillus, H.S. Under bark and by beating trees. Tarn Lodge (G.B.R.), Durdar (J.M.), Kingmoor (F.H.D.).

Anthocoris confusus, Reut.
,, **nemoralis,** F.
,, **nemorum,** L.
These three common species are to be found on various trees and bushes throughout the county.

,, **gallarum-ulmi,** De G. Our only record is of a specimen taken by Mr. Murray, at Orton, 30th August, 1913.

,, **sarothamni,** D. & S. Tarn Lodge (G.B.R.).

Tetraphleps vittata, Fieb. A common species on S. fir, and occasionally larch. Orton (J.M.), Carleton, Durdar, Gaitsgill, Gelt, Great Salkeld (F.H.D.).

Acompocoris pygmaeus, Fall. Also attached to conifers, common. Hayton Moss, Tarn Lodge (G.B.R.), Great Salkeld, Wan Fell (H.B.), Dalston, Orton, Oulton Moss (J.M.), St. Bees (Collett), Warnell Fell, Crown Woods, Durdar (F.H.D.).

Triphleps minuta, L. Scarce. Great Salkeld, 10th October, 1909. (F.H.D.).

Microphysa pselaphiformis, Curt. On birch, hawthorn, etc., rather uncommon. Tarn Lodge (G.B.R.), Orton, Durdar, Kingmoor, Cumwhitton Moss, Gaitsgill, Penrith (F.H.D.).

,, **elegantula,** Baer. Great Salkeld, Skirwith, on fruit trees (H.B.).

Myrmedobia distinguenda, Reut. Great Salkeld, Skirwith (H.B.).

CAPSIDAE.

Miris calcaratus, Fall. Common in grassy places. Tarn Lodge, Easby, &c. (G.B.R.), Kelsick, Port Carlisle (J.M.), Great Salkeld, Langwathby (H.B.), Carlisle and district, Wan Fell, Keswick, Mungrisdale, &c. (F.H.D.), St. Bees (Collett).

,, **laevigatus,** L. Common in grassy places. Kelsick, Shawk, Newby Cross (J.M.), Langwathby (H.B.), Durdar, Orton, Easby, Newton Reigny (F.H.D.).

,, **holsatus,** L. Very common in Cumberland in grassy places

Megaloceraea erratica, L. Apparently rare here. I took one specimen on a dry hedgebank at Blackwell, 18th July, 1919, of the var. **virescens,** Fieb.

,, **ruficornis,** Geoffr. Common in grassy lanes and meadows in all parts of the county.

,, **psammaecolor,** Reut. Occurs on coast sandhills on the marram grass. Silloth (J.M.), Drigg, abundant in July, 1926 (F.H.D.).

Teratocoris saundersi, D. & S. A somewhat scarce species, occurring on vegetation on marshy ground. Newton Reigny Moss, June, 1925; Cumwhitton Moss, July, 1917 (F.H.D.), St. Bees (Collett).

Leptopterna ferrugata, Fall. Locally common on tall grass, etc., in July. Tarn Lodge (G.B.R.), Great Salkeld (H.B.), Kelsick, Beckfoot, Orton (J.M.), Kingmoor, Wan Fell, Cumwhitton Moss (F.H.D.).

,, **dolabrata,** L. Occurs commonly in grassy places. Tarn Lodge, Gelt (G.B.R.), Belle Vue, Kelsick, Dundraw (J.M.), Great Salkeld (H.B.), St. Bees (Collett), Orton, Durdar, Caldbeck (F.H.D.).

Lopus gothicus, L. Scarce. Mr. Murray took a series by sweeping in a lane in Eskdale, 5th July, 1917.

" " var. **superciliosus,** L. Eskdale, one specimen, 5th July, 1917 (J.M.).

Pantilius tunicatus, F. Scarce. Rose Bridge, on alder in September and October (J.M.).

Phytocoris populi, L. On oak and other trees, not very common. Tarn Lodge, Hayton Moss (G.B.R.), Langwathby (H.B.), Gelt (J.M.).

" " var. **distinctus,** D. & S. Spa Well (J.M.), Tarn Lodge (G.B.R.), Durdar (F.H.D.).

" **tiliae,** F. On lime, oak and other trees, fairly common. Orton (J.M.), Great Salkeld on plum trees (H.B.), Tarn Lodge, Hayton Moss (G.B.R.), Durdar, Nunnery Woods (F.H.D.).

" **longipennis,** Flor. Common on various trees, oak perhaps being the most favoured. Hayton Moss, Tarn Lodge (G.B.R.), Kelsick (J.M.), Orton, Durdar, Baron Wood (F.H.D.).

" **dimidiatus,** Kbm. Sparingly on oak. Hayton Moss, Tarn Lodge (G.B.R.), Orton (J.M. & F.H.D.).

" **pini,** Kbm. Locally common in August on Scotch fir and spruce. Wan Fell (H.B.), Hayton Moss (G.B.R.), Crown Woods, Broadfield (F.H.D.).

" **varipes,** Boh. Apparently scarce or overlooked. St. Bees, one from hedgerow (Collett, *E.M.M.*, 1925, p. 116).

" **ulmi,** L. Common on nettles, etc. Great Salkeld (H.B.), Tarn Lodge (G.B.R.), Grinsdale, Kelsick, Burgh (J.M.), Durdar, Orton (F.H.D.).

Adelphocoris lineolatus, Goeze (**Calocoris chenopodii,** Fall). Has only occurred on the coast, not common. Allonby (J.M.), Silloth, Seascale, a short series swept from rushes, July, 1926 (F.H.D.).

Calocoris bipunctatus, F. On low herbage, nettles, etc., common. Tarn Lodge, Hayton Moss, Edmond Castle (G.B.R.), Burgh, Wigton, Kelsick, Castle Carrock, &c. (J.M.), St. Bees (Collett), abundant near Carlisle (F.H.D.).

Calocoris roseomaculatus, De Geer. A local species. Mr. Routledge has taken a few at Tarn Lodge, in July.

,, **alpestris,** Mey. Very local on *Stachys sylvatica* in June. Gelt Woods (J.M., G.B.R., F.H.D.).

,, **sexguttatus,** F. Very common in Cumberland in nettle beds and similar coarse herbage.

,, **ochromelas,** Gmel. In woods, generally on oak, common. Gelt, Hayton Moss (G.B.R.), Spa Well (J.M.), Orton, Baron Wood, Keswick, Durdar (F.H.D.).

,, ,, var. **fornicatus,** D. & S. Gelt (G.B.R.). Kirkbampton (J.M.), Orton (F.H.D.).

Pycnopterna (Calocoris) striata, L. Occurs on oak in our larger woods in June. Gelt (G.B.R.), Orton (J.M.), Baron Wood, Keswick (F.H.D.).

Dichrooscytus rufipennis, Fall. On S. fir and spruce, local, found in July and August. Wan Fell (H.B.), Cumwhitton Moss, Hayton Moss (G.B.R.), Orton (J.M.), Broadfield (F.H.D.).

Plesiocoris rugicollis, Fall. Common on sallow bushes, also at times on black currant (G.B.R.). Kelsick, Bowness-on-Solway, Coombe Crags (J.M.), Great Salkeld (H.B.), Tarn Lodge, Carlatton (G.B.R.), Orton, Gelt, Middlesceugh (F.H.D.).

Lygus pabulinus, L. Common on low herbage. Great Salkeld, Wan Fell (H.B.), Tarn Lodge, Gelt (G.B.R.), Eskdale, Cleator (J.M.), Orton, Durdar, Middlesceugh (F.H.D.).

,, **contaminatus,** Fall. Common on birch. Great Salkeld (H.B.), Wetheral (J.M.), Tarn Lodge, Hayton Moss (G.B.R.), Orton, Cumwhitton Moss (F.H.D.).

,, **lucorum,** Mey. Spa Well, one, Dalston, 30th September, 1916, on alder (J.M.), Wreay (F.H.D.).

,, **viridis,** Fall. Rather scarce. My specimens were taken on lime trees in August. Orton (J.M.), Tarn Lodge, Naworth (G.B.R.), Nunnery Woods (F.H.D.).

,, **pratensis,** L. A very common species in Cumberland.

Lygus rubricatus, Fall. Confined to spruce and S. fir trees, locally common. Great Salkeld (H.B.), Gaitsgill, Broadfield (F.H.D.).

,, **cervinus,** H.S. Of rather infrequent occurrence. Spa Well (J.M.), Gelt, Tarn Lodge (G.B.R.), Gaitsgill, Middlesceugh (F.H.D.).

,, **kalmii,** L. On *Umbellifers*, moderately common. Tarn Lodge, Gelt (G.B.R.), St. Bees (Collett), Port Carlisle, Brownrigg Marsh, Aikshaw Moss, Burgh (J.M.), Kingmoor, Durdar, Orton (F.H.D.).

Camptozygum pinastri, Fall. On S. fir, local, but not scarce. Hayton Moss (G.B.R.), Oulton Moss (J.M.), Orton, Broadfield, Armathwaite (F.H.D.).

Poeciloscytus unifasciatus, F. I took a specimen from" Meadow Sweet," at Orton, 28th June, 1919, which is our only record.

Polymerus nigritus, Fall. Recorded from Carleton, 14th July, 1917, by Mr. Murray as " common but very local on White Bedstraw."

Charagochilus gyllenhali, Fall. On nettles, etc., not uncommon. Tarn Lodge (G.B.R.), Orton, Port Carlisle (J.M), Seascale, Great Salkeld (F.H.D.).

Liocoris tripustulatus, F. On nettles and other low herbage, also in flood refuse in winter. Tarn Lodge, Gelt (G.B.R.), Prior Rigg, Ainstable (J.M.), Orton, Cummersdale (F.H.D.).

Capsus scutellaris, F. Among heather in July, local. Wan Fell, Cumwhitton Moss (F.H.D.) ; most specimens from the later locality being the black var. **morio,** Boh.

Rhopalotomus ater, L. Common on various low plants. Great Salkeld (H.B.), Tarn Lodge, Gelt (G.B.R.), Kelsick, Port Carlisle, Orton (J.M.), St. Bees (Collett), Rockcliffe, Newton Reigny Moss, Blackwell (F.H.D.).

Pithanus maerkeli, H.S. In grassy places, generally distributed. Kelsick, Eskdale, Dalston (J.M.), Tarn Lodge (G.B.R.), St. Bees (Collett), Kingmoor, Orton, Port Carlisle, Cumwhitton Moss (F.H.D.).

Bothynotus pilosus, Boh. This rare British insect has been taken by Mr. Murray at Orton, and by Mr. Routledge on Hayton Moss. It occurs in July and August, and is said to be associated with conifers.

Monalocoris filicis, L. Common on various kinds of ferns throughout Cumberland.

Bryocoris pteridis, Fall. Also on ferns, but less frequent than the last; the **macropterous** form is scarce. Wan Fell, Great Salkeld (H.B.), Gelt, Orton, Kelsick (J.M.), Egremont, St. Bees (Collett), Tarn Lodge, Hayton Moss (G.B.R.), Wreay (F.H.D).

Macrolophus nubilus, H.S. Rare. I swept three specimens from *Stachys* on a hedge bank at Blackwell, July, 1918. The locality was soon after built on.

Dicyphus epilobii, Reut. Locally common, where its food-plant, *Epilobium hirsutum*, grows. Gelt in August, Dundraw (J.M.), Great Salkeld (H.B.), Cummersdale, abundant (F.H.D.).

,, **stachydis,** Reut. On *Stachys sylvatica*, very common at times. Shawk, Kelsick, Lesson Hall, Aikshaw Moss (J.M.), Great Salkeld (H.B.), Gelt Woods (G.B.R.), Wreay, Cummersdale, &c. (F.H.D.).

,, **pallidicornis,** Fieb. Common on foxgloves, preferring the undersides of the lower leaves. Great Salkeld (H.B.), Cummersdale, Armathwaite (F.H.D.).

,, **globulifer,** Fall. Has only occurred sparingly hitherto. Associated with *Lychnis*. Gelt Woods, Tarn Lodge (G.B.R.), Seascale, Great Salkeld (F.H.D.).

Campyloneura virgula, H.S. Sparingly in August on oak. Wreay (J.M.), Nunnery Woods, Durdar (F.H.D.).

Orthocephalus saltator, Hahn. A scarce species in Cumberland, Seascale, 2nd July, 1917 (J.M.), Tarn Lodge, one, undeveloped (G.B.R.), Ennerdale, one, **macropterous** (Collett).

Strongylocoris leucocephalus, L. In grassy places, rather frequent in the sweep net. Great Salkeld (H.B.), St. Bees (Collett), Orton, Port Carlisle (J.M.), Baron Wood (F.H.D.).

Strongylocoris luridus, Fall. A rarity in the British Isles. Mr. Murray took a specimen at Prior Rigg, 9th July, 1921, "from amongst a mixture of nettles, docks and lady ferns."

Cyllocoris histrionicus, L. Common on oak trees in June and July. Gelt, Hayton Moss (G.B.R.), Spa Well, Coombe Crags, Caldbeck (J.M.), Orton, Durdar, Middlesceugh, Keswick (F.H.D.).

,, **flavonotatus,** Boh. Another common oak species. Gelt Woods, Kelsick (J.M.), Heads Nook, River Irthing (G.B.R.), Wreay, Orton, Keswick, Baron Wood (F.H.D.).

Aetorhinus angulatus, Fall. On various trees, alder most frequently. Great Salkeld (H.B.), Kelsick, Oulton Moss, Orton (J.M.), Tarn Lodge, Hayton Moss, Carlatton (G.B.R.), Kingmoor, Port Carlisle, Newton Reigny Moss (F.H.D.).

Globiceps dispar, Boh. Apparently scarce. St. Bees (Collett), Pow Bridge, near Durdar, one swept from mixed herbage, August 19th, 1922 (F.H.D.).

Mecomma ambulans, Fall. Common on rushes and other plants in damp situations. Great Salkeld (H.B.), Tarn Lodge, Gelt (G.B.R.), St. Bees (Collett), Castle Carrock Fell, Brayton, Oulton Moss (J.M.), Kingmoor, Cumwhitton Moss, Carleton, &c. (F.H.D.). The scarce **macropterous** form of the female is recorded from Culgaith, 19th August, 1920, by Mr. G. E. Hutchinson (*E.M.M.*,1921, p. 39).

Cyrtorrhinus caricis, Fall. On marshy ground, local. Great Salkeld (H.B.), Newton Reigny Moss, Durdar (F.H.D.).

Orthotylus virens, Fall. The first British specimens were taken on Cumwhitton Moss by me, 12th July, 1917; a few days later Mr. Murray took one at Spa Well. Subsequently it was found in abundance on the Bay Willow (*Salix pentandra*) in the first

locality by Mr. Routledge and myself. Other localities are Hayton Moss (G.B.R.), Kelsick (J.M.), Newton Reigny Moss (G. E. Hutchinson), Orton (F.H.D.).

Orthotylus marginalis, Reut. Common on sallow. Brayton, Orton (J.M.), Great Salkeld (H.B.), Cumwhitton Moss, Tarn Lodge on black currant (G.B.R.), Broadfield, Wan Fell, Durdar, &c. (F.H.D.).

,, **bilineatus,** Fall. Ousby, 10th September, 1922, common on aspen (H.B.).

,, **tenellus,** Fall. Very sparingly on oak. Kingmoor, Cumwhitton Moss, Middlesceugh (F.H.D.).

,, **viridinervis,** Kb. On elm and hazel, not uncommon. Great Salkeld (H.B.), Tarn Lodge, Hayton Moss (G.B.R.), Gaitsgill, Middlesceugh, Cumwhitton Moss (F.H.D.).

,, **flavosparsus,** Sahlb. On low herbage, scarce. Great Salkeld (F.H.D.).

,, **chloropterus,** Kb. Local, but sometimes common on broom. Orton, Brownrigg Marsh (J.M.), Port Carlisle (F.H.D.).

,, **concolor,** Kb. Recorded from Great Salkeld by Mr. Britten, 27th August, 1913 (*E.M.M.*, 1916, p. 278).

,, **ericetorum,** Fall. Common on heather. Hayton Moss (G.B.R.), Wan Fell (H.B.), Ennerdale (Collett), Orton, Oulton Moss, Baron Wood, Castle Carrock (J.M.), Broadfield, Durdar, Port Carlisle, Drigg (F.H.D.).

Heterocordylus genistae, Scop. Scarce. Seascale, 4th July, 1917 (J.M.), Great Salkeld, freely (H.B.).

,, **tibialis,** Hahn. On broom, usually abundant. Bromfield, Orton (J.M.), Great Salkeld (H.B.), Hayton Moss (G.B.R.), Cumwhitton Moss, Gelt (F.H.D.).

Malacocoris chlorizans, Fall. Not uncommon on hazel. Great Salkeld (H.B.), Tarn Lodge (G.B.R.), Wreay (J.M.), Cummersdale (F.H.D.).

Onychumenus decolor, Reut. Local, common at times on grass. Great Salkeld (H.B.), Port Carlisle, Orton (F.H.D.).

Conostethus salinus, J. Sahl. On salt marshes, sometimes abundant in June running on the ground among short grass. Kirkbride (F.H.D.).

Macrotylus paykulli, Fall. Common on *Ononis*, especially on the coast. Allonby, Silloth (J.M.), Carlatton (G.B.R.), Drigg, Seascale (F.H.D.).

Harpocera thoracica, Fall. Common on oak in June. Gelt, Tarn Lodge (G.B.R.), Sceughmire, Port Carlisle (J.M.), Kingmoor, Durdar, Baron Wood, Great Salkeld, Seascale, &c. (F.H.D.).

Phylus palliceps, Fieb. Fairly common on oak in July. Spa Well, Orton (J.M.), Hayton Moss, Wetheral (G.B.R.), Kingmoor, Castlesteads, Middlesceugh (F.H.D.).

,, **melanocephalus,** L. In company with the last, but commoner. Newby Cross, Eskdale, Orton (J.M.), Tarn Lodge, Hayton Moss, Gelt (G.B.R.), Kingmoor, Middlesceugh (F.H.D.).

,, **coryli,** L. In July and August on hazel, local. Tarn Lodge (G.B.R.), Gelt, Cummersdale (J.M.), Egremont (Collett), Middlesceugh (F.H.D.). In my experience, var. **avellanae,** Mey, is less common than the type form. At Middlesceugh they occur together.

Plesiodema pinetellum, Zett. Wan Fell, 2nd July, 1911, one specimen (H.B., *E.M.M.*, 1916, p. 279).

Psallus ambiguus, Fall. On various trees and bushes, common at times. Gelt, Dalston on alder (J.M.), Great Salkeld (H.B.), Carlatton (G.B.R.), Wreay, Middlesceugh (F.H.D.).

,, **betuleti,** Fall. Generally on birch, fairly common. Orton, Spa Well (J.M.), Baron Wood (H.B.), Tarn Lodge, Cairn Bridge, Hayton Moss (G.B.R.), Kingmoor, Middlesceugh (F.H.D.).

,, **obscurellus,** Fall. Great Salkeld on Scot's pine (H.B.).

Psallus variabilis, Fall. On oak and other trees, common, Gelt (G.B.R.), Coombe Crags, Orton (J.M.), Great Salkeld (H.B.), Durdar, Kingmoor, Keswick, Seascale (F.H.D.).

,, **quercus,** Kb. On young oaks, local. Orton, June and July (F.H.D.).

,, **lepidus,** Fieb. On ash trees, not very common. Tarn Lodge (G.B.R.), Kelsick, Spa Well, Holmrook (J.M.), Durdar, Kingmoor, Middlesceugh (F.H.D.).

,, **alnicola,** D. & S. Scarce, perhaps overlooked. Dalston. 30th September, 1916 (J.M.), Middlesceugh, 22nd July, 1924 (F.H.D.).

,, **falleni,** Reut. Somewhat scarce on birch. Tarn Lodge (G.B.R.), Orton (J.M.), Nunnery Woods, Rose Bridge (F.H.D.).

,, **varians,** H.S. Abundant in Cumberland, localities are hardly necessary.

,, **roseus,** F. On sallow bushes, common at times. Newby Cross, Shawk, Kelsick, Wreay (J.M.), Tarn Lodge (G.B.R.), Wan Fell, Great Salkeld (H.B.), Durdar, Newton Reigny Moss (F.H.D.).

Atractotomus magnicornis, Fall. Locally common on spruce and S. fir. Tarn Lodge (G.B.R.), Orton, Ivegill (J.M.), Crown Woods, Gaitsgill (F.H.D.).

Plagiognathus albipennis, Fall. Mr. Britten records this from Great Salkeld.

,, **chrysanthemi,** Wolff. Common in the sweep net. Silloth, Burgh, Kelsick, &c. (J.M.), Gelt, Tarn Lodge (G.B.R.), Great Salkeld (H.B.), St. Bees (Collett), Seascale, Kingmoor, Orton, &c. (F.H.D.).

,, **arbustorum,** F. Common everywhere on nettles, etc.

Chlamydatus wilkinsoni, D. & S. I have two specimens, one from Durdar swept from grass in a marshy place, 5th July, 1919, the other from Saddleback, 21st July, 1918, taken at a height of about 1,500 feet.

Asciodema obsoletum, D. & S. Occurs on furze in numbers, less frequently on broom. Tarn Lodge, Carlatton (G.B.R.), Orton, Kelsick (J.M.), Great Salkeld (H.B.), Kingmoor, Seascale (F.H.D.).

,, **fieberi,** D. & S. One specimen from hazel at Hesket-New-Market, 27th August, 1918 (F.H.D.).

NEPIDAE.

Nepa cinerea, L. In ponds and small lakes, not uncommon. Hayton Moss, Tarn Lodge (G.B.R.), Great Salkeld (H.B.), Edenhall, Thurstonfield, Monkhill, Cummersdale (F.H.D.).

NOTONECTIDAE.

Notonecta glauca, L. A common inhabitant of ponds. Great Salkeld, Wan Fell (H.B.), Monkhill, Oulton Moss (J.M.), Cumwhitton Moss (G.B.R.), Cumwhinton, Orton, Edenhall, Thurstonfield, Cummersdale (F.H.D.).

,, **furcata,** F. Wan Fell (H.B.), Kirkbride (F.H.D.).

,, **maculata,** F. Edenhall (F.H.D.).

CORIXIDAE.

***Corixa geoffroyi,** Leach. The members of this genus are aquatic, and are found in ponds of clear water, ditches, occasionally in the brackish pools on the Solway marshes, and in the sphagnum-choked water holes on the peat mosses. They are to be captured in spring and autumn ; in the summer months they are less in evidence except as larvae. **C. geoffroyi** is generally common, and is our largest species. Great Salkeld, Wan Fell (H.B.), Monkhill, Oulton Moss, Cummersdale (J.M.), Cumwhinton, Edenhall, Durdar, Rockcliffe Marsh (F.H.D.).

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* See E.M.M. 1927, pp. 224-226, for further notes on this genus in Cumberland.—Eds.

Corixa lugubris, Fieb. A salt-marsh species, common. Burgh Marsh (J.M., F.H.D.).

,, **hieroglyphica,** Duf. In clear water, rather scarce. Cummersdale, Durdar, Carleton (F.H.D.).

,, **sahlbergi,** Fieb. One of our commonest species. Hayton Moss (G.B.R.), Wan Fell (H.B.), Burgh Marsh, Cummersdale, Carleton (J.M.), Durdar, Orton, Thurstonfield, Mungrisdale, Cumwhinton, &c. (F.H.D.)

,, **linnaei,** Fieb. Scarce. Orton, Cummersdale (F.H.D.).

,, **limitata,** Fieb. Rather scarce. Rockcliffe Marsh (G.B.R.) Kingmoor, Cummersdale (F.H.D.).

,, **semistriata,** Fieb. More frequent than the last. Cummersdale, Kingmoor, Stoneyholme, Thurstonfield (F.H.D.).

,, **venusta,** D. & S. Locally common. Kingmoor, Cumwhinton, Bowscale Moss, Seascale (F.H.D.), Carlisle (J.M.).

,, **striata, L.** Common. Great Salkeld, Edenhall (H.B.), Rockcliffe Marsh (G.B.R.), Carleton, Cummersdale (J.M.), Kirkbride, Burgh Marsh (F.H.D.).

,, **distincta,** Fieb. Fairly common. Great Salkeld (H.B.), Thurstonfield, Monkhill, Edenhall, Cumwhinton, Kirkbampton (F.H.D.).

,, **falleni,** Fieb. Less frequent than the last. Cummersdale, Monkhill (J.M.), Cumwhinton (F.H.D.).

,, **moesta,** Fieb. Local, common at times. Wan Fell (H.B.), Hayton Moss (G.B.R.), Silloth, Bowscale Moss(F.H.D.)

,, **fossarum,** Leach. Fairly common. Cummersdale (J.M.), Kingmoor, Black Dub, Cumwhinton (F.H.D.).

,, **scotti,** Fieb. Rare, Orton, 22nd September, 1906, one specimen (F.H.D.).

,, **nigrolineata,** Fieb. Our commonest **Corixa**, so localities are not necessary. Specimens from peaty water are very dark.

Corixa praeusta, Fieb. Common, in some ponds the prevailing species. Hayton Moss, Rockcliffe Marsh (G.B.R.), Cummersdale, Oulton Moss, &c. (J.M.), Wan Fell (H.B.), Durdar, Kingmoor, Newby West, Bowscale, &c. (F.H.D.).

,, ,, var. **wollastoni,** D. & S. Sprinkling Tarn (H.B.), Orton, Thurstonfield, Saddleback (F.H.D.).

,, **caledonica,** Kirk. A specimen taken at Thurstonfield, 12th September, 1908, is mentioned by Butler (*Biology*, p. 596) as possibly this " Scotch " species.

,, **concinna,** D. & S. Burgh Marsh in numbers, May, 1927 (F.H.D.).

,, **bonsdorffi,** Sahlb. Local and not very common. Monkhill (J.M.), Thurstonfield, Edenhall (F.H.D.).

Micronecta minutissima, L. In small rivers, locally common. River Caldew at Dalston (J.M.), River Caldew at Cummersdale, River Irthing at Easby (F.H.D.).

Corixa dentipes, Th. See E.M.M., 1928, p. 158, for a note on the occurrence at Thurstonfield of this recent addition to the British list, also p. 236 for a note on its occurrence at Edenhall.

CUMBERLAND ODONATA (DRAGONFLIES).

By F. H. DAY, F.E.S.

(*Read March 24th*, 1927).

There are few more striking or (when alive) beautiful insects than Dragonflies, and being of either large or medium size and active habits, their observation in the field may be prosecuted without the close search required with other Orders of insects.

To be sure the wonderful power of flight possessed by some of the larger species, makes their capture no easy matter, and calls for the exercise of much patience and considerable skill in the use of the net, but to the entomologist with a love for sport, Dragonfly-hunting can be recommended as conducive to healthful and vigorous exercise.

The earlier stages of Dragonflies are passed in water, and the perfect insects are to be found during the summer months flying about in the vicinity of ponds, lakes, ditches and streams in pursuit of flies and other insects, upon which they prey, although, at times, one or two species are to be found far away from their natural habitats.

Contrary to the popular idea, Dragonflies cannot sting, and they may be handled with perfect safety. The local name of " Bullstang " is entirely misapplied. They neither sting nor torment cattle or horses in any other way.

The following faunal notes on the 13 species I have met with in Cumberland have been drawn up from over 30 years' work on the Entomology of the county. This is about a third of the number known to occur in the British Isles, but from the known distribution of two other species—**Sympetrum striolatum** Charp and **Lestes sponsa** Hansem—it is probable that they also will eventually be found with us.

Leucorrhinia dubia, Lind. This " northern " species is extremely local in Cumberland. I have only met with it, as yet, on Cumwhitton Moss, where, however, it is quite common in June and July, the males being most abundant. It frequents boggy pools, but often indulges in short, jerky flights over the heather, rarely soaring up into the tops of trees. A very handsome insect when alive.

Sympetrum scoticum, Don. A common species in August on some of our local mosses, Bowness Moss, Lazonby Fell, Keswick, etc. I have also taken it in marshy meadows at Orton, near Carlisle, where it has probably survived from the time when this locality was more primeval than now. Teneral specimens from their lighter colour are more conspicuous in flight over the dark background of the " moss " than mature ones.

Libellula quadrimaculata, L. One of the most characteristic " moss" species. Occurs from the end of May until August. Bolton Fell, Newton Reigny, Bowness Moss, Hayton Moss, &c. A vigorous Dragonfly on the wing, but sometimes may be found at rest among heather or in bushes on dull, cloudy days.

Orthetrum coerulescens, F. Except for a male I captured in Borrowdale, on June 30th, 1903, and recorded in the *Ent. Monthly Magazine*, 1904, p. 111, I do not think this fine species has been taken in Cumberland. In its British distribution it is a southern insect, the nearest locality to us where it has been found being in Cheshire (vide Lucas, " *British Dragonflies*", p. 126). My specimen was captured on the wing in a wet meadow by the River Derwent.

Cordulegaster annulatus, Latr. Fairly common in the Lake District in July. Derwentwater, Ullswater, Crummock, Buttermere, &c. It flies far out over the lakes, and may also be seen careering high up on the fells. I have one from the hills above Caldbeck, taken at rest on a rock. It is not often met with in this way, and being a most powerful insect on the wing, is more often seen than captured.

Aeschna juncea, L. A common insect in Cumberland. I have taken it at Orton, Newton Reigny, Wan Fell, Cumwhitton Moss, Bowness Moss, and elsewhere from June to late September. In addition to frequenting "mosses," it also occurs in lanes, along hedgerows, and on the outskirts of woods, wandering far from the ponds in which its earlier stages were passed.

Aeschna cyanea, Mull. Appears to be scarce in the county. I possess only two examples, both taken on the wing along hedgerows near Carlisle.

Calopteryx virgo, L. This charming species is associated with streams, especially where fringed with osiers and alders. It occurs in May and June, and although widely distributed, is hardly a common insect in Cumberland. I have taken it by the River Petteril, at Wreay; by the River Derwent, at Seathwaite, and by the River Eden, near Warwick. Being weak on the wing, it is easily captured.

Pyrrhosoma nymphula, Sdlz. One of the earliest species to appear. May be found early in May, and lingers on into August. It frequents the "mosses," the margins of streams and marshy ground generally, and occasionally wanders into gardens. Carlisle district, Cumwhitton Moss, Keswick, Great Salkeld, Bowness Moss, &c.

Ischnura elegans, Lind. Very common by streams and ditches. weedy ponds and in marshy meadows in June and July, Carlisle district, Solway Moss, Newton Reigny, Great Salkeld, Cumwhitton Moss, &c.

Agrion pulchellum, Lind. I took four specimens on Newton Reigny Moss, 25th June, 1905, which are the only captures I know of.

Agrion puella, L. Another common Dragonfly in Cumberland, being found on marshy ground, by weedy ditches and ponds throughout the county. My specimens are from the Carlisle district, Cumwhitton Moss, Solway Moss, Great Salkeld, and Newton Reigny. It is on the wing in June and July.

Enallagma cyathigerum, Charp. Widely distributed, but not an abundant species. Sometimes found in dry situations far away from water. I have specimens from Kingmoor, Blackwell and Solway Moss, and it has been recorded from Keswick and Brampton. It occurs in June.

FURTHER ADDENDA TO "THE COLEOPTERA OF CUMBERLAND," published in Vols. I., II., and III.

By FRANK H. DAY, F.E.S.

(Read 8th December, 1927).

Since the publication of the above list, the following additional species have been found in Cumberland :—

Haliplus apicalis, Th. This species occurred in abundance in brackish pools near Kirkbride, in June, 1924, and in subsequent years. I found it also on Burgh Marsh in 1927.

,, **immaculatus,** Gerh. Two specimens among some material captured near Carlisle in 1903. Mr. Murray also took a pair near Sellafield in 1917.

,, **nomax,** B. Browne. Monkhill ; two specimens several years ago.

Myrmedonia limbatus, Pk. Ennerdale, 5/6/1926 ; two specimens under stones in company with the yellow ant (**F. flava**).

Oligota apicata, Er. One specimen under bark on a fallen beech, Kingmoor, 16/5/1925.

Quedius schatzmayri, Gridelli. This recent addition to the British list occurs not uncommonly in flood refuse, etc., in the neighbourhood of Carlisle.

Stenus ater, Man. Tarn Wadling, 3/5/1926 ; one specimen in dead reeds.

Bledius terrebrans, Schiodte. Kingwater, 24/5/1926 ; two specimens on the sandy margin of the stream.

Lesteva luctuosa, Fauv. In waterfall moss, Skiddaw and Helvellyn.

Olophrum nicholsoni, Donis. One in moss at Orton, 19/5/1924 ; another in flood refuse near Carlisle, 7/11/1925.

Phyllodrepa puberula, Bernh. Three specimens, Great Salkeld, Durdar, Southwaite.

Trichopteryx fratercula, Matth. Mr. Britten tells me he has this species from Great Salkeld, taken by him in 1913.

Colon latum, Kr. Caldbeck, 20/4/1924; one specimen in moss.

Ephistemus globosus, Waltl. Two specimens near Carlisle, in June, 1924, and February, 1925.

Coenocelis pallida, Woll. Middlesceugh, 19/7/1924; one specimen by sweeping under trees.

Psilothrix cyaneus, Ol. Seascale, July, 1921; one specimen taken by Mr. Murray.

Monochamus sartor, F. Two specimens in Carlisle among imported timber.

„ **sutor** L. One specimen; also imported.

Gracilia minuta, F. A number of specimens captured among baskets in a factory in Carlisle, July, 1925.

Aphthona nigriceps, Redt. Taken rather freely by Mr. Murray, at Dundraw, from **Geranium,** September, 1925.

Meloe violaceus, Marsh. One specimen at Mungrisdale, 16/5/1925.

Ceuthorrhynchus chalybaeus, Germ. Sparingly at Kingmoor, Wreay, and Great Salkeld. This species replaces **C. timidus,** Weise, recorded Vol. III., p. 104, which was wrongly identified.

Dryocoetes alni, Georg. Mr. Britten reports this species as abundant at Skirwith, September, 1924.

When the publication of the list of Cumberland Coleoptera was commenced in these Transactions, nearly 20 years ago, the records then in hand referred to some 1,630 species, and I expressed the opinion that about 1,700 would probably eventually be found. Progress has, however, been so satisfactory that actually 190 additional species have been discovered since my estimate was made, and the total number of species for Cumberland is now 1820. There are probably, however, other species still to be detected, as considerable areas have not yet been fully explored.

I shall be glad, therefore, as heretofore, to receive notes of captures from, or to name doubtful species for, any collectors who may do any work in the county.