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THE

# ESSEX NATURALIST:

BEING THE

Journal of the Essex Field Club,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary.*

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*“Men that undertake only one district are much more likely to advance natural knowledge than those that grasp at more than they can possibly be acquainted with. Every kingdom, every province, should have its own Monographer.”—GILBERT WHITE, of Selborne,*

*“Things seen are mightier than things heard.”—TENNYSON.*

[The authors alone are responsible for the statements and opinions contained in their respective papers.]

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1906



*Dr. J. Lowell Good*

*"To the attentive eye, each moment of the year has its own beauty."*

EMERSON.

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*"If you have seen, as I have seen  
One morning in November,  
The sun burn through a foggy screen  
Like some red glowing ember,  
White yellow leaves from pencilled trees  
Fly down like small canaries—  
If you have caught a glimpse of these,  
Then you have seen the Fairies !*

*"If you have heard above the roar  
Of traffic in the city,  
The gentlest pecking at your door,  
The faintest chirp for pity,  
If scattered crumbs from off your plate  
Have made brown wings the fleetest,  
Then you have walked right through the gate  
Whose keys are held by Peter !"*

ROSE HENNIKER HEATON.

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*. . . . "The only real gain of wealth is that represented by the storage of energy from without, which comes to us by the action of green leaves waving in the sunshine."*

Prof. H. MARSHALL WARD.

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<sup>1</sup> Note.—The Plates may either be arranged as indicated, or placed together at the end of the volume.

## ERRATA.

- Page 8 line 17 from foot, for "promimently" *read* prominently.  
 ,, 32 line 12 from foot, for "Amercian" *read* American.  
 ,, 61 bottom line, for "1900" *read* 1893.  
 ,, 69 line 9 from foot, for "Frankport" *read* Frankfort.  
 ,, 128 line 8, for "that" *read* than.  
 ,, 150 line 16 from foot, *delete* more.  
 ,, 160 line 8, after "Epping" *add* Forest.  
 ,, 165 line 9 from foot, for "orcadensis" *read* scomerensis.  
 ,, 235 line 11 from foot, for "hygrometer" *read* hydrometer.  
 ,, 236 line 13 from foot, for ".45" *read* .44.  
 ,, 257 line 5 from foot, for "principal" *read* Principal.  
 ,, 258 line 18 for "precedenee" *read* precedence.  
 ,, 268 line 7 from foot, after "Essex" *insert* Field Club.  
 ,, 269 line 23 from foot, for "Amesbresbury" *read* Ambresbury.  
 ,, 274 lines 10 and 14, for "mistakeable" *read* mistakable.  
 ,, 274 lines 12 and 15, for "remainæ" *read* remanié.

[The Editor is greatly indebted to the kindness of Mr. Henry Whitehead for making the foregoing Index.]

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[APRIL, 1905.

*The*

# Essex Naturalist:

BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary and Curator.*

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<i>[This Part contains the first Instalment (nine) of the Twenty-five Plates by Mr. C. Sillem, which will be used to illustrate the Monograph on the British Woodlice.]</i>	
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*The Authors alone are responsible for the statements and opinions contained in their respective papers.*

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# THE ESSEX FIELD CLUB.

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**Membership of the Club.**—Information respecting Membership and the work of the Club, with forms of proposal, will be sent on application to the Hon. Secretaries, at the Headquarters.

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**The Essex Museum of Natural History** (*Romford Road, Stratford, Essex*) is designed and arranged as a Local Museum for the County, and as an Educational Museum for use of the general public, students and schools. Included in the scheme is a Lecture-room for Demonstrations and the aid of a growing Library of some of the most useful monographs of British Geology, Botany, and Zoology, *for the use of Students in the Museum.* *Curator,* W. COLE. *Assistant,* HENRY WHITEHEAD.

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**The Epping Forest Museum**, established by permission of the Corporation of London in Queen Elizabeth's Hunting Lodge, Chingford, Essex, is devoted to the elucidation of the Natural History and Antiquities of Epping Forest, and as a centre for Nature-study for schools and young naturalists. *Honorary Curators,* W. COLE, B. G. COLE, and H. A. COLE.

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**The Libraries of the Club** include works on Natural History, Geology, and Antiquities, with a special department of books, pamphlets, and MSS. relating to Epping Forest. *Honorary Librarian,* THOMAS W. READER.

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**The Photographic and Pictorial Survey of Essex** has been founded for the preservation of photographs, pictures and maps, etc., illustrative of the topography, antiquities, social habits, natural history, etc., of the County. The collections will be stored in the Essex Museum, and will be available for reference on application to the Curator. *Hon. Secretary,* VICTOR TAYLOR, Hurstleigh, Buckhurst Hill, Essex.



THE  
ESSEX NATURALIST :

BEING THE

Journal of the Essex Field Club

FOR 1905-1906.

(VOLUME XIV.)

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ON NATURAL HISTORY MUSEUMS.

*An Address delivered to the Essex Field Club at the Annual Meeting,  
April 8th, 1905,*

By F. W. RUDLER, I.S.O., F.G.S., *President.*

THE members of the Essex Field Club have met together on this occasion under circumstances of an exceptionally interesting character. As pointed out in the notice convening this meeting, the Club has now completed the twenty-fifth year of its history. Not only has it gone on for a quarter of a century regularly holding its evening meetings and its field meetings, but during this long period it has enjoyed the advantage of retaining uninterruptedly the services of its Honorary Secretary and Founder, Mr. William Cole. Moreover, for nearly the whole of this long term he has been associated in the Secretarial work with Mr Benjamin G. Cole. This exemplary devotion of two brothers to the service of our Club—not to mention the valued assistance of Mr. Henry A. Cole and of the ladies of the family—seems to me deserving of some recognition, more substantial in character than the verbal thanks formally voted at an Annual Meeting. But Mr. W. Cole, having the interest of the Club ever at heart, assured us some time ago that the recognition of the twenty-fifth Anniversary which would best please him would be the means of completing the Epping Forest Museum. Just as the Club itself originated with Mr. W. Cole, so this museum owes to him its initiation; and it is consequently but natural that he should desire to see his ideas brought to maturity. Whatever, therefore, may be done on some future occasion, our immediate attention should be given to this modest suggestion with regard to the Forest Museum; and I think I cannot do

better than seize the opportunity afforded by the Annual Meeting to plead very urgently on behalf of this part of the work of our Club.

It should be our proud endeavour to make the little Museum in the old Hunting Lodge an attractive centre of scientific instruction to the multitudes who visit the Forest every season. To do this is by no means an easy matter. It requires much knowledge and great skill, a good deal of labour, and a little money. If the Club undertakes to furnish gratuitously the knowledge, the skill and the labour, surely it is not unreasonable to expect the money to be forthcoming from some other source. As a matter of fact, however, the members of our Club have done much themselves in furnishing funds, but their donations, though generous, are still insufficient for the work at present contemplated. According to a recent estimate the sum of £200 is now required to bring the arrangement of the Museum within a reasonable approach to completeness. With this moderate sum, it is believed that it would be possible to procure such glass-cases and specimens as are urgently needed to make the museum representative of the Natural History of the Forest District. It seems absurd that a work of this importance should be delayed through any difficulty in raising so comparatively trifling a sum!

The Museum at Chingford may be regarded as a Monograph of the Natural History of the Forest, illustrated with realities and not semblances—a monograph which may be read by every visitor more readily, yet more profitably, than any illustrated book. Instead of turning over the pages of a volume and admiring the plates, the visitor passes from case to case, seeing in most instances the veritable objects instead of their mere presentment on paper, and learning about these objects many a useful lesson from the descriptive labels, with which they are invariably accompanied. In a "Museum Leaflet," issued by our Club ten years ago, Mr. W. Cole explained the purpose of the Museum to be two-fold; first, to "promote a love for the out-of-door study of Natural History, etc., among the intelligent visitors to the Forest," and secondly, "to form a store-house for the preservation of authentic series of forest-specimens."<sup>(1)</sup> Both these objects have been already, to a great extent, fulfilled—

(1.) *A short account of the Epping Forest Museum.* E.F.C. Museum Leaflets, No. 1. 1895.

fulfilled, indeed, so far and in such way as our means have permitted.

As many of our members may not have visited the Forest Museum recently, it may not be without use to explain what has already been done there, and what more it is intended to do, provided the necessary funds are forthcoming. Even in its present incomplete state the Museum is a source of much attraction to the crowds of excursionists in the summer months. It appeals to many who might not otherwise be attracted to a Museum. A visitor to the forest will casually enter the Lodge, and have his attention arrested by the collections, whereas he might never think of making a definite visit to a Museum in town. And who dares to guess what far-reaching results may perchance flow from such an accidental introduction! It may be true as Oliver Wendell Holmes said, that the ordinary visitor to the British Museum "will know as much about it as the fly that buzzes in at one window and out at another." But that, I believe, is due mainly to the bewildering wealth of our National Treasure-house. A small museum is likely to have in some respects much more educational value than a large one; and just because our Forest Museum is not embarrassingly rich in specimens, I venture to assess its value as altogether out of proportion to its magnitude. That remarkable man, the late Professor Rolleston, remarked that "a young man who is possessed of a talent for Natural Science and Physical Inquiry generally, may have the knowledge of this predisposition made known to himself and to others, for the first time, by his introduction to a well-arranged Local Museum."<sup>(2)</sup> Is it unreasonable to hope that some bright spirit—perhaps some 'potential Darwin'—may date his inspiration from a casual visit to that little Museum in the Forest?

Obviously the first thing that claims attention in a forest is its timber; and hence a Forest Museum must contain, first and foremost, illustrations of the *Forest Trees*. Of the throngs of Londoners who visit Epping Forest, how small a proportion could name the common trees, even when clad in all their livery of green! I heard of a Cockney who, failing to distinguish one tree from another, grouped the oak, the beech, the elm, and a

(2) Address to the Biological Section of the British Association at Liverpool, 1870. *Report*, p. 93.

number of others together under the vague name of "the ordinary tree."<sup>(3)</sup> It is not contended for a moment that a man will be a better citizen because he calls an oak *Quercus*, and a beech *Fagus*; but it is undoubtedly true that the man who marks the essential points of difference between one tree and another—who can distinguish, say, the hornbeam from the beech or the elm—is a man who exercises his faculties of observation, and to that extent is likely to become a better workman and a more intelligent member of Society.

Ignorance of the forest trees may readily be overcome by a little study of the specimens, which are already shewn in the museum, mounted in glass-cases affixed to the wall on the great staircase and on the landings. Here the visitor finds preserved specimens of the foliage and the fruit, with sections of the wood, and photographs of the trees shewing their characteristic habit; whilst in some cases, the diseases of the trees have been illustrated by Mr. Paulson.

The *Herbaceous Flowering Plants* of the forest are illustrated during the season by specimens of cut flowers, duly labelled—a source of never-failing interest to the procession of young people who pass through the rooms at holiday time. The frequent change of fresh flowers involves, however, much work; and it seems to me desirable that some of our members living near the Museum should offer to assist the Curator in this respect. Botany is a subject much cultivated by many ladies, and it would surely be an interesting occupation for ladies of leisure to collect the plants and label them, giving with the name a brief note which might include, if nothing else, scraps of folk-lore, such as may readily be found in popular works on wild flowers. Such information, neatly expressed, makes very pleasant reading, and would render the plants attractive even to those who have no aspiration to become botanists. "Of the many thousands who visit us on every sunny day in summer," says Mr. E. N. Buxton, "few return without securing some floral trophy, which it has given them infinite pleasure to gather."<sup>(4)</sup> Would it not be well that they should carry off with their trophy some interesting scraps of information, which will abide long after the flowers themselves shall have perished!

(3) *Landscape Geology*. By Hugh Miller, 1891. p. 38.

(4) *Epping Forest*. By Edward North Buxton, Verderer. London, 1885., p. 114.

Dried plants are not readily exhibited, and if exhibited are not generally attractive, It is true they may be mounted in frames and glazed, but they require much space for their display upon the wall. A preferable mode is to hinge the glazed frames to an upright standard, so that they be made partially to revolve. The proper course, however, is to preserve the specimens in an herbarium, and to consult them as books may be consulted in a library.

Fortunately our Club possesses a good collection of dried plants, preserved in eight cabinets, now in the Stratford Museum. This herbarium includes the important donation of specimens due some years ago to the generosity of Mr. J. C. Shenstone ; it contains also the late Mr. Sewell's collection, presented by his widow ; Mr. E. J. Powell's herbarium, and Dr. Varenne's collection of Cryptogams. I understand from Mr. W. Cole that he is about to arrange these herbaria in two series—the one a general collection of British plants for the use of the student ; the other limited absolutely to the Flora of Essex.<sup>(5)</sup> Our local herbarium will be invaluable to future botanists, inasmuch as we possess representatives of plants from numerous localities in Essex now built over or otherwise lost to science.

A large number of our Essex specimens have been obtained from the Forest district, but it hardly seems desirable to remove these to the Forest Museum, inasmuch as there they could scarcely be exhibited to advantage. Although an herbarium is clearly of the highest value to the student of systematic botany, it is hardly a suitable object for public exhibition. Indeed Prof. Weiss, of Manchester—a very high authority—has said “ I regard the Herbarium as not forming part of a Museum.”<sup>(6)</sup> Probably the ordinary visitor would find good coloured plates of the flowers of the Forest more serviceable than dried specimens ; for these have generally lost to a large extent their colour and even their shape, so that the tyro would be more likely to identify his specimen from a well-executed coloured plate than from the dried plant.

It is said, I believe, that among English counties Essex stands second only to Herefordshire in the interest of its *Fungi*.

(5) On the arrangement of dried plants see a paper by Mr. E. M. Holmes, F.L.S., on “The Arrangement of Herbaria.” *Report of Museums Association*, Sheffield, 1899, p. 63.

(6) “The-Organization of a Botanical Museum.” By F. E. Weiss. *Rep. Mus. Assoc.*, Manchester, 1892, p. 25.

Our Club indeed has become rather famous for its annual Fungus Forays in the Forest. Some of the common fungi of Epping Forest are so conspicuous as to attract general attention, and it should always be the object of our Museum to enable a student—or even a chance visitor—to identify any natural object which he may find in the course of a Forest ramble. In the Museum at Chingford there is a good collection of preserved specimens of the local fungi, accompanied by coloured drawings, and well displayed in a series of wall-cases. Some of the specimens, I believe, were prepared by that skilful naturalist, the late Mr. English, of Epping. Nor should we omit to notice the set of original drawings of flowerless plants, executed specially for the Museum by our veteran friend, Dr. M. C. Cooke. This series of large drawings, framed and glazed, is mounted on screens in the Upper Room of the Museum, where it offers in an attractive form much information to the visitor.

So far as the zoology of Epping Forest is concerned, popular interest seems to centre in the *Insects*—if, at least, we may judge from the large number of visitors who carry butterfly-nets and other entomological gear. The Curator, whom we all know to be an enthusiastic entomologist himself, has done well to minister to their tastes by a remarkably fine display in the Oak Room. Here the instructive specimens illustrating the life-history of the Forest butterflies and moths, with their food-plants, is especially noteworthy. As most insects suffer deterioration by the action of light, they are here preserved in flat glass-cases, which are provided with covers that may be freely opened by the public, whilst the covers themselves are glazed and serve for the display of a most attractive series of coloured plates of insects, taken, I believe, from Curtis's *Entomology*. The effect of this admirable method of utilizing the covers of the cases contrasts very favourably with the ordinary practice of screening the specimens from light by means of moveable covers of American cloth, or other opaque material—a method which is rather unsightly and decidedly uninformative.

With regard to the *Mollusca*, reference should be made to the fine collection of land and fresh-water shells from the woods and lanes, the ponds and streams, of the Forest District, which has been on loan for many years by the courtesy of Mr. Walter Crouch, by whom they were collected and to whom the Museum

has so often been in other ways greatly indebted. The educational value of this collection is much increased by Mr. Crouch's neat drawings of the living molluscs, shewing their relation to the shells. I understand that a large collection of Forest species is in course of preparation, and as this is the property of the Club it will be a permanent exhibit. It is well to note, too, that some of the living mollusca will be on view in the aquaria in the museum, and I feel sure these will prove a constant source of interest and instruction to the visitors. The fascination of living things makes an aquarium one of the most popular features in any Museum, and amply repays the trouble which it necessarily involves.

It is not so easy to represent the *Vertebrata* of the Forest in our small Museum as it is to illustrate the invertebrate fauna. There is, however, in the Banqueting Hall a collection of *Birds' Eggs* (founded on a collection presented by Mr. G. E. Vaughan), in glass-topped boxes; and as many eggs suffer by direct exposure to light, they are protected, like the insects, by covers to the table-cases in which they are preserved. These glazed covers are utilized by the display of a charming series of coloured plates and reproductions of photographs, illustrating the residents, migrants and visitors to the forest, with their nests. The effect of thus appropriating what would otherwise be bare covers is admirable; but let it not be forgotten that the judicious selection, the neat mounting, and the careful labelling of such a series of plates, must have required the expenditure of much time and thought. It is evident that some sympathetic hand must have been busy with this work, and I think I trace that of Mr. Henry Cole.

At present there is no collection of stuffed birds in the Museum, but it is proposed, as soon as sufficient funds are in hand, to place in the centre of the Banqueting Room a pedestal case, divided into four compartments, each containing a small collection of the *Birds* of the Forest, in association with their natural surroundings. What species are to be represented I know not; perhaps it is not yet decided. But in view of the great interest of the Heronry in Wanstead Park, I should think that a group of herons, with the nest, would be at once appropriate, attractive and instructive. Fortunately the Club has, in its new president, a distinguished ornithologist, under

whose guidance we may be sure that the birds will receive due attention. It is also intended, our purse permitting, to erect a case in the middle of the Oak Room, on the lower floor, with a collection of the small *Mammals* of the Forest, showing their natural environment. At present the Forest mammals are represented only by a few examples of heads and antlers of the fallow deer, the red deer, and the roe deer—with one stuffed specimen of the forest breed of fallow deer.

In the picturesque mounting of natural objects, we cannot hope to imitate the splendid groups in the British Museum (Natural History), or even to vie with those of the large Provincial Museums, such as the fine pictorial groups by Mr. Montagu Browne, at Leicester. But even in a small way, we may be able to invest our stuffed birds and mammals with a touch of living interest. Instead of mounting them in the time-honoured fashion on polished pedestals of wood, we may at least encircle them with something suggestive of their forest-surroundings. The realistic adjuncts of a "habitat group" appeal especially to the young visitor; and a young visitor is always worth attracting.

Although the pictorial mounting of natural history objects has been brought prominently forward in recent years, it is by no means a new thing in Museums. In the early years of the last century, there existed at the Egyptian Hall, in Piccadilly, in connection with Bullock's famous Museum, an exhibition called the *Pantherion*. The conception was much too ambitious, since it aimed at representing, as far as possible, the whole of the mammalia, but its merit and novelty lay in the attempt to convey, in the words of its projector, "a more perfect idea of their haunts and mode of life than has hitherto been done."<sup>(7)</sup>

By means of a tropical scene, with models of appropriate vegetation, such creatures as the lion, the elephant, the rhinoceros, and the giraffe were "exhibited as ranging in their native wilds and forest." With regard to our unambitious Museum at Chingford, it seems in the highest degree desirable that we should be able to set up without further delay a few groups of local birds and mammals, under conditions suggestive of a glimpse of wild nature in Epping Forest. Nature-study is making us now-a-days

(7) *A Companion to the London Museum and Pantherion*. By William Bullock, London. 1816 (17th Ed.) p. 97.



rather impatient of artificiality, and indeed the naturalistic idea is even being extended from the Museum to the Menagerie. Just as people are not satisfied to-day with seeing in our glass cases stuffed birds perched in rows on monotonous stands of turned wood, so they are getting rather tired of seeing wild animals pent up in rows of cages; and Mr. Hagenback is said to have in view a scheme which will enable him in the near future to exhibit the animals under conditions apparently approaching to some extent those of nature.

At the present time there is displayed in the Upper Room of the Forest Museum a small collection of *Fossil Vertebrata*, representing the ancient fauna of the district; but the question is under consideration, whether it would not be expedient to remove these objects to Stratford, and devote the space at Chingford, which is but very limited, to illustrations of the fauna and flora of the Forest as they exist to-day.

Whilst the Chingford Museum makes natural history its most prominent feature, it has always sought—and quite legitimately—to illustrate the early archæology of the district, especially the *Prehistoric ages*. Hence we find in the Banqueting Hall the interesting collection of relics which were dug up from the two Forest camps—the camp at Amesbury Banks explored by our Club in 1881, and Loughton, or Cowper's Camp, examined in the following year, both probably of British origin. Then again the same room contains the valuable group of antiquities obtained by Mr. Chalkley Gould in the course of his exploration of the Romano-British settlement at Chigwell, and so well described in his *Museum Handbook*.<sup>(8)</sup>

The mention of antiquarian relics raises a suggestion which, to some, may appear rather startling. Will the day ever come when it will be possible to divorce these relics from the natural history objects with which they are now associated, so that the works of art may be shewn in one building and the works of nature in another? It is true that Sir Thomas Browne, that grand old East Anglian worthy, quaintly says that "All things are artificial, for nature is the art of God." But taking words as common-place people like ourselves use them, there seems ample justification for separating, under certain conditions, the

(8) "Notes upon the Romano-British Settlement at Chigwell, Essex." By I. Chalkley Gould, Essex Field Club Museum Handbooks, No. 2, 187.

artificial from the natural, and recognizing two groups of objects appealing to two types of visitor; not always in sympathy with each other's tastes.

Now that the Forest Museum, after costing so much thought, labour and money, is approaching within moderate distance of completion—so far at least as is contemplated by our modest scheme—it seems rather ungracious, not to say ungrateful, to raise any doubt as to the fitness of the present building for the purposes of a Natural History Museum. And yet such a doubt can hardly be repressed by any unprejudiced visitor. No one will deny that the building is much too small, and that the illumination in parts is sadly defective. Even with the addition of the new glass cases suggested in our scheme, there will be provision for only a very inadequate representation of the fauna and flora of the Forest. Mr. E. N. Buxton has very wisely raised his voice against over-crowding the Rooms. No one but a naturalist has any notion of the prodigality of life in the Forest district, and even the naturalist has probably but very imperfect ideas on such a subject. It is related that a certain professor once projected the formation of a Museum to be confined to the natural objects collected in the Gardens of Lincoln's Inn; but after a while he found himself compelled to abandon his scheme in consequence of the great number and variety of objects which the locality yielded.<sup>(9)</sup> If Lincoln's Inn Fields are so rich, what must the Forest be? The district which we desire to illustrate in the Museum is indeed much too prolific to be adequately represented in our present restricted quarters.

Nor is the illumination everywhere sufficient, except on very bright days, to enable the visitor to inspect the specimens with satisfaction. It is true that many natural objects suffer from exposure to light, but the Curator can always shut out light, or moderate it, by means of blinds, whilst he can hardly ever admit more natural light than the architect has permitted. It is therefore, in my opinion, a matter of prime importance that every Museum should be so constructed as to allow a free flood of light into the exhibition galleries. Some people possibly may think otherwise, and prefer a dull and dreary place. One of the most curious remarks I ever met with in connection

(9) *Hints on the Formation of Local Museums.* By the Treasurer of the Wimbledon Museum Committee, London, 1863, p. 20.

with Museums was that of a writer who, otherwise uttering much common sense, held that "the drowsy appearance of a Museum peculiarly adapts it to the requirements of students."<sup>(10)</sup>

If I might be bold enough to throw out a hint as to what I should like to see in the Forest Museum of the future, I would venture to say that in my opinion the present building, with its interesting associations, should be used as a small antiquarian Museum and that the Natural History collections should be removed to a neighbouring building to be specially erected for their reception—a building which may be severely simple in architecture, but which shall be spacious and light.

The exhibits at present at Chingford may be regarded, for convenience, as falling into two groups—one scientific, the other archæological; though I do not for a moment intend to suggest by this conventional arrangement that archæology is not to be treated on scientific principles. The display of scientific objects in an ancient building always strikes me as rather incongruous, whereas objects of archæological interest readily harmonize with their antique surroundings. If I may dare to introduce just one word of criticism respecting another museum in Essex, I would refer to that at Colchester. There the archæological treasures, which everyone knows are of surpassing interest and inestimable value, including the famous Joslin and Jarmin collections, may not be considered altogether out of keeping with the venerable castle in which they are housed, but the small Natural History collection in the same building seems to me quite out of place in such an edifice.

Queen Elizabeth's Hunting Lodge, the present home of the Epping Forest Museum, is an example of early Tudor architecture, which itself forms a fine specimen for an "Open Air Museum." By the restoration of this building, the Corporation of the City of London has earned the gratitude of every lover of antiquity. It seems to me that the ideal way of utilising the old building would be to furnish it with appropriate objects of corresponding age, so that the whole might form a grand historical object-lesson. But as such an ideal is never likely to be reached, the next best thing is to use the building for the

(10) *Principles which should govern the classification and arrangement of Public Museums.* By Henrie O'Hara. Dublin: 1862, p. 3.

exhibition of a wider archæological collection of local character. The fittings should harmonize with the antique aspect of the rooms, and the contents of the cases should carry the visitor back, in imagination, to the distant past. All the antiquarian objects now on exhibition might remain in their present home—the relics from the Camps and the Chigwell Settlement, the stone and bronze implements, the old fire-producing appliances, the tapestries, the pictures, and the engravings of local interest. But all the natural history objects should, in my opinion, be transferred to new quarters—spacious, airy, and bright—where they would be more attractive and of greater educative value than in their present rather unsuitable location.

That the Forest Museum, even in its present state, is widely appreciated, let the thousands who throng it every season testify. But notwithstanding the crowds which pass through the rooms, a large proportion being children, scarce a single instance is known in which any damage has been wilfully done. This is the more remarkable, considering what a large surface of glass is exposed; moreover, there are many specimens under glass shades, accessible on shelves in the room, yet it is the rarest thing for these or the small glass vivaria to get injured.

To the schools which so often visit the Forest the museum is a source not only of great attraction, but in many cases of permanent profit. Children are quick to observe and ready to remember, full of curiosity and usually interested in a remarkable degree in living things, such as will be seen in the aquaria and vivaria in the museum. So again, to the young naturalist visiting the Forest, this museum is a feature of exceptional interest, for here he may hope to identify the spoils which he has secured in his rambles. Special attention should therefore be given to the exhibition of common things. The resorts of the London naturalist are unfortunately but few, and are getting fewer every year, but we rejoice that the Forest, which is one of the most favoured haunts, is preserved for ever from the defilement of bricks and mortar. May it have eventually a museum which shall be worthy of its reputation!

Five years after the Epping Forest Museum had been opened another Museum under the care of our Club, of wider scope than that at Chingford, inasmuch as it represents the whole county of Essex, was formally opened at Stratford by the Countess of

Warwick.<sup>11</sup> As the history of this Museum has been written by Mr. W. Cole in one of our little "Handbooks" I am relieved of the necessity of entering into historical details.<sup>12</sup> It is not without interest, however, on the occasion of this—our twenty-fifth—annual meeting, to recall the fact that the idea of forming a museum was entertained by those who founded the Club, and was distinctly explained by our first President, Prof. Meldola, in his inaugural address. There is probably no member of our Club ignorant of the way in which that idea, though long in abeyance, was ultimately carried out through the enlightened policy of the Corporation of West Ham, associated with the munificence of Mr. Passmore Edwards.

On entering the Passmore Edwards Museum, anyone familiar with the details of museum work will be struck with the admirable way in which modern ideas have been carried out. It is not a museum run on old lines, like many of those which are themselves qualified to be preserved in a larger museum as interesting, but rather melancholy, records of obsolete science. True it is but a small museum, yet it is arranged in harmony with the state of knowledge in the twentieth century. In a discussion on "The Museum Question" a few years ago in Liverpool, Prof. Herdman, one of our most distinguished naturalists, condemned the usual methods of exhibiting natural history objects as suggestive of the days of Linnæus, rather than of present day biology.<sup>13</sup> At Stratford, however, he would find, I venture to think, little or nothing of an antiquated character. Mr. Cole has taken care that the biological clock should not be put back to the time of Linnæus. Let the visitor turn to the left as he enters the building, and he finds himself at once in a recess surrounded by cases which contain beautiful illustrations of the leading *Principles of Bionomics*. Here are several well-chosen series of specimens, chiefly insects, illustrating such subjects as protective and aggressive resemblance for concealment by colour and form; protection by warning colours; mimicry, or imitation of protected animals; and dimorphism or differences relating to season and sex. In a yet more prominent position in the body of the hall is a wall-case devoted to specimens,

<sup>11</sup> ESSEX NATURALIST, Vol. xi. (1901), p. 319.

<sup>12</sup> *The Essex Museum of Natural History*. By W. Cole, F.L.S., *Museum Handbook*, No. 3, 1900.

<sup>13</sup> "The Museum Question." Report of Liverpool Geological Society, Vol. ix. (1901), p. xxvii.

principally casts, illustrating the famous case of the Ancestry of the Horse.

To all these collections which bear on natural evolution great value is imparted by the long descriptive labels, which have been drawn up by Mr. W. Cole. Not only here but all over the museum there are large labels and tablets, admirably composed, which make the collections self-interpreting, and offer to the visitor, who cares to read them, an excellent epitome of information on many branches of natural history. It is probable that by the casual visitor as he hurries through the museum they are unread and unheeded. Even the student who lingers over them may have but a faint notion of the labour involved in their composition. To put a scientific statement concisely yet clearly and in popular language is a task, the difficulty of which is known only to those who have had to face it. The labels in our museum are neat and legible, being either printed or typewritten, whilst they appeal by their simplicity of expression to that unscientific individual, our familiar friend, who passes nowadays as the "man in the street." An American has said that our labels ought to be clear enough to "attract the newsboy and the boot-black."<sup>14</sup> I hardly think our critic would find much fault in this respect at Stratford.

The prime object of the Essex Museum is, of course, to illustrate the natural history of the county. The greater part of the *Invertebrata* are represented by a large and valuable collection of shells, crustacea, insects and other objects which are, or will be, preserved in two mahogany cabinets that have recently been placed in the museum. These beautiful cabinets contain upwards of 100 glass-topped drawers, each having a stop at the back so that it may be partially drawn out by the visitor, and its contents inspected without fear of damage. In this way the specimens will be preserved from deterioration by exposure to light, and yet remain freely accessible to the public.

Notwithstanding the efforts of the curator there are still many gaps in the local collection, and members of the Essex Field Club may be reminded that they have it in their power to render the museum very material aid by contributing from the spoils which they collect. Addressing the members of the

<sup>14</sup> Mr. Harlan J. Smith on "Popular Museum Exhibits." Museums Association Report of Oxford Meeting. 1897. p. 65.

Woolhope and Cotteswold Clubs many years ago, the late Prof. John Phillips said, "I would urge all persons belonging to field clubs, not selfishly to retain the specimens they gather, but to deposit them where they may be of use to their fellow-explorers."<sup>14</sup> Such advice may be repeated with advantage to-day. Most members would, no doubt, be willing, if solicited, to share their captures with the museum, but they are probably not aware that such objects would be valued. Good examples of common things systematically collected are, however, much needed in many museums. It is a great encouragement to a young collector, who is not likely to secure rarities, to come to this museum and be able to identify the common species which he has collected.

By preserving the bulk of the local collection in cabinets much space is gained in the exposed table-cases for the exhibition of more attractive specimens not of local origin. While the prime function of the Museum is to illustrate the natural history of Essex, it has always been very properly regarded as a desirable object of the Club to render the collection of wide and even general educational value. Mr. W. Cole, in a suggestive paper, read seven years ago before the South-Eastern Union of Scientific Societies,<sup>15</sup> emphasized this idea, and advocated the formation, even in a small local museum, of what is often called a "type or index collection." As long as a student limits his studies to the products of a special area, he finds himself unable, in consequence of the serious gaps in every local collection, to take a general and systematic view of any organic group. My friend, Mr. H. M. Platnauer, the accomplished curator for so many years of the York Museum, has aptly remarked that "Teaching from a local collection was like teaching from a text-book from which whole chapters and many pages have been torn."<sup>16</sup> A visitor would form, in truth, but a poor idea of the group of the marine mollusca, for example, if he limited his attention to the shells of the Essex coast; but by the exhibition of a few typical shells from tropical seas, he gets a glimpse of the beauty and wealth of nature's resources in this department. Hence the table-cases in the Stratford Museum contain an

<sup>14</sup> "On the Geology of the Malvern Hills."

<sup>15</sup> "The Objects and Methods of a Local Museum." *Trans. South-Eastern Union Scien. Soc.* for 1897, p. 17.

<sup>16</sup> *The Museums Journal*, vol. ii. (1902), p. 54.

attractive and instructive collection of mollusca, crustacea, and insects from all parts of the world.

The very effective manner in which this collection is displayed ought not to pass unnoticed. The molluscan shells, for instance, are placed on cotton wool in trays, whilst the crustaceans are mounted on a sand-like floor; nothing, too, can be more clear and striking than the labelling—white letters being used on a black ground with a vermilion border. Let it not be thought that such details are too trivial for mention at a scientific meeting; on the contrary they are matters of the first moment in rendering the collection attractive to visitors; and it is neglect of such small matters that has done much to bring museums into ill repute.

Whilst referring to the excellent manner in which the specimens throughout the Museum are mounted, I should ill discharge my duty if I made no mention of the labours of Mr. Whitehead, Mr. Cole's assistant, to whose skill and taste in displaying the specimens the Museum owes much of its attractiveness; nor should I omit reference to his wide range of knowledge and scientific enthusiasm, which render his services of such great value to the Institution.

Part of the Invertebrate Collection is exhibited on the walls of the staircase leading from the ground floor of the Museum to the Gallery. Here will be found representatives of the great groups of *Cœlenterata*, *Porifera*, *Echinodermata* and *Vermes*, mostly preserved in spirit. Even the fugacious jelly-fish from Southend is represented here. Nothing can be more effective than the manner in which the soft organisms are mounted on sheets of glass, with a suitable dark background, in rectangular glass jars. In fact, the use of the parallel-sided jar instead of a cylinder, and the employment of formalin as a preservative agent, have been the means, in recent years, of displaying such objects in a manner which contrasts most favourably with the unsatisfactory methods of exhibiting "spirit specimens" in old-fashioned museums.

The lower *Vertebrata* are represented by an excellent collection of local *Fishes*, beautifully arranged in the alcove on the right hand of the visitor as he enters the museum. Here are numerous specimens, some stuffed and others preserved in spirit, illustrating the fish-fauna, not only of the freshwaters of Essex, but also of the shallow part of the North Sea which washes the



coast of our county. A chart shows the physical conditions of the North Sea, whilst a large series of coloured plates, from Couch's work, serves further to illustrate the local ichthyology. Let the anglers in the Essex rivers never forget that certain freshwater fishes are still wanted to complete the collection ; and, I believe, that some of the less common marine species are also needed.

In a glass case on the left of the entrance an attempt is made to illustrate the *Amphibians* and *Reptiles* of Essex. A fairly complete set of the *Mammals* of Essex, with skulls and skeletons of many species, is at present placed in the Small Hall, near the Curator's Room. The *Birds* of Essex are represented by a series of stuffed specimens in the glass cases which run round the walls of the museum, whilst these birds are associated in many cases with their nests and eggs, forming groups which offer an interesting insight into local bird-life. Many of the ornithological specimens are due to the generosity of Dr. Laver, of Colchester, who has also presented valuable collections of local lepidoptera and land and fresh-water shells.

It is the intention of the Curator to collect a series of specimens of local interest, in illustration of *Economic Zoology*, including especially the Mollusca and Crustacea which come into London from the estuary of the Thames and other parts of the Essex coast. Such a collection would do much to excite an interest in familiar objects, and might be useful as serving to show the visitor that science does not stand aloof from the incidents of daily life.

In the Small Hall, to which reference has been made above, there is now exhibited a small collection of *Prehistoric and other Antiquities*, including many objects of local interest, especially the relics from the Dene-holes, the Red Hills, and the settlement at Braintree. Further reference to these is rendered unnecessary, however, by the excellent descriptions in the little handbook by Mr. F. W. Reader.<sup>17</sup> Although scarcely coming within the scope of a museum mainly devoted to natural history, I should like to see our museum possess a *Technological Department*, in which the industries of Essex should be illustrated, especially those which are extinct or tending to extinction.

<sup>17</sup> *A Handbook to the Collection of Prehistoric Objects in the Essex Museum of Natural History.* By F. W. Reader.

A part only of the Gallery of the museum is at present given up to the natural history collections, but as these are rapidly increasing it is hoped that additional space may be secured in this section of the building, where the illumination by means of a direct top-light is well adapted for the display of objects requiring close inspection. The *Botanical collection* is located in the gallery. During the season fresh cut flowers are here exhibited week by week, as at the Forest Museum; and the visitor is introduced to them by means of tablets adorned with charming little coloured sketches by Mr. Henry Cole. Here, too, are the *Mineralogical* and *Petrological* collections in course of arrangement by the skilful hands of Mr. Thomas W. Reader; and here, likewise, is the collection of *Fossils*—a collection containing many choice specimens, due chiefly to the generosity of Dr. Horace T. Brown, Mr. W. H. Dalton, and Mr. Carvalho. As an introduction to this section of the museum there is a most instructive series of specimens illustrating the phenomena of fossilization, and intended to answer the question which is asked by a bold tablet at the head of the case: “What is a fossil?”

In dealing with fossils a Curator is at once faced with the vexed question whether they should be arranged independently as a palæontological collection, or be associated with the zoological and botanical specimens as one series—the extinct and the extant forms taking their place in juxtaposition. A fossil may in fact be viewed in two aspects: as a “medal of creation” it has an obverse and a reverse. The biologist looks at one side, the geologist at the other. To the biologist the fossil is a link in the chain of life, connected with other links on its two sides—a unit in a long organic concatenation related to certain antecedents and to certain successors. But the geologist, whilst fully appreciating this philosophical aspect, views the fossil as an index to a certain set of strata, as a representative of life at a particular period of the earth’s history.

After all, this question, whether a Curator should arrange his fossils on the biological or on the geological system, seems rather like the old question, “Whether the tailor should make coats or trousers.” To which the very obvious retort was, “Why not make both?” If the museum is extensive enough, there can surely be no valid reason why the two systems should not be followed. The Curator, realizing this, will do his best to satisfy at once the student of Life and the student of Time.

Even in the Essex Museum, though far from being large, an attempt has been made in a small way to carry out this dual scheme. A case stands, for example, in the Hall, containing both living and fossil forms of the Cephalopoda. Several fossil Nautili are here placed by side of the recent Pearly Nautilus; and some typical Ammonites are to be found close by; whilst a group of Belemnites keeps company with spirit preparations of the calamaries and the cuttle-fishes of the Essex coast. In the Gallery, again, will be found a very instructive case of certain extinct animals associated with their living representatives.

But whilst these series are arranged to illustrate in some measure the biological side of Palæontology, the bulk of the fossils will be found arranged, as is usual elsewhere, on a chronological system. By disposing them in stratigraphical sequence, the student gets a notion of the fauna and to some extent of the flora at successive periods of geological history. To Mr. W. H. Dalton the Club is much indebted for having expended a great deal of labour on the arrangement of the Fossils, and especially for writing a Handbook<sup>18</sup> descriptive of the Pliocene fossils which have rendered East Anglia geologically famous, and of which, notwithstanding the ravishes of denudation to which Mr. Spiller has lately called attention, Essex can still boast a characteristic example in those shelly sands of Walton-on-the-Naze, which are believed to represent the oldest part of the Red Crag.

From this rapid survey of the contents of the Essex Museum and their arrangement, it will be seen how admirably the objects for which the Museum was originally organized have been so far carried out. The division into a Local and a General Collection is well defined. This division is in harmony with the views of most of those who have given thought to the Museum question. Mr. John Hopkinson, for instance, in suggesting to the Hertfordshire Natural History Society many years ago a scheme for the formation of a County Museum, insisted on the importance of dividing every Provincial Museum into two parts—one representative of a definite district, generally a county, and the other an educational department with a typical collection chiefly for the purpose of teaching.<sup>19</sup>

<sup>18</sup> *A brief sketch of the Crag Formation of East Anglia.* By W. H. Dalton, F.G.S. Essex Field Club, Museum Handbooks, No. 4, 1900.

<sup>19</sup> "The Formation and Arrangement of Provincial Museums," *Trans. Herts. Nat. Hist. Soc.*, Vol. i. (1881), p. 193.

The late Sir Wm. Flower, whose life was devoted to the highest type of museum work, pointed out, in his famous British Association address, that a museum should have a two-fold object—Research and Instruction.<sup>20</sup> The part devoted to research would be consulted only by those favoured few who had ability and opportunity for enlarging the bounds of knowledge, and consequently this portion need not be exhibited, but should be reserved for secluded study by the specialist. Such an arrangement is, perhaps, hardly applicable to a small museum like ours at Stratford; yet even there we are following, to some extent, the lines indicated, inasmuch as specimens prominently displayed to the public are such as should attract the general visitor, whilst the local collection for consultation by the serious student is preserved in cabinets, though those are accessible to all.

My friend, Dr. Bather, in a valuable address delivered a short time ago to the Museums Association at Aberdeen, took a wider view of museum organisation, and held that a typical museum has three functions—Investigation, Instruction and Inspiration.<sup>21</sup> As an aid to investigation the Museum is consulted by the specialist who is occupied in original research; as a means of instruction it is used by the ordinary student, the amateur and the collector; as an aid to inspiration it appeals to the lay public, the rank outsider, the man in the street. Our Essex Museum, though appealing to the ordinary student, is largely concerned with the last of these functions—it seeks to attract and elevate the general public of West Ham. Our purpose, to borrow Dr. Bather's words, is "not to turn every member of the gaping crowd into a doctor of science, but to awaken their imagination and interest, and to give to a street-bred folk some feeling for the nature it has well-nigh forgotten. The love of nature is the essential thing; the questioning of her will follow."

It may, perhaps, be said that theoretically we need three museums, one for each type of visitor—the specialist, the student and the stranger. The first and the second type of museum may be united, so may the second and third, but the first and third types are generally as little disposed to union as oil and water.

<sup>20</sup> *Rep. Brit. Assoc.* Newcastle-on-Tyne, 1889, reprinted in *Essays on Museums*. London: 1898, p. 1.

<sup>21</sup> *Rep. Mus. Assoc.* Aberdeen meeting, 1903. See also his paper on "The Functions of Museums," in the *Popular Science Monthly*, Jan., 1904, p. 210.

All we can hope to do in our small museum is to appeal to the student and the stranger; whilst the specialist, bent on original research, will naturally turn to more important institutions, generally to the British Museum.

Considering the magnitude and importance of our National Museum—the pride of British science—it seems amazing that its existence goes no further back than some hundred and fifty years. It was first opened to the public at Montague House, on January 15th, 1759, only, however, for three hours a day; and indeed for long afterwards the admission was restricted by complicated regulations, which were no doubt considered necessary at the time but which seem to us, looking back from these days of freedom, to have been of a most vexatious character.<sup>22</sup>

The original nucleus of the British museum, around which the magnificent national collections have aggregated in the course of a century and a half, was the private museum of Sir Hans Sloane. Sloane—the intimate friend of Boyle and Ray, and the immediate successor of Newton in the Presidential chair of the Royal Society—had not only made a great collection himself, begun in early life during his sojourn in the West Indies, but he succeeded in 1701 to the valuable collections of his friend William Courteen. In 1684, Courteen, who had lived much on the continent, opened a suite of rooms in the Temple, and there arranged his collections, on which he had spent the greater part of his fortune, and which he valued at £50,000. Yet the sum paid by the nation in 1753 for the Sloane museum at Chelsea, including Courteen's specimens, was but £20,000—a sum which, according to a codicil to Sloane's will, was not a quarter of their intrinsic value. The Act of Parliament which was passed for the purchase of the Sloane collection and the Harleian manuscripts was also directed to "providing one general repository for the better reception and more convenient use for the said collection." Such was the origin of the British museum. It is this repository which has gradually expanded into the splendid institutions at Bloomsbury and South Kensington.

<sup>22</sup> Walter Harrison in his "History" gives the following description of the mode of gaining admittance to the Museum:—

"If any number, not exceeding fifteen, are inclined to see it, they must send a list of their christian and surnames, with their place of abode, to the porter's lodge, in order to their being entered in the book; in a few days the respective tickets will be made out, specifying the day and hour when they are to come; which, on being sent for, will be delivered. The fewer names there are on the list, the sooner the company will gain admittance."

Previously to the foundation of the British museum, the great museum in London was that of the Royal Society. The formation of a Museum has generally been considered to be legitimately included in the work of any society devoted to the advancement of science; and the Essex Field Club has consequently been simply a humble follower in this direction. Bishop Sprat, in describing the early doings of the founders of the Royal Society after the Oxford Meetings were broken up and they had settled in London, tells us that:—

“As soon as they were reduc'd into a *Fix'd Assembly*, one of the Principal Intentions they propos'd to accomplish, was a General Collection of all the Effects of *Arts*, and the Common, or Mounstrous *Works of Nature*. This they at first began by the casual Presents, which either *Strangers*, or any of their own Members bestow'd upon them. And in short time it has increas'd so fast, by a contribution from all Parts, and chiefly by the bounty of Mr. *Colwall*, that they have already drawn together into one Room, the greatest part of all the several kinds of things, that are scatter'd throughout the *Universe* (!). The Keeping, and Ranging of these into order, is committed to Mr. *Hook*, who had also the honour of being made the first *Curator* of the *Royal Society* by election.”<sup>23</sup>

Writing to Mr. Boyle on February 3, 1666, Hooke, the Secretary of the Royal Society, says “I am now making a collection of natural rarities, and hope within a short time to get as good as any that have yet been made in any part of the world.” About this time, the Council resolved “that the donation of £100, presented by Mr. Colwall, should be expended in purchasing the collection of rarities formerly belonging to Mr. Hubbard.”

Dr. David Murray in his recently published work on museums,<sup>23\*</sup> suggests with much plausibility that this “Mr. Hubbard” was really Robert Hubert *alias* Forges, who is known to have had a large collection of rarities, which he exhibited publicly in 1664 at “the place called the Musick House, at the Miter near the west end of St. Paul's Church.” Of this collection a catalogue exists, and many of the objects are

<sup>23</sup>*The History of the Royal Society of London, for the improving of Natural Knowledge.* By Tho. Sprat, D.D., Lord Bishop of Rochester. London: 2nd ed. 1702. P. 251.

The “Curator” of the Royal Society was an officer who attended to the experiments, etc.

<sup>23\*</sup>*Museums: their History and their Use.* By David Murray, LL.D., F.S.A. 3 vols. Glasgow. 1904.

It was not until after this Address had practically been finished that I had an opportunity of consulting this valuable work. Had I seen it earlier I should have used it more freely. In working up the history of the subject I was familiar with the chapter on “Collections of Natural Curiosities” in Beckmann's *History of Inventions*, and with Prof. Newton's paper and a few other short notes; but struck with the scarcity of information on the subject, I had said, in the draft of the address, “The history of museums has yet to be written.” Before the time came, however, to deliver the address Dr. Murray's comprehensive volume had made its appearance

evidently those which afterwards figured in the Royal Society's Museum.

As soon as the Society thus acquired the nucleus of a collection, donations flowed in rapidly, including many objects of a rather curious character. Sir Robert Moray, for instance, presented "a bottle full of stag's tears"—reputed at that time to possess much medicinal value. We have not, I believe, yet procured for our Museum a similar specimen as a relic of the red deer of Epping Forest.

When Boyle died in 1691 it was found that he had bequeathed to the Society his mineral collection, or as he described it, "all my raw and unprepared minerals as ores, marchasites, earths, stones (excepting jewels), etc., to be kept among their collections of the like kind, as a testimony of my great respect for the illustrious Society."<sup>24</sup>

But before the time of the Boyle bequest the collections had grown so large that it was felt necessary to have a catalogue. Accordingly, at a meeting on July 18, 1678, it was ordered "That Dr. Grew be desired at his leisure (*sic*) to make a Catalogue and Description of the Rarities belonging to this Society." At that time the Repository, as it was called, contained, we are told, "several thousand specimens of zoological subjects and foreign curiosities." Nehemiah Grew, who was commissioned to compile the catalogue, was a very learned, versatile, and industrious man, especially distinguished for his researches in vegetable physiology. He seems to have completed his catalogue within a year, though it was not published until 1681, when it appeared as a folio of 388 pages, with an anatomical supplement of 43 pages. It was dedicated to Daniel Colwall, a wealthy citizen, described as Founder of the Museum, and his portrait forms the frontispiece.<sup>24\*</sup>

The catalogue is in many places very quaint and amusing reading, and offers an insight into the state of natural history two centuries ago. In 1682 Grew was appointed to take charge of the Repository under the title of "Præfectus Musei Regalis Societatis," and he was requested to "make a short catalogue of

<sup>24</sup> The quotations are from *A History of the Royal Society*. By Charles Richard Weld. London: 1848.

<sup>24\*</sup> *Museum Regalis Societatis, or a Catalogue and Description of the Natural and Artificial Rarities belonging to the Royal Society, and preserved at Gresham College. Made by Nehemiah Grew, M.D. Whereunto is Subjoined the Comparative Anatomy of Stomachs and Guts. By the same Author.* London: 1681.

the Rarities, with a method for the ready finding them out." They were indeed a very miscellaneous collection, including, according to the catalogue, not only all kinds of animals, plants, and minerals, but also metals and chemical products, physical apparatus and models, coins and various antiquities, ethnological objects, and curios in general. In fact, so august a body as the Royal Society seems in those days to have regarded a museum much as Horace Walpole regarded it at a later date, as "A hospital for everything that is singular."

When the Government granted rooms to the Society no space was provided for the museum, and consequently on removal from Gresham College the collections were presented to the newly-established British Museum. The Royal Society's Museum, after a life of rather more than a century, ceased to exist as such in the year 1779.

I am not ambitious enough in this address to attempt to trace, even in the barest outline, the general history of museums. Where was the first museum, and who was its curator, are questions which no man is ever likely to answer. Reference has often been made to the collections of Aristotle and other naturalists of classical antiquity, and to the treasures of Solomon and Hezekiah; whilst some writers have even been bold enough to suggest that prehistoric man was not without his little Museum. Forty years ago M. Dupont discovered in a limestone cavern on the bank of the river Lasse, in Belgium, a collection of fossil shells, including the gigantic *Cerithium*, which must have been brought a distance of 40 or 50 miles, with a piece of fluor-spar, and various other objects. Possibly they were brought together as mysterious objects for worship, or perhaps only as personal decorations; but the late Mr. G. H. Morton, of Liverpool, thought it more likely that they were collected as mere curiosities—prehistoric curios.<sup>25</sup>

As practical people, however, it is more to our present purpose to utilize the brief time at our disposal in dealing with the museums of our own country, in comparatively modern times.

At the time the Royal Society founded its Museum, the only collection of importance in this country seems to have been that

<sup>25</sup> "Museums of the Past, the Present, and the Future." *Proc. Liverpool Nat. Field Club* for 1893.



of the Tradescants.<sup>26</sup> John Tradescant, the elder, who travelled as a botanist, and was gardener to Queen Henrietta Maria, is described by an old writer as "a painful industrious searcher, and lover of all Nature's varieties," but his tastes were not confined to natural history, and the museum which he formed at Lambeth became an *omnium gatherum*. The collections were augmented by his son John Tradescant, who in 1656 published a catalogue of his "Rarities," which he described as being "more for variety than any one place known in Europe could afford."<sup>27</sup> The museum, known as "Tradescant's Ark," became one of the curiosities of the age—"a world of wonders in one closet shut." Prof. Newton, of Cambridge, has referred to the two Tradescants as "the parents of British Musæology,"<sup>28</sup> and as such they command our profound homage.

It appears that the second Tradescant made over his "Closet of Curiosities" by deed of gift, in 1659, to his friend Elias Ashmole, but by a will of later date bequeathed the collection to his wife, for her life. This led, unfortunately, but not unnaturally, to litigation. After a while, however, the museum passed to Ashmole, whose name it afterwards bore.

Ashmole, who thus became possessed of the extensive collections of the Tradescants, was a learned man of versatile tastes, leaning especially towards heraldry, astrology, and alchemy. A liking for botany seems to have attracted him to Tradescant, with whom at one time he lodged. On acquiring the "Ark," he built for its reception a house in South Lambeth, adjoining that previously occupied by Tradescant. After retaining the collection for some years, and much enriching it, he offered to present it to the University of Oxford, provided that a suitable building were erected for its reception. This condition having been accepted, the "Ashmolean Museum" was built from plans, said to be by Sir Christopher Wren; and in 1682, twenty years after the death of the younger Tradescant, the collection was removed in twelve wagons from Lambeth to Oxford. Dr. Plot, the historian of Oxfordshire and Staffordshire, became the first curator. In an old essay on the "History of Museums," read before the

26 Excellent biographies of the Tradescants, by Prof. G. S. Boulger, will be found in the *Dictionary of National Biography*.

27 *Museum Tradescantianum*; or a *Collection of Rarities preserved at South Lambeth, near (sic) London*." By John Tradescant. London: 1656.

28 "Notes on some old Museums." By Alfred Newton, M.A., V.F.R.S. *Rep. Museums Assoc.*, Cambridge Meeting, 1891, p. 32.

Ashmolean Society, the author says "It is agreed on by all our antiquaries that the Tradescant collection, which was the foundation of the Ashmolean Museum, was the earliest exhibited in Britain."<sup>29</sup>

On the Continent, however, there were collections of no mean importance a hundred years earlier. A printed catalogue exists, for instance, of the Kentmann Cabinet, dated 1565. Johann Kentmann was a physician, who lived at one time at Torgau in Saxony, and afterwards at Dresden. The doctor had collected about 1,600 specimens, chiefly minerals and fossils, with a few shells, corals, and other marine objects, and preserved his collection in an ark, or cabinet, of 13 double drawers, figured in the catalogue. This catalogue was published by the doctor's good friend Gesner, in a volume which contains also a number of scientific essays, including a treatise on precious stones and other minerals.<sup>30</sup>

Conrad Gesner, who has been styled "The German Pliny," seems to have been one of the most remarkable men the world has ever seen. At one time he was professor of the Greek language, at another time professor of medicine, and again we hear of his holding a chair of philosophy. His industry was prodigious, for though he died before he was fifty years of age (*b.* 1516, *d.* 1565) he left a vast number of works relating to most diverse subjects. Every branch of natural history secured his sympathy, and he formed a collection much larger and more important than Kentmann's, though I am not aware that a catalogue of it is included in his writings. To accommodate this collection he built at Zurich a Museum surrounded by a botanic garden. It is related that knowing his end was approaching he had a couch placed in his Museum and was carried thither, so that he might expire in the midst of those objects to which he was so devoted. It is with good reason that Gesner has been called the "Father of Natural History Museums."<sup>31</sup> His collection passed, on his death, to his friend Felix Plater, a doctor in Basle,<sup>32</sup> who possessed a notable collection.

<sup>29</sup> *A Catalogue of the Ashmolean Museum.* Oxford: 1836.

<sup>30</sup> *De Omnium Rerum Fossilium Genere, Gemmis, Lapidibus, Metallis et hujusmodi, Libri aliquot, plurique nunc primum editi. Opera Conradi Gesneri.* Tiguri: MDLXV.

<sup>31</sup> Presidential Address by Rev. Henry H. Higgins, M.A. *Report Museums Assoc., Liverpool Meeting, 1890.*

<sup>32</sup> *Conrad Gesner: Ein Beytrag zur Geschichte des Wissenschaftlichen Strebens und der Glaubensverbesserung im 16 ten Jahrhundert.* By Johannes Hanhart. Winterthur: 1824. p. 270.

Our illustrious countryman, Ray, in passing through Basle; visited Plater's Museum, which he describes as "a good collection of minerals, stones, metals, dried fishes, and other natural and artificial rarities," and he goes on to say that these were "disposed in a good method, the names being set to each one."<sup>33</sup> Plater had evidently the methodical instinct of the true curator.

Gesner's museum carries us back at least 350 years, but we might pursue the history of museums to a much more remote period, for we know that there were collections of natural objects occasionally made by men in advance of their generation. To us, however, it is more interesting to note the character of the museums which satisfied the wants of our forefathers in less remote times.

During the eighteenth century, and even later, there were several proprietary museums opened in London and elsewhere as shows. Probably the most famous was that of Sir Ashton Lever. Born at Alkrington, near Manchester, in 1729, he developed in early life a great taste for collecting, and being possessed of ample means, acquired a large collection. This he removed, in 1774, from Alkrington Hall to London, and he then exhibited it at Leicester House, in Leicester Square. He styled his exhibition the "Holophysikon," and charged each visitor 5s. 3d. for admission. Having spent a very large sum on his museum his affairs became embarrassed and he offered his collection at a very moderate price to the trustees of the British Museum. By them, however, it was declined. Lever then obtained parliamentary power to dispose of it by lottery, the value officially put upon it being £53,000. At the lottery the prize fell to a certain James Parkinson, who had been a law-stationer and estate agent. He not unnaturally endeavoured to dispose of it, and seems to have entered into negotiations with people of importance, like the Queen of Portugal and the Empress of Russia; but these negotiations fell through, and as the rent of Leicester House was considerable he purchased a piece of ground in Albion Street, Southwark, in which he erected a building that came to be known as the Rotunda.<sup>34</sup> To this museum the admission was half-a-crown, and for some years

<sup>33</sup> "Travels through the Low Countries, Germany, Italy, and France." 2nd ed., 1738, p. 85.

<sup>34</sup> A view of the interior of the Museum is engraved as a frontispiece to the Catalogue, entitled *A Companion to the Museum (late Sir Ashton Lever's). Removed to Albion Street, the Surrey End of Black Friars Bridge.* London, 1790.

it flourished as one of the sights of London. An American naturalist, C. W. Poole, describing a visit to London in 1800, says:—"The trouble to obtain a sight of the British Museum renders it of less value to the public than a private collection belonging to Mr. Parkinson, called the Leverian Museum." Eventually, however, the popularity of this museum declined, and in 1806 it was sold by auction—the sale extending over 65 days, and including 7,819 lots. The Rotunda was afterwards used for some time as a scientific institution.

Another metropolitan museum, well known in the early part of the last century, was Bullock's Museum, which had the advantage over Lever's of a more central situation, and a smaller admission fee. William Bullock was originally a silversmith and jeweller in Lord Street, Liverpool, where he opened, in 1801, a Museum of Natural and Artificial Curiosities, which he described as "comprising upwards of 800 objects." The admission to this modest collection was 1s., or by an annual ticket costing 10s. 6d. After removing his collection to other premises in Liverpool, he brought it, in 1809, to London, and exhibited it at No. 22, Piccadilly, at first under the name of "the Liverpool Museum." By this time the original 800 specimens had increased to 7,000, described as "Natural and Foreign Curiosities, Antiquities, and Products of the Fine Arts," which had cost the owner £20,000. Its popularity was so great that Bullock was led to build for its reception the Egyptian Hall. This remarkable building, now about to be pulled down, was erected in 1812, from the designs of Mr. P. F. Robinson, at a cost of £30,000. When transferred to the "Egyptian Gallery" the collection became known as the "London Museum," and was described by the owner, in his guide book, as consisting of upwards of 15,000 specimens "collected during 20 years of unwearied application, and at an expense exceeding £30,000." Mr. Bullock refers to his museum as "an Establishment for the Advancement of the Science of Natural History, which in magnitude and expense, he presumes, is unparalleled as the work of an individual."<sup>35</sup>

In 1819, Bullock's collection was brought to the hammer, the sale including 3,331 lots, extending over 26 days, and realizing about £12,000. After the sale, Bullock went to Mexico, and

<sup>35</sup> "A Companion to the London Museum and Pantheon, containing a brief description of upwards of 15,000 natural and foreign curiosities, antiquities, and productions of fine arts; now open for public inspection at the Egyptian Temple, Piccadilly, London." By William Bullock.

formed large collections which he brought home and exhibited in the Egyptian Hall, in 1824, in the form of two exhibitions called "Ancient Mexico" and "Modern Mexico." From the guide-books which I possess to all his exhibitions it is clear that Bullock was a man of much enthusiasm for natural history and archæology.

Before the days of the large museums of Lever and Bullock, it was the custom to form small collections at houses of refreshment as an attraction to the customers. Of these, perhaps, the most famous was that in Cheyne Walk, Chelsea, opened in 1695 by the eccentric John Salter, known as "Don Saltero." He had been for many years in the service of Sir Hans Sloane, who had given him most of the specimens with which he started the museum that he called the "Chelsea Knackatory." Steele speaks of "ten thousand gimcracks round the room and on the ceiling." The miscellaneous assemblage of things included, however, a large number of natural-history objects. Faulkner, the historian of Chelsea, refers to "a great variety of petrifications, corals, chrystals, ores, shells, animals preserved in spirits, stuffed animals from various parts of the world, idols, curious Chinese manuscripts, missals, birds, snakes, butterflies, medals," etc. It is the custom to smile and sneer at these old miscellaneous collections, but Faulkner sympathetically remarks that they "cherished the infancy of science, and should not be depreciated now, as the playthings of a boy are scorned after he has arrived at manhood."<sup>36</sup>

When Don Saltero's collection of curiosities was sold by auction in 1799, the total amount realized was but little over £50!

The days of Salter's "auld knick-knackets" are over, but even at the present day collections of curiosities at public places of refreshment are not altogether unknown; witness, for example, the museum of the Edinburgh Castle, in Camden Town, which has become quite famous for the eggs of the Great Auk.

Let us turn now to the county in which our Club is specially interested. Whether any antiquary has ever been able to ascertain when the first museum was formed in Essex, I know not. Probably here as elsewhere private collections have always been

<sup>36</sup> *An historical and topographical description of Chelsea and its Environs.* By Thomas Faulkner. London: 1829, vol. 1, p. 382.

made, more or less systematically by students of natural history, though such collections might never rise to the dignity of a museum. Our great Essex naturalist, John Ray, must surely have possessed a collection. His friend and benefactor, Francis Willughby, we know collected extensively and secured the advantage of Ray's curatorial assistance. In a letter to Martin Lister, dated June 18, 1667, Ray says: "The most part of the winter I spent in reviewing and helping to put in order Mr. Willughby's collection of birds, fishes, shells, stones, and other fossils; seeds, dried plants, coins, etc."<sup>37</sup>

It is clear therefore that the Willughby collection was of a very comprehensive character. Ray, being a man of restricted means, could hardly indulge in a similar manner, however wide his sympathies may have been; but that he had some kind of collection is clear, for we are told that "whatever he had preserved relative to any branch of natural history he gave before his death to his neighbour, Mr. Samuel Dale."<sup>38</sup> The Ray collection therefore passed to his executor, and the herbarium was presented by him to the Physic Garden at Chelsea, but ultimately found an appropriate resting place in the British Museum.

One of the earliest, and still one of the best, natural history museums ever founded by a local society in this country is the museum at Saffron Walden. Soon after the foundation of a Natural History Society in that town, in 1832, it was resolved "that a museum be founded to include specimens in the several departments of natural history, with antiquarian remains and such other articles as might be of general or local interest." The collections were accommodated at first in the house of Mr. Jabez Gibson, who had been mainly instrumental in organizing the society, but in 1834 they were removed to the building specially erected for their reception by Lord Braybrooke. This museum was opened on May 12th, 1835.

That the special value of a local collection was recognized at that time is evident from a statement circulated before the building was opened, in which it was said that "the concentration of Specimens peculiar to the District in which the Museum is established will form a leading feature in its

<sup>37</sup> Dr. Derham's Life in *Memorials of John Ray*. Edited by Edwin Lankester. Ray Society: 1845, p. 17.

<sup>38</sup> Sir J. E. Smith in the Ray Society's volume, p. 85.

arrangement." At the same time the collections included specimens from widely distant parts of the world, and these of such exceptional interest in certain cases that the museum positively surpassed at that time the British Museum. The skeletons and skins of the African elephant and the two-horned rhinoceros were said to be the earliest ever known in this country; indeed, the specimen of the African elephant, stuffed by Mr. Joseph Clarke, was considered to be of such interest that it was sent to the Great Exhibition of 1851. Many of the larger mammals were due to the generosity of Mr. George Wombwell, the proprietor of the menagerie, who took, from his local association, great interest in the museum.

It is a notable proof of the intelligence and enterprise of the organisers of this museum that within ten years of its foundation they published an admirable catalogue.<sup>39</sup> Sixty years have slipped by since that work was issued, and during this time science has indeed made startling progress, yet it may be fairly said that the production of such a catalogue—so carefully compiled, admirably printed, and delicately illustrated—would be creditable to any provincial museum even at the present day. From the frontispiece we get an insight into an Essex Museum sixty years ago, and the view is one in which an Essex man may justly feel pride! We are not surprised that, according to Mr. Miller Christy, the catalogue "is said to have been the best of its kind in existence at that day."<sup>40</sup>

Since the Saffron Walden Museum was founded, now seventy years ago, the museum movement, at that time scarcely recognised, has made marvellously rapid progress. In 1845, the year in which the Saffron Walden catalogue was published, an Act was passed by the Legislature, enabling certain municipal bodies to levy a rate for the establishment of museums of science and art. From this small beginning we have advanced, until at the present day most of our museums are under municipal authority, so that, unlike museums belonging to local societies they enjoy an income which though it may be small is yet officially assured. Without such support by the West Ham Corporation, where would be our Essex museum!

When we remember the difficulty of formerly obtaining access to the British Museum, when we remember too that to see

39 *An Abridged Catalogue of the Saffron Walden Museum.* 1854.

40 *The Birds of Essex.* Essex Field Club Special Memoirs, vol.ii., 1890.

the Leverian museum in Leicester Square the visitor had to pay at least five shillings, we ought indeed to congratulate ourselves that our lot is cast in such enlightened times that we have municipal museums freely scattered throughout our land, which may be visited by anyone without entrance fee or other hindrance. The museum has come to be recognised, in the words of Mr. E. Howarth, as "an essential element of municipal life."<sup>41</sup> It is hardly too much to say that every free library should have associated with it a free museum. Indeed, many who have given much thought to the matter have been led to conclude that the museum is perhaps in some respects the more important of the two institutions. "Museums," said Professor Boyd Dawkins, "appeal to the interest of many, while books and a taste for books interest a narrower circle."<sup>42</sup> Turning to the admirable speech delivered by the Countess of Warwick, at the opening of our Essex museum, we find the opinion expressed that "the foundation of a local museum for purposes of study and reference is as valuable—perhaps even more valuable—than a public library, for the drift of modern thought in the direction of scientific education is towards a knowledge of nature rather than a knowledge of books."<sup>43</sup> It is obvious that the young student learns more by direct relation with the concrete natural objects—the minerals, the plants, the animals—even if he merely sees them in glass-cases—than he can possibly learn about them by mere reading. An American writer has remarked that "the near future may well see as great an interest in the establishment of museums as there is now in the founding of libraries."<sup>44</sup>

The day has gone by when people could afford to sneer at local museums—"the little museums accumulated for the service of science by the philosophers of all our country towns."<sup>45</sup> It must be admitted that the old type of provincial museum founded by the enthusiasm of a few members of a local society usually left much to be desired. When the founders passed away, it often became difficult, sometimes impossible, to find successors who would carry on the work of the museum, and the collections were consequently doomed sooner or later to

<sup>41</sup> *Report, Museums Association, Canterbury Meeting, 1900, p. 76.*

<sup>42</sup> *Ibid.* Manchester Meeting, 1892.

<sup>43</sup> *ESSEX NATURALIST*, Vol. xi. (1900), p. 325.

<sup>44</sup> "The Opportunity of the Smaller Museums of Natural History."—*Popular Science Monthly*, May, 1903, p. 40.

<sup>45</sup> *A Second Letter to a Dissenter on the Opposition of the University of Oxford to the Charter of the London College.* By the Rev. W. Sewell, M.A., 1834.



fall a prey to neglect. Hence, there was little to induce the possessors of valuable objects to give them to the local museum. But all this is now changed. Public opinion to-day recognises that the care of the local museum is as much a part of the duty of the Corporation as the care of the public roads. "The one vital principle which surrounds Corporations," says Mr. Greenwood, "is that they are gifted with perpetual life."<sup>46</sup> Anyone therefore who gives a collection to a municipal museum feels that its care is permanently assured.

Since the Essex Field Club was founded, a quarter of a century ago, there has been a great advance in the popular appreciation of museums. An important step was taken in 1886, when the British Association appointed a committee to report upon the Provincial Museums of this country. The reports of this committee drawn up by the late Mr. F. J. Mott as Secretary, form a valuable repertory of information.

But a far more important step was taken by the formation, in 1889, of the Museums Association. Then, for the first time, the Curators throughout the country became organised. At the annual meetings of this Association the Curators and others interested in museums meet in conference, so that all matters of museum economy can be fully discussed by experts. Those who wish to know something about modern museums will find information of the most valuable character in the Annual Reports and in *The Museums Journal*, which is the organ of the association. Here the reader is made acquainted with the most recent methods of museum work, and will thus realise the admirable manner in which most of our provincial museums are becoming organised.

As an example of a museum which in spite of very restricted space, and with only moderate resources, may yet profit by the modern system of museum *technique*, we may point with some pride to our own museum at Stratford. Let it ever be remembered, however, that the maintenance of a museum, worthy of the present day, involves an immense amount of labour. It was a remark of the late Sir William Flower, that "a museum is like a living organism—it requires continual and tender care. It must grow or it will perish."<sup>47</sup> No words could be more just. However carefully a collection may be arranged, it will, if left to

<sup>46</sup> *Museums and Art Galleries.* By Thomas Greenwood, London 1838

<sup>47</sup> *Essays on Museums* p. 13.

itself, inevitably degenerate. The tender care of the Curator is needed incessantly. The Rev. H. H. Higgins, who was for so many years the enthusiastic honorary Curator of the Liverpool Museum, well said that "the Curator is the soul of the museum"—a sentiment endorsed by most authorities on museum organization. Yet how often does it happen that as we pass through a well-arranged museum we forget the Curator! The visitor seems usually to think that the specimens are able to shuffle about and arrange themselves in scientific order. But if in the midst of an orderly arrangement there should be some small part of the collection in an unsatisfactory condition, the Curator is then by no means forgotten. In accordance with the common tendency of human criticism, we are apt to overlook the bulk of the collection in all its fair aspect, and centre our attention on the disfiguring speck.

However devoted and however smart a Curator may be, he finds it impossible to make bricks without straw. In order that his museum may be in creditable condition, he needs all the neat appliances which are now in the market for mounting and displaying specimens; he needs the best books of reference for the identification of the objects which pass through his hands; he requires assistance at least to carry out such mechanical details as mounting and labelling. Above all, the cases and cabinets in the museum must be of the best construction, so as to protect their contents from dust and other sources of deterioration. If we have any regard for our collection, it will be found the worst possible policy to buy cheap cabinets. Taking all this into consideration, a museum is often denounced as an expensive fad. Never was there a greater mistake; it is not a fad, and considering its value to the community it is not expensive. "If you compare its cost with that of any other part of our educational machinery, I maintain," said Mr. Charles Madeley, "that it is exceedingly cheap."<sup>48</sup>

Admitting the value of Museums, under certain conditions, objection has sometimes been taken to their multiplication. It has been held that in proportion as they become common they will cease to be impressive. We in London surely cannot want them. What need can there be to have small Museums in or near the metropolis, when we have the doors of the

48 "District Museums." *Museums Journal*. vol. IV. (1904). p. 117.

National Museum always open in our very midst! Everything that we can hope to shew in a small museum, may certainly be found in the British Museum.

I have already referred, however, to the bewildering effect of large collections. There is no question that the wealth of specimens is apt to throw the untrained visitor into a state of mental distraction. Mr. Thomas Greenwood has observed that "there is such a condition of mind as picture drunkenness or Museum drunkenness."<sup>49</sup> Depend upon it a small collection encourages concentration of attention, whilst a large collection tempts to diffusion of thought. Just as every student knows "it is better to digest a chapter than to read a volume," so it is far better to see a small collection, and remember what it teaches, than to range aimlessly over a vast museum.

Many years ago when it was proposed to establish a local museum at Wimbledon, Mr. Joseph Toynbee delivered an excellent address in which he advanced the view that in a large town or city, each parish should have its own museum, exhibiting the objects collected within a radius of five miles from the parish."<sup>50</sup>

No thoughtful person will despise a small museum, or object to such museums being multiplied, when he reflects on the utility of such humble institutions to the young people in their immediate neighbourhood. If any one desires to see what may be done with small means, let him visit the little museums at Stepney under the care of Miss Kate Hall.<sup>51</sup> This enthusiastic lady, by her admirable demonstrations, has made her museums living centres of light and learning to the children of the East End.

The subject of demonstrations is one of great importance in viewing museums from an educational standpoint. Many persons fail to feel interest in a visit to a museum merely because they have no one to direct them and offer simple explanations of what they see. A party of visitors will often sigh for some "museum Cook," who could personally conduct them round the institution. Such conduct, however, needs to be in capable hands. In the early days of the British Museum it was the custom for the attendants to take the visitors, in small parties,

<sup>49</sup> *Museums and Art Galleries*, p. 29.

<sup>50</sup> "Hints on the Formation of Local Museums." p. 21.

<sup>51</sup> See her paper, "The Smallest Museum," *The Museums Journal*, vol. i. (1902), p. 38

from room to room ; but the practice does not appear to have been always satisfactory. At any rate a visitor in the beginning of the last century, was led to complain that the conductor treated the company to "witticisms on various subjects of natural history, in a style of vulgarity and impudence, which I should not have expected to have met in this place."<sup>52</sup>

Formal demonstrations in a museum are generally attended with more difficulty than most people imagine ; and after much experience, both as a listener and as a demonstrator, I was led some years ago to suggest that the formal demonstration, or lecture, should be given in a neighbouring room rather than in the midst of the cases.<sup>53</sup> It is gratifying to find that at the Essex Museum arrangements are now being made, whereby a convenient room, with electric lantern and screen, will be placed at the disposal of those who desire to give demonstrations in illustration of the contents of the museum.

In a paper on the utilization of local museums read at the last meeting of the British Association, the Rev. W. Johnson, of York, described the excellent work of Mr. Crowther, the Curator in Leeds, in lecturing to the schools, which systematically visit the museum ; and considering the great value of such work he strongly advocated its extension, with payment by the local authorities for the additional labour thus thrown upon the Curator. "This work," said Mr. Johnson, "is at any rate as well worthy of this support as are free libraries, or municipal bands, or art-galleries."<sup>54</sup>

Apart from formal lectures and demonstrations, a visitor to a Museum would often be glad of a description of some particular object, or group of specimens, of exceptional interest, and would be quite willing to pay a small fee for such a description by some competent person. Prof. Anton Fritsch, of Prague, has playfully suggested that the day may come when a visitor, standing in front of some interesting specimen, will have simply to drop a coin into a slot connected with a phonograph, and forthwith he will hear a short discourse on the specimen in the very words, nay, even the very voice, of some

<sup>52</sup> *Journal of a Tour and Residence in Great Britain, in the years 1810-1811.*  
By Louis Simond. 1815. vol. i., p. 84.

<sup>53</sup> "On the difficulties incidental to Museum Demonstrations." *Report Museum Association, Cambridge Meeting, 1891, p. 71.*

<sup>54</sup> *Report British Association, Cambridge Meeting, 1904.*

distinguished professor."<sup>55</sup> Many a true word is proverbially spoken in jest, and, in conclusion, I commend this idea to our Curator, who happens to be much interested in talking machines. We already have in the Essex Museum, for the use of the public, a microscope and a spinthariscopes. Why not a phonograph?

In now relinquishing the honourable position to which your suffrages kindly, and quite undeservedly, called me two years ago, I am anxious to express my deep sense of obligation to the officers, the Council, and the members generally—but especially to the Honorary Secretaries—for the generous assistance and loyalty which they have uniformly rendered to me, and for the courteous indulgence which they have extended to me, during my occupation of the presidential chair. The pleasure with which I shall look back upon my tenure of this position will be greatly enhanced by the feeling that I am succeeded by one so much more worthy in every way to conduct the affairs of this important organization. In Mr. Miller Christy, the Essex Field Club has at once a local naturalist, who has made his mark by a standard work on the Birds of Essex, and an antiquary who is an acknowledged authority on many branches of county history—one who has always been zealous in his support of this Club in the past; one who will, I feel sure, be yet more zealous for its welfare in the future.

<sup>55</sup> "The Museum Question in Europe and America." *The Museums Journal*, vol. iii. (1904), p. 248.

## THE BRITISH WOODLICE.

By WILFRED MARK WEBB, F.L.S., and CHARLES SILLEM.

(With Plates I.—XXV., and numerous other Illustrations).

**Introduction.**—Having finished a somewhat exhaustive list of the land and fresh-water molluscs of Essex,<sup>1</sup> one of the present writers felt that if he were to make any further contributions of importance to a knowledge of the fauna of that interesting county, he must turn his attention to some other group of animals. It seemed most fitting that some creatures should be chosen which are commonly met with during the search for molluscs. Centipedes, millepedes, and woodlice fulfilled these conditions, and all were collected, but as only seventeen species of woodlice had at the time been found in England, it was deemed advisable to study these in detail to begin with. The present contribution is the result of the undertaking, and we have thought that a general consideration of the British Woodlice, with careful drawings from nature of all the species now known from this country, ought to lead to a more general study of these interesting creatures and their habits.

**Position in the scheme of classification.**—The Woodlice belong to an immense group of invertebrate animals known as the Arthropoda, the bodies of which are segmented and provided with jointed appendages for purposes of walking, swimming, and feeding. Of this group, two large divisions are recognized. The first contains the forms which breathe by means of air tubes, such as the Insects; and the second has been constituted for Crustacea, which breathe by means of gills. The latter are, of course, adapted more especially for a life in water, but here and there we come across examples so modified that they can exist in air. The land-crabs are a case in point, and so are the Woodlice. These belong to an order which contains many fresh-water and marine species, known as the Isopoda.

**Geological history.**—The known history of the order is a long one, for remains occur in the Old Red Sandstone (Devonian) of Herefordshire, and in the Coal Measures. (79<sup>2</sup>). A form

<sup>1</sup> "The Non-Marine Molluscs of Essex," by Wilfred Mark Webb; *ESSEX NATURALIST*, Vol. x. (1897), pp. 27-48 and 65-81.

<sup>2</sup> The numbers in brackets refer to papers mentioned in the Bibliography at the end.

which has been named *Archæoniscus brodiei*, and is said to be referable to the recent family Aegidae is found in some numbers in the Purbeck Beds (Upper Jurassic), of this country (47). Fossil Isopods have also been recorded from the Oolite and from the Oligocene (Isle of Wight).

Turning to the Woodlice proper, we find that they first make their appearance in the Miocene (of Oeningen and Baden), and occur also in amber (79); while examples of the genera, such as *Oniscus* and *Porcellio*, have been discovered in late Tertiary deposits (47).

**External structure and appendages.**—Woodlice agree

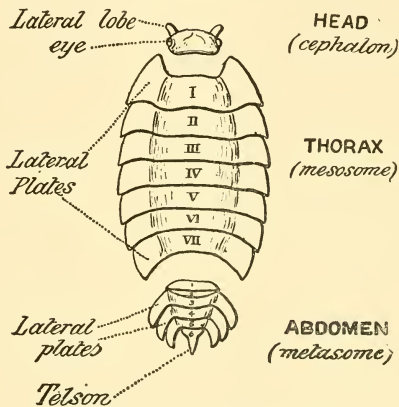


FIG. 1.—PARTS OF THE BODY.  
(*Oniscus asellus*.)

in being of a somewhat oval form, and their bodies are arched, the curve varying in different genera and species. A *head* is to be distinguished; behind this comes the *thorax* of seven segments which are often considerably broader than the six succeeding ones which form the *abdomen* (see fig. 1.)

The head carries two *large antennæ* (fig. 3) which are very evident, and a careful search with a lens will reveal a second and minute pair (the *smaller antennæ*) situated between the base of the others, and really anterior to them. (figs. 2 and 4.)

The larger antennæ are customarily bent at certain points, and we can distinguish a



FIG. 2.—THE FIRST ANTENNA.  
(*Oniscus asellus*.)

terminal part, or *flagellum*, and a basal part, the *peduncle* (fig. 3). The number of joints in these structures, which varies in different genera and species, forms a useful classificatory character, and

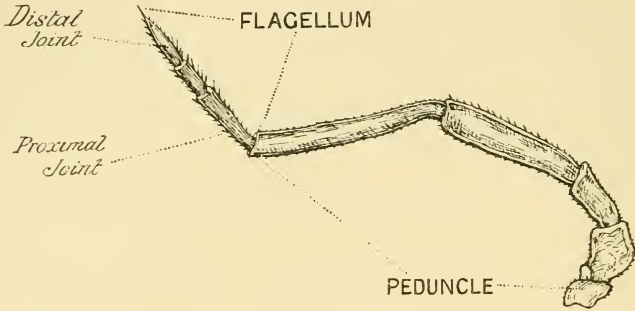


FIG. 3.—THE SECOND ANTENNA.  
(*Oniscus asellus*.)

the relative length of the component parts is of considerable value in distinguishing species.

There are four pairs of mouth appendages—namely the jaws

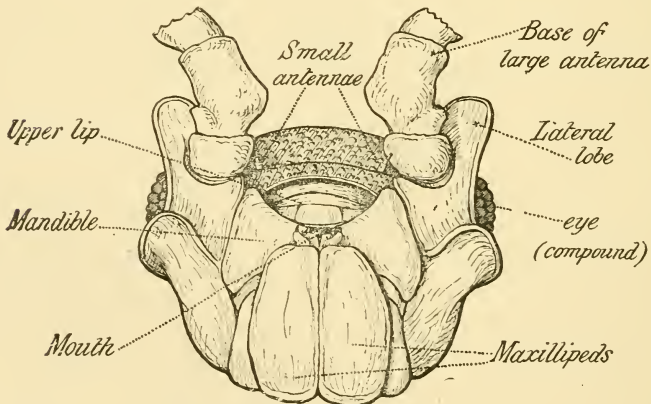


FIG. 4.—THE UNDERSIDE OF THE HEAD.  
(*Oniscus asellus*.)

or mandibles (fig. 5), the first maxillae (fig. 6), the second maxillae (fig. 7), and the maxillipeds (fig. 8). When the head is examined from the underside the last of these organs will be seen first, covering in the others.



A small median plate attached to the front of the head has been called "*the upper lip*" (fig. 9), while inside the mouth appendages is a little bilobed structure "*the lower lip*" (fig. 10).

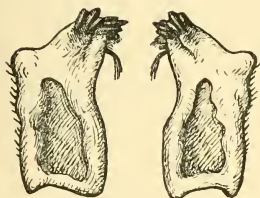


FIG. 5.—THE MANDIBLES.  
(*Oniscus asellus*.)

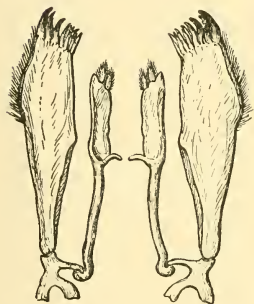


FIG. 6.—THE FIRST MAXILLAE.  
(*Oniscus asellus*.)

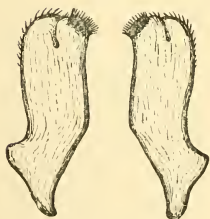


FIG. 7.—THE SECOND MAXILLAE.  
(*Oniscus asellus*.)

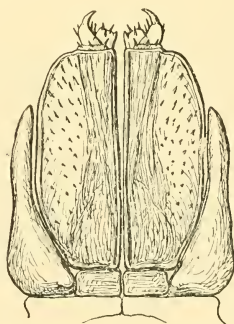


FIG. 8.—THE FUSED MAXILLIPEDS.  
(*Oniscus asellus*.)

form a brood pouch, in which the eggs are carried (fig. 12) until they are hatched, and in which the young ones remain for some time afterwards.

Before leaving the external features of the head, we must allude to the pair of *eyes* which are usually present, though never raised on stalks. In the Common Wood-loose (*Oniscus asellus*, from which all our figures to illustrate structure have been made), as in many other species, the eyes are compound (fig. 4), but in some forms these are simple.

Each of the seven joints of the thorax bears a pair of *walking legs* (fig. 11), and in the female at the time when the eggs are laid, a pair of plates (fig. 12) arises on segments II. to V. These plates together

When we examine the abdomen, we find that the appendages are plate-like, with the exception of the last pair (fig. 13), and



FIG. 9.—THE "UPPER LIP."  
(*Oniscus asellus*)



FIG. 10.—THE "LOWER LIP."  
(*Oniscus asellus*.)

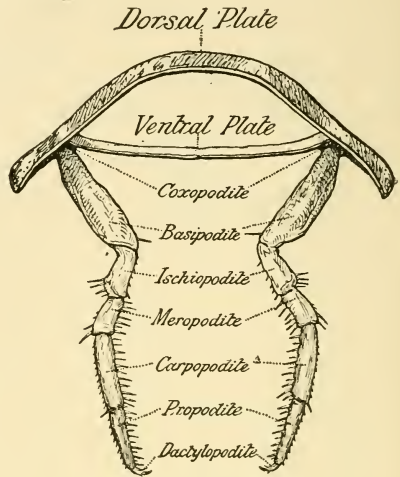


FIG. 11.—A TYPICAL THORACIC SEGMENT  
(*Oniscus asellus*.)

they all agree in having two divisions, an arrangement which would prove awkward in limbs used for walking or feeling.

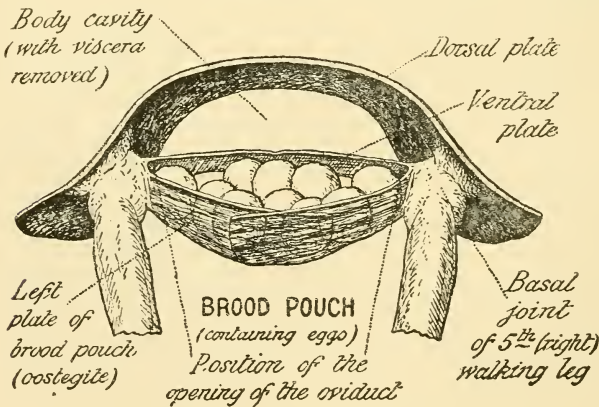


FIG. 12.—THE FIFTH THORACIC SEGMENT OF A FEMALE.  
(*Oniscus asellus*.)

The inner plate (or endopodite) is in structure a gill, but the blood that passes through it, is enabled to take up oxygen

from moist air, while the outer division (or exopodite) acts as a protecting cover (fig. 14). In *Porcellio*, air-tubes (*tracheae*) may be present (see below).

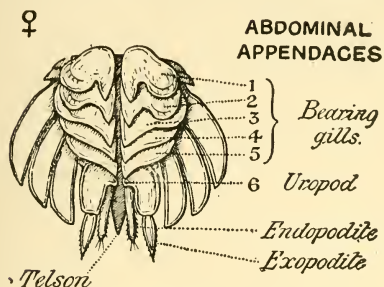


FIG. 13.—THE UNDERSIDE OF THE ABDOMEN OF A FEMALE. (*Oniscus asellus*.)

female, and the form of these structures is sometimes of value in classification.

**Alimentary canal.**—The main portion of the alimentary system is, practically speaking, a straight tube (fig. 17). Its first part (not shown in the figure) is a narrow gullet, which after passing through the nerve collar dilates to form a sort of stomach. Into this the secretion of four digestive glands is poured by two ducts. These glands have a somewhat striking appearance, being yellow tubes spirally

In the male the first two pairs of abdominal appendages are specially modified, the inner divisions (endopodites) being long and pointed (figs. 15 and 16). The last pair, or tail appendages, in the male are often considerably larger than in the

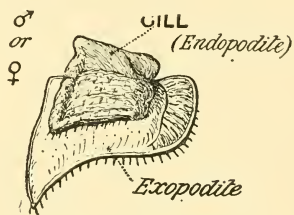


FIG. 14.—A TYPICAL ABDOMINAL APPENDAGE. (*Oniscus asellus*.)



FIG. 15.—THE FIRST ABDOMINAL APPENDAGE OF THE MALE. (*Oniscus asellus*.)

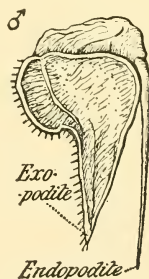


FIG. 16.—THE SECOND ABDOMINAL APPENDAGE OF THE MALE. (*Oniscus asellus*.)

coiled, and they end blindly. From the stomach the intestine runs to the hinder end of the body and passes under the heart.

**Circulatory system**—The blood being aerated in the abdominal appendages, we find that the heart is situated towards the hinder end of the body (fig. 18). Three main arteries supply the thorax and head, while the blood is brought from the gills to the heart.

**Excretory system.**—The excretory organs consist of a (*a*) pair of so-called "shell glands," which are considered to be the equivalents of the excretory tubes or nephridia of annelid

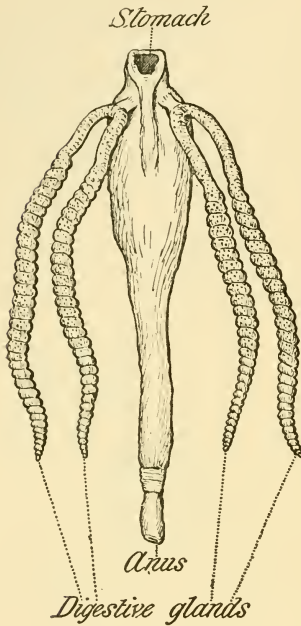


FIG. 17.—THE ALIMENTARY CANAL.  
(*Oniscus asellus*.)

worms. In the woodlouse these excretory organs open on the second pair of maxillae. They are composed of a tube (*sacculus*) closed at one end and more or less bent upon itself (5, p. 261) which communicates with a *labyrinth* that is provided with an excretory orifice. Matters are eliminated by the *epithelial cells* [the histology has been described and figured in *Ligidium hypnorum* (66)], which are very large in *Ligia oceanica*.

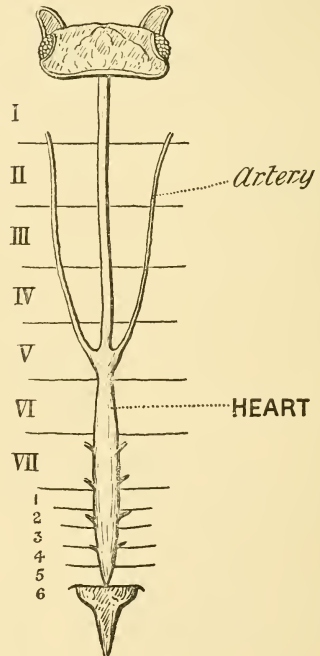


FIG. 18.—THE CIRCULATORY SYSTEM.  
(*Oniscus asellus*.)

(b) Masses of cellules in the head, very greatly developed in *Ligia oceanica* (but numbering scarcely more than ten in *Oniscus asellus*), which have no external opening. They also function as excretory organs (5, p. 263), and have been called "cephalic nephrocytes."

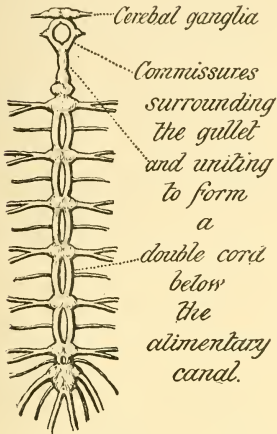


FIG. 19.—THE NERVOUS SYSTEM.  
(*Oniscus asellus*.)

or less continuous in *Oniscus* (5, p. 265).

(d) The digestive glands have also been shown to be excretory (5, p. 270).

#### Nervous system.—

The nervous system consists of *paired ganglia* in the head, above the alimentary canal which send off nerves (*commissures*) that meet below, to form a *double nerve cord* with ganglia at intervals. (see fig. 19).

#### Reproductive organs.

—In the female there are a pair of *ovaries* in the positions shewn in fig. 20; and *ducts* run to the underside of the fifth thoracic segment.

(c) Other "branchial nephrocytes" are situated on the dorsal surface between the last thoracic and the first abdominal segments, as well as between those that follow, with the exception of the last two; they are in distinct patches, one on each of the middle line in *Ligia*, but more

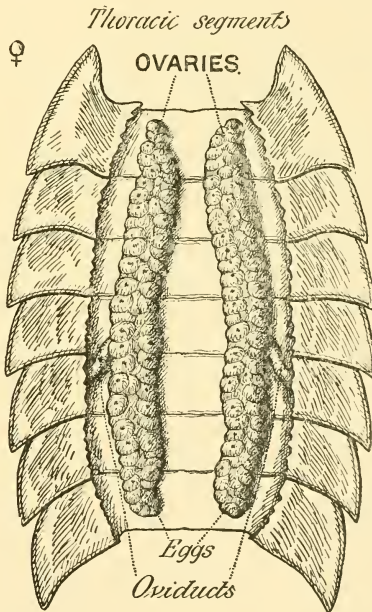


FIG. 20.—FEMALE REPRODUCTIVE ORGANS.  
(*Oniscus asellus*.)

The openings are very difficult to identify, and Lereboullet (39, p. 113) was unable to find them. It is obvious that the openings must be underneath the plates that form the egg pouch, and as a change of skin is required to set these free, it would appear that at ordinary seasons the ducts from the ovaries are closed. The writers have been able to determine from external examination of specimens which had moulted and were about to lay eggs, that the oviducts at such time open to the inside of the base of each walking leg on the fifth segment. In similar specimens the oviducts were also followed to the opening from within. The *brood pouch* has already been described.

The male organs consist of six *testes* arranged in two pairs, each of which is provided with a *reservoir* (see fig. 21). The efferent ducts from the two reservoirs unite at the base of the thorax to form a common duct (or 'penis').

**Development.**—The eggs, in the common species of woodlice, at least, are laid at the beginning of summer, and are retained in the brood pouch, where they undergo their development. The process has been recently traced with great care by Professor Louis Roule (58) in *Porcellio scaber* and the description which follows is based upon his researches.

As, practically speaking, the larval stages are passed within the egg, and there is no free embryo differing in form from the

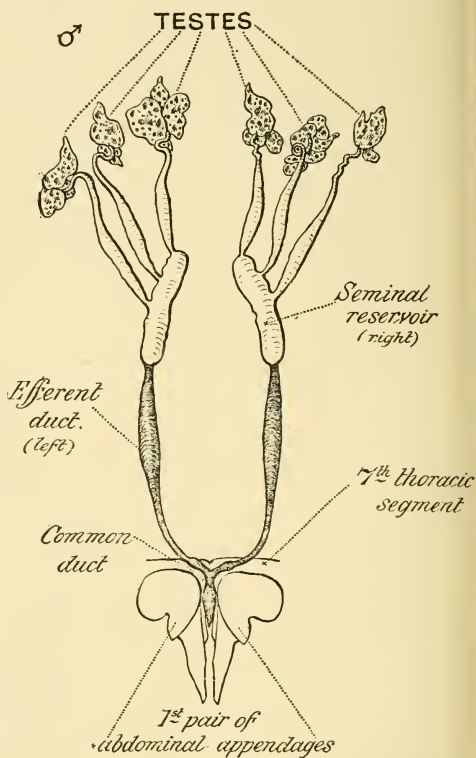


FIG. 21.—THE MALE REPRODUCTORY ORGANS.  
(*Oniscus asellus*.)

parent, it is necessary for the young creatures to be well supplied with nutritive material. In fact, the bulk of the large egg is made up of *food-yolk*, on the outside of which the *formative protoplasm* is disposed in irregular patches. In the fertilized ovum, one of the latter, which lies in a particular position at the end, is found to be larger than the others (see fig. 22). It contains the nucleus of the egg-cell (see fig. 23) and is called the *cicatricula*. This is the only portion of the egg which divides and produces *nucleated cells*. It is these which gradually spread all over the surface of the food-yolk, forming a layer known as the *blastoderm*, which is at first but one cell thick (see figs. 24, 26, and 28).

Before, however, the food-yolk is quite closed in, a differentiation into two layers—the *pro-ectoderm* and *pro-endoderm*—takes place (see fig. 25) and rudiments of the first two pairs of

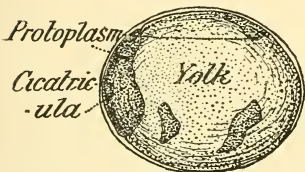


FIG. 22.—THE FERTILIZED EGG (*Porcellio scaber*), AFTER ROULE.

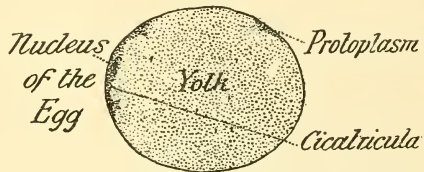


FIG. 23.—THE FERTILIZED EGG SEEN IN SECTION (*Porcellio scaber*), AFTER ROULE.

appendages appear (see fig. 26). Moreover, the cells of the ectoderm change their shape and begin to multiply at two points to form the beginnings of the cerebral ganglia and the nerve cord respectively.

As the blastoderm closes over the food-yolk, two more appendages arise and these are soon followed by others (see fig. 28). A depression appears at the point where the blastoderm closed and internally the pro-endoderm or inner layer is differentiated into two—the *endoderm proper* and the *mesoderm* (see fig. 29). The former begins to grow so that its edges unite to form the middle part of the intestine (see fig. 29) seen from the outside in fig. 30. The depression already mentioned grows deeper, forming a tube which is the hind portion of the *intestine*, while at the anterior end of the embryo the front part of the intestine is similarly formed (see fig. 30). By this time also all the nineteen

SURFACE VIEWS.

OPTICAL SECTIONS.

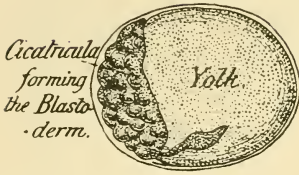


FIG. 24.

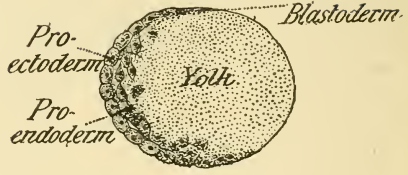


FIG. 25.

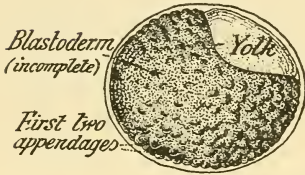


FIG. 26.

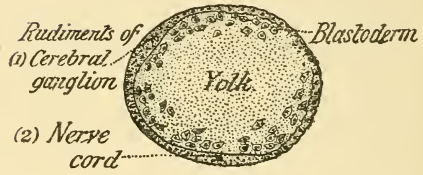


FIG. 27.

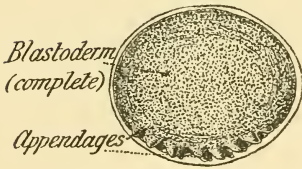


FIG. 28.

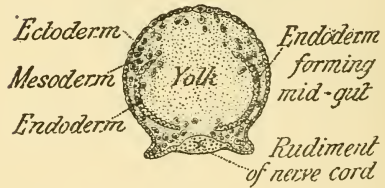


FIG. 29.

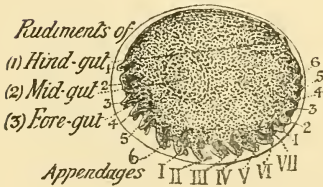


FIG. 30.

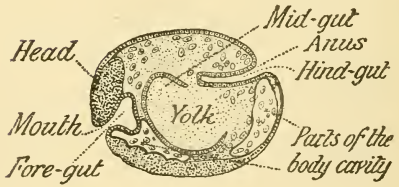


FIG. 31.

THE DEVELOPMENT OF A WOODLOUSE (*Porcellio scaber*), AFTER ROULE.

Figs. 24, 26, 28, 30, are Surface Views, and figs. 25, 27, 29, 31, which indicate slightly later stages respectively than the others, are of eggs seen in Optical Section.



appendages have made their appearance and the mesoderm, (which has grown considerably, to form the beginnings of the muscles) has sent prolongations into each of them. About this time, spaces (see fig. 31) are formed in the muscular mesoderm which are all that remain of the *true body cavity* characteristic of animals above the level of the jelly-fish, and in these spaces the blood ultimately circulates.

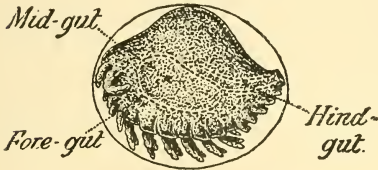


FIG. 32.—EMBRYO OF THE WOODLOUSE SHOWING THE THREE DIVISIONS OF THE INTESTINE SEPARATELY DEVELOPED (*Porcellio scaber*). AFTER ROULE.

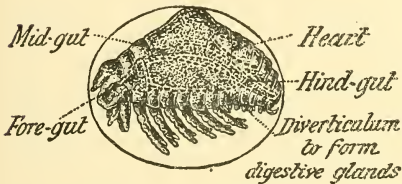


FIG. 33.—EMBRYO OF THE WOODLOUSE SHOWING TRACES OF THE SEGMENTS (*Porcellio scaber*). AFTER ROULE.

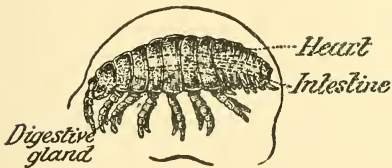


FIG. 34.—AN EMBRYO WOODLOUSE READY TO BE HATCHED (*Porcellio scaber*). AFTER ROULE.

The body next alters somewhat in shape and the three divisions of the intestine approach one another (see fig. 32) previous to their junction. As may be imagined during these processes the food-yolk has gradually been used up and the space which it occupied taken by the internal organs, which we have mentioned.

In the last stages of the development the appendages become larger still, the *heart* makes its appearance, segmentation of the body is completed, and except that the seventh pair of walking legs are as yet rudimentary the woodlouse is completed. It is only after hatching that the

pair of legs mentioned, attain to their normal length.

The process of segmentation of the egg and the formation of its layers lasts about a fortnight, while the completion of the development proceeds much more rapidly, for another three weeks bring it to an end.

After the first moult or change of skin the last pair of

walking legs makes its appearance, and Mr. James B. Casserley [whose work one of us (75) has described elsewhere] found when keeping a number of the common pill-woodlouse (*Armadillidium vulgare*) in captivity that his specimens did not subsequently change their skins more than once in the six months during which he had them under observation. He also noted that the crustaceans go on growing after they are sexually mature. As his specimens grew older, Mr. Casserley noticed that their colour became darker, and a curious point recorded by him is that two examples of the same age may change their skins at the same time, and while one may have afterwards nearly twice as many markings, on the other very few at all will be seen. The time required for the growth of a woodlouse from the size of a pin's head to that of an adult example—say three-quarters-of-an-inch long—must be fairly considerable, taking into account the fact that any appreciable increase in size can only occur at a moult and Mr. Casserley's observations as to the infrequency of the process in *Armadillidium vulgare*.

**Habits and Economic Considerations.**—The construction of the breathing organs of woodlice, and the necessity which exists for these to be kept moist, restricts the habitats of the animals considerably. Woodlice are found under stones and logs, beneath the bark of dead and rotten trees, among decaying vegetable matter as well as living grass and moss in damp or wet situations. When looking for some of the common species under the bark of fallen trees it is surprising to notice that the crustaceans may be entirely absent from many trunks, while when another is examined which seems to differ very slightly, if at all, in condition or situation, they are found in swarms. There is no doubt but that the habits of woodlice would well repay the attention of naturalists, who are now recognizing that besides anatomy as such, and the classification which a knowledge of structure permits, there is the equally important consideration of the creatures as they live their own life and affect that of others. It is not our object to give a detailed account of the ecology of British woodlice, but rather to provide a basis from which it may be approached. Nevertheless a few general remarks may not come amiss. Many points in the life-history of woodlice may no doubt be learned by keeping them in captivity and there is

just sufficient difficulty in doing this successfully to give an interest to the matter.

Apart from a supply of proper food, we take it that the chief object to be attained is the provision of the amount of moisture required by the particular species under examination, together with a sufficient supply of air.

A great many interesting observations can be thus carried out, such as those of Mr. Casserley, to which allusion has already been made. The process of moulting for instance is well worth watching, and although specimens with half their coat changed may be found in remote corners, yet the whole course of the moult can be seen much better in the case of captive woodlice. The following account is taken from Mr. Casserley's description (75) of what happens in the case of *Armadillidium vulgare*:—The approach of the moult is indicated by the appearance of a white border on each segment of the body, which becomes gradually more marked, while at the same time the animal is seen to be less active and often makes a small burrow in which to hide. Sometimes a sheltered corner against a stone is looked upon as affording sufficient protection, but, in either case each woodlouse keeps to the place originally chosen. About ten days after the white lines have become visible the animal appears to be divided into two. Its skin is becoming loose and little movement can take place at the joints of its body with the exception of that between the fourth and fifth thoracic segments where the skin will ultimately break. The woodlouse spends a day or two in this condition and then, by suddenly walking forward, frees itself from the covering of the hinder portion of its body. The three last pairs of walking legs are carefully pulled out from the old skin, which now appears perfectly white, and at the same time the lining of the hind portion of the alimentary canal (hind gut) is also shed. After putting the tender half of his body well into his corner or burrow the woodlouse proceeds to eat the part of his skin that he has cast. The creature has now a very odd appearance. His front half with the exception of the white edges is as it was before, the rest of him instead of a light slaty blue, and is very soft as well as proportionately a little larger.

In three days or so the tail end becomes hard and attains the normal colour. Then the old skin from the front half is pushed off and the creature becomes practically defenceless, so much

so in fact, that any of his species that happen to find him will attack him and eat all his front half, rejecting, however, his now hardened tail-end.

Provided that the moulting woodlouse has survived (and in captivity, to ensure this, he must be isolated), after three days his jaws will be sufficiently hardened to allow of his eating, and usually he first of all devours the second half of his cast skin. The operation of moulting does not occupy quite so long a time in the case of young examples. Specimens half-an-inch long do not moult more than once in six months and show but little increase in size after the process.

Woodlice do not appear to live on either animal or vegetable food alone, but adopt a mixed diet. It is, however, owing to their attacks upon cultivated plants that the creatures are looked upon as pests by the horticulturalist. The animals feed either in the night or in the very early morning, on seedlings, orchid tubers, mushrooms, or anything that comes to hand. Few of the accounts, however, of their ravages, mention that the crustaceans have been caught absolutely in the act of doing the damage ascribed to them. Some careful inquiries have nevertheless enabled us to discover several observers who have watched woodlice feeding. Mr. F. V. Theobald, of Wye College, and one of the students at Swanley Horticultural College are among the number. The former has also given us an account of the methods, out of many tried, which he has found most successful for getting rid of the crustaceans. Out of doors trapping with moss, sacking or horse-dung is best. In glass houses, fumigation with hydro-cyanic acid gas has cleared them out, and poison baits, especially potatoes cut and soaked in white arsenic, have done some good. Stable manure is especially favourable to these creatures, particularly when it is used "long": in this condition it should therefore be avoided.

It is interesting to note how the woodlice in winter simply remain where they happen to be so long as there is sufficient moisture, though they are ready to run about as rapidly for a time as in summer, should they happen to be disturbed.

No doubt many points of inter-relation between woodlice and other animals remain to be discovered. Mr. John W. Odell tells us that on Exmoor, in the open, he found no *Armadillidia*, though other forms occurred under nine out of every ten stones

that he turned over, and here the smaller species of ants also abounded. Close to stone walls *Armadillidia* were to be seen to the exclusion of all other genera, and this state of affairs was ascribed by Mr. Odell to the presence of swarms of the large wood-ants which he considers would make short work of any woodlice that could not protect themselves by rolling up.

We ought not to conclude this account without mentioning the fact that woodlice once played an important part in medicine.

Doctor Fernie (28) gives some interesting extracts with regard to the hoglouse and the woodlouse. The latter he seems to have identified quite correctly as *Oniscus asellus*. He calls the former, however, indiscriminately, "the common armadillo" (which is the old name for the pill-woodlice now known as *Armadillidium*), "the pill millipede" and "*Glomeris marginata*." The last two names are those of another creature, not a crustacean, which when it is rolled up can be very easily mistaken for an *Armadillidium*, though, when it uncurls, it will be seen to have many more than seven pairs of legs. The local appellations applied to the hog-louse by Doctor Fernie, and his remarks with regard to its commonness, tend to show that it is *Armadillidium vulgare*, to which he really refers, and the use of which in medicine was commonly general.

Hog-lice were prescribed for scrofulous diseases and obstructions of the liver and digestive organs, among other things, and the London College of Physicians directed that the creatures should be prepared by suspending them in a thin canvas bag placed within a covered vessel over the steam of hot spirit or wine, so that being killed by the spirit they might become friable. Hog-lice and Wood-lice were also administered alive, while the former were also put down the throats of cows "to promote the restoration" of their cud, hence their name of "cud-worm." There seems to be considerable evidence that even in modern times Wood-lice have had considerable remedial effect which depends upon an alkaliescent fluid contained in them.

**Local Names.**—Among the local names by which these creatures are known are those of "sow bug," "lucre pig" (Berkshire), "carpenter" and "chiselhog" (Berkshire). Doctor Fernie (28) gives a number of others:—"thrush-louse," "tiggylhog," "cheslip," "kitchenball," "chiselbob," "lugdor,"

‘palmer,’ and ‘cudworm.’ In the eastern counties the same writer notes that they are known as ‘old-sows’ or ‘St. Anthony’s hogs’ while the Welsh call them ‘little grey-hogs,’ ‘the little old women of the wood’ or ‘grammar-sows,’ grammar signifying a shrivelled up old dame. *Oniscus asellus* was sometimes called ‘socchetre,’ ‘church louse,’ and ‘chinch.’

**Methods of Collection and Preservation.**—Woodlice should be collected straightway into tubes or bottles half filled with 30 per cent. methylated spirit.<sup>3</sup> Woodlice dropped into this weak spirit become gradually narcotised and die, and they remain limp enough for purposes of examination or to allow, of their legs and antennæ being set out during the process of mounting. Specimens to be kept permanently should be placed in 70 per cent. alcohol. For storage purposes the specimens of each species from a given locality should be put together into a small flat bottomed tube such as are used for pillules by apothecaries or specially made for natural history purposes. A paper label on which the name, locality, date of capture and any other necessary particulars have been written with dark lead pencil, is not affected by the spirit. The tubes may be corked, though if not frequently examined all the spirit may evaporate, and cause the specimens to be spoilt. A safer method is to plug the tubes with cotton wool and keep all those containing a given species or specimens from a particular locality beneath the surface of spirit in a large wide-mouthed bottle, into which first of all some cotton wool has been put to prevent the tubes from coming into sudden contact with the glass at the bottom. For show purposes in museums, specimens taken direct from 30 per cent. spirit should be mounted on slips of opal glass by means of gum-tragacanth which has been powdered and shaken up in spirit before having water added to it. The slips can be exhibited in glass tubes, six inches high by one across, or in narrow stoppered museum jars. A variation of the method is to mount the animals on clear glass and to place behind them another strip of any colour that may be preferred.

<sup>3</sup> It should be pointed out that the methylated spirit now sold in the shops contains mineral naphtha and goes milky on the addition of water. Permission can be obtained from Somerset House to buy what is still called ‘ordinary methylated spirit,’ but at present five gallons has to be purchased at one time.

**Classification.**—The various genera of woodlice are connected together so closely, by intermediate forms, that their division into families is to a very great extent, arbitrary. Bate and Westwood described but a single family Oniscidæ (1), though they distinguished two sub-families :—Ligiinæ, which included the forms with many joints to the flagellum of the antenna, and Oniscinæ, which contained the rest.

Since then the pill-woodlice have been thought by some, to be sufficiently different from the other genera to warrant their separation, and three families namely, Ligiidæ, Oniscidæ, and Armadillidæ have been recognized, as for instance by Dr. Scharff (63).

A fourth family—Trichoniscidæ—has been added by Professor G. O. Sars, who in his *Crustacea of Norway* (59) alludes to the division of the tribe into the sections Ligiæ and Onisci and has adopted the following classification :—

### Order—ISOPODA.

#### Tribe—ONISCOIDA.

Family I.—LIGIIDÆ.

*Ligia.*

*Ligidium.*

Family III.—ONISCIDÆ.

*Oniscus.*

*Philoscia.*

*Platyarthrus.*

*Porcellio.*

*Metoponorthus.*

*Cylisticus*

Family II.—TRICHONISCIDÆ.

*Trichoniscus.*

*Trichoniscoides.*

*Haplophthalmus.*

Family IV.—ARMADILLIDIÆ.

*Armadillidium.*

All the genera described by Professor Sars are represented in the British Islands.

Below is a scheme of classification and synopsis of the characters of British genera of woodlice which we have compiled in order to render easy the determination of the genus to which any particular specimen may belong.

SCHEME OF CLASSIFICATION AND SYNOPSIS  
OF GENERIC CHARACTERS.

Order—ISOPODA.

Tribe—ONISCOIDA.

Section I.—LIGIÆ.

*The Two Divisions of the Tail Appendages alike in Shape.*

- (A.)—Flagellum with 10 or more joints; tail appendages wholly visible; head without lateral lobes - LIGIIDÆ.  
 (1.)—Abdomen broad; body large; habitat the sea-shore - *Ligia*.  
 (2.—Abdomen narrow; habitat wet moss - *Ligidium*.  
 (B.)—Flagellum with less than 10 joints; head with small lateral lobes, tail appendages partly covered TRICHONISCIDÆ.  
 (3.)—Abdomen narrow; eyes compound; flagellum usually with more than 3 joints - *Trichoniscus*.  
 (4.)—Abdomen narrow; eyes simple or wanting; flagellum with 4 joints - *Trichoniscoides*.  
 (5.)—Abdomen broad (comparatively); eyes simple; back with longitudinal; ridges; flagellum with 3 joints - *Haplophthalmus*.

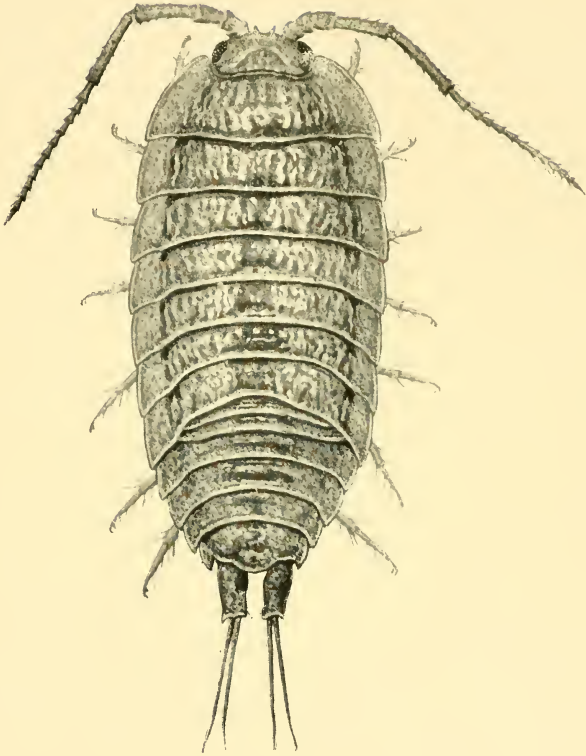
Section II.—ONISCI.

*The Outer Divisions of the Tail Appendages Broader than the Inner.*

- (A.)—Tail appendages projecting when the animal is walking - ONISCIDÆ.  
 (a.)—Unable to roll up into a complete ball.  
 (6.)—Flagellum with 3 joints; abdomen broad; head, with lateral lobes - *Oniscus*.  
 (7.)—Flagellum with 3 joints; abdomen narrow; head without lateral lobes - *Philoscia*.  
 (8.)—Flagellum with 1 joint; eyes wanting; abdomen broad; habitat, ant's nests - *Platvarthrus*.  
 (9.)—Flagellum with 2 joints; abdomen broad; frontal lobe projecting - *Porcellio*.  
 (10.)—Flagellum with 2 joints; abdomen narrow - *Metopenorthus*.  
 (b.)—Able to roll up into a complete ball.  
 (11.)—Flagellum with 2 joints; antennae folded together over the thorax when the animal is rolled up into a ball - *Cylisticus*.  
 (B.)—Tail appendages not projecting when the animal is walking - ARMADILLIDIIDÆ.  
 (12.)—Flagellum with 2 joints; antennae hidden or carried at the sides of the head when the animal is rolled up into a ball - *Armadillidium*.

[To be continued.]

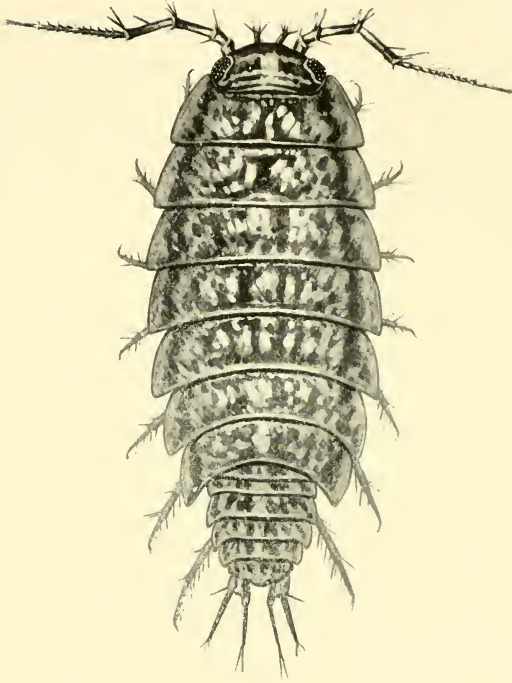




LIGIA OCEANICA Linné. THE QUAY-LOUSE.

*Length, two to three centimetres.*

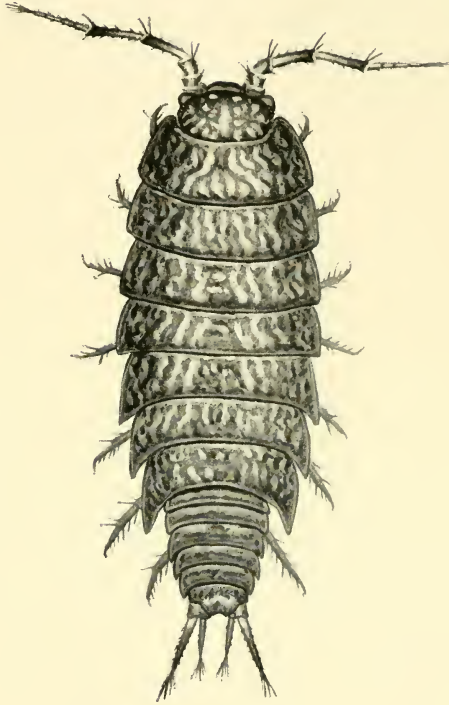




LIGIDIUM HYPNORUM Cuvier.

*Length, nine millimetres.*

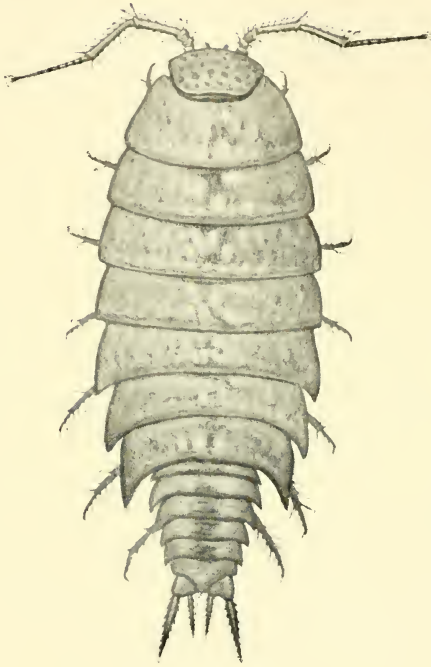




TRICHONISCUS PUSILLUS Brandt.

*Length, four millimetres.*



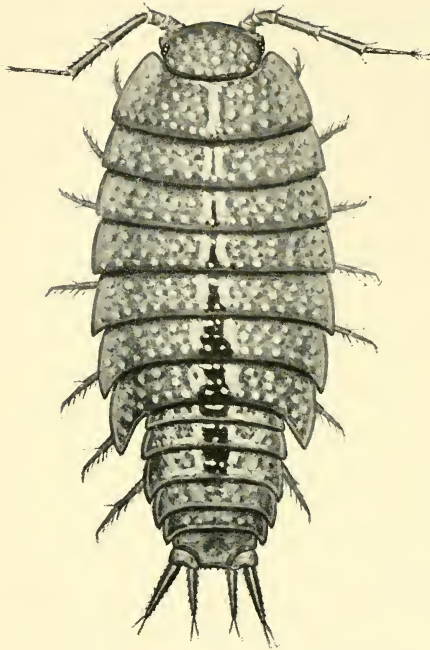


TRICHONISCUS VIVIDUS Koch.

*Length, eight millimetres.*

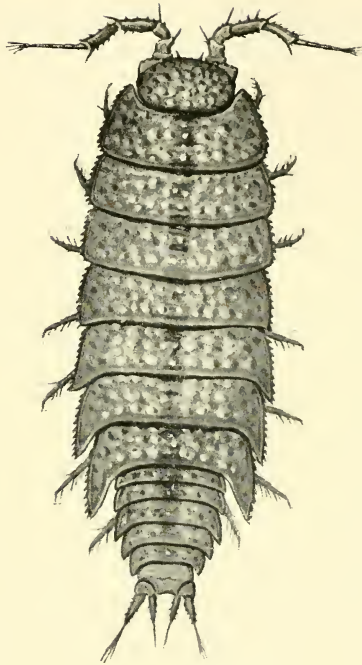






TRICHONISCUS ROSEUS Koch.  
*Length, five millimetres.*

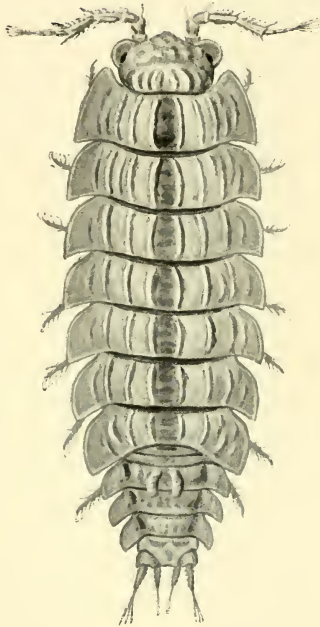




TRICHONISCOIDES ALBIDUS Budde-Lund.

*Length, four millimetres.*





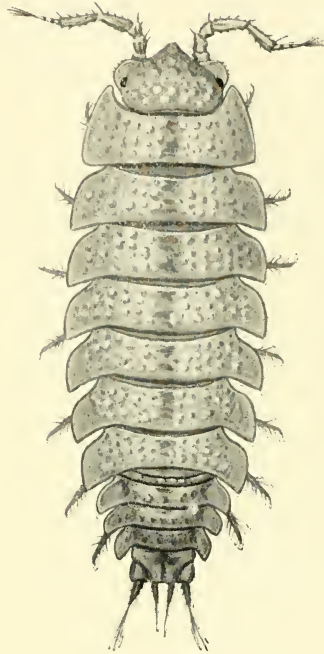
HAPLOPHTHALMUS MENGII Zaddach.

*Length, three to four millimetres.*

Charles Sillem, del. ad nat.

F. W. Reader, sculpt.



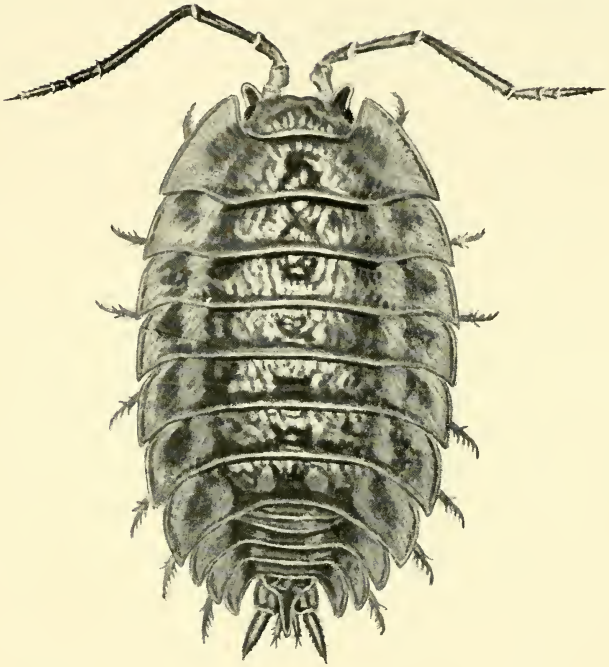


HAPLOPHTHALMUS DANICUS Budde-Lund.

*Length, three to four millimetres.*







ONISCUS ASELLUS Linné (The common slater).

*Length, sixteen millimetres.*



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The members and friends of the Club are reminded that the **Winter Session** will commence on **Saturday, October 28th, 1905**, at the Essex Museum of Natural History, Romford Road, Stratford, Essex.

The Secretaries will be glad to have intimation of **Papers** and **Exhibitions** intended to be brought before the Club. Early notices of this kind would greatly facilitate the arrangements for the meeting.

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[JULY, 1905.

*The*

# Essex Naturalist:

BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary and Curator.*

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*The Authors alone are responsible for the statements and opinions contained in their respective papers.*

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# THE ESSEX FIELD CLUB.

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**The Essex Museum of Natural History** (*Romford Road, Stratford, Essex*) is designed and arranged as a Local Museum for the County, and as an Educational Museum for use of the general public, students and schools. Included in the scheme is a Lecture-room for Demonstrations and the aid of a growing Library of some of the most useful monographs of British Geology, Botany, and Zoology, *for the use of Students in the Museum.* *Curator, W. COLE. Assistant, HENRY WHITEHEAD.*

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**The Photographic and Pictorial Survey of Essex** has been founded for the preservation of photographs, pictures and maps, etc., illustrative of the topography, antiquities, social habits, natural history, etc., of the County. Complete sets of the 1-inch and the 6-inch Ordnance Surveys and the Geological Survey of Essex, have been obtained to aid in this work. The collections will be stored in the Essex Museum, and will be available for reference on application to the Curator. *Hon. Secretary, VICTOR TAYLOR, Hurstleigh, Buckhurst Hill, Essex.*

## THE BEETLES OF THE EASTERN COUNTIES.<sup>1</sup>

By CLAUDE MORLEY, F.E.S., &c.

WHEN I last year (1904) wrote my comparative account of the the Coleopterous fauna of Suffolk and Norfolk I had had no opportunity of studying the very excellent catalogue of the Essex beetles published in the *Victoria History* of that county. This I have recently done with some care, and the results, as connected and interwoven with those of a similar study of the neighbouring counties, may be of interest to Essex Coleopterists, and will indicate the directions in which they may most advantageously strike out with a view to augmenting their list.

Rich as are both Suffolk and Norfolk in coast sands and salt marshes, those of Essex are of yet greater extent, and of a conformation to shelter a broader fauna; in the way of woods and forests Norfolk is the worst off, and the small patches of ancient timber at Staverton and Fakenham in Suffolk cannot be compared with the large tract of land still covered by Epping Forest. As regards the light lands, however, I do not think Essex so well equipped as her northern sisters; certainly she can boast no *inland* dunes and sandhills such as those of the Breck District.

My personal acquaintance with the beetles of Essex is so slight that it will hardly be wearisome to notice it here. In September, 1893, *Silpha atrata* was very common at Maldon; in January, 1896, *Homalium iopterum*, *Rhagium inquisitor* and *Scolytus intricatus*\* were found at Chingford Hatch. At Harwich early in June, 1897, *Bembidium ephippium*, *Dyschirius salinus*,\* *Cercyon aquaticus*,\* *Philonthus ventralis*, *Heterocerus obsoletus* and *Codiosoma spadix* turned up; and at Wood Street, Epping, in May, 1902, were *Anchomenus gracilis*, *Bembidium lunulatum* Fourc.,\* *Hydrous caraboides* and *Balaninus villosus*, with *B. tessellatus*, at Halstead. In July of the same year, and again in April of the following, I had several delightful days' collecting with my dear friend Mr. Alfred Beaumont, who had the honour (with the exception of Lord Avebury and two others) of being the oldest Fellow, among 500, of the Entomological Society; and of whose death I have to-day regretfully heard. We met with several nice beetles at Gosfield, near Halstead, the best being *Bolitochara lucida*,\* *Liodes*

<sup>1</sup> Written 1st March, 1905.

<sup>2</sup> *Trans. Norf. Nat. Soc.*, 1904, pp. 706-721.

*orbicularis*, *Rhizophagus perforatus*, *Tryphillus suturalis*, *Dyphyllus lunatus*,\* *Agrilus laticornis*,\* *Cis hispidus*, *Strophosomus retusus*, *Hypera plantaginis*, *Onthophilus striatus*,\* *Mycæta hirta*, *Monotoma quadricollis*,\* and *Stilicus fragilis*.\* I am surprised, in comparing these meagre records with the *Victoria History* list, to find among them no less than ten additions to the county list; these are marked with an asterisk.

Since my enumeration of our Coleoptera last year, thirty-three species have been added to the "Coleoptera of Suffolk,"<sup>3</sup> and Mr. James Edwards, F.E.S., has added seven species in the *Transactions of the Norfolk Naturalists' Society*, 1904, pp. 744-5, to the 1,796 species which he had previously noticed from Norfolk.<sup>4</sup> A comparison of the Essex list with these is most instructive—all the following one hundred and seventy-four species are hitherto quite unknown to occur in either of the more northern counties. I have taken the opportunity of appending a comparative table, illustrating the distribution of the various groups in the Eastern Counties. The only species I have excluded from the Essex list is *Brachinus sclopeta*, a very doubtful insect as British, which should be placed in the same category as *Chrysomela gloriosa* in Suffolk and *Cardiophorus ruficollis* in Norfolk; nor have I included my own records, mentioned above, in so unofficial a review as the present.

### BEE TL ES PECULIAR TO ESSEX.

GEODEPHAGA	
<i>Dyschirius extensus</i>	<i>Hydrophorus rivalis</i>
<i>Stenolophus elegans</i>	<i>Agabus biguttatus</i>
<i>Acupalpus consputus</i>	
<i>Anisodactylus pæciloïdes</i>	PALPICORNIA
<i>Pterostichus inæqualis</i>	<i>Paracymus nigro-æneus</i>
<i>Auchomenus atratus</i>	<i>Spercheus emarginatus</i>
„ <i>juncus</i>	<i>Ochthebius æneus</i>
<i>Bembidium paludosum</i>	<i>Hydraena nigrita</i>
<i>Trechus lapidosus</i>	BRACHELYTRA
	<i>Microglossa gentilis</i>
HYDRADEPHAGA	<i>Oxypoda exoleta</i>
<i>Hydrophorus celatus</i>	„ <i>lentula</i>

<sup>3</sup> *The Coleoptera of Suffolk*, by Claude Morley, F.E.S., &c. Plymouth, J. H. Keys, Printer, Whimble Street, 3s. 6d.

<sup>4</sup> *Fauna and Flora of Norfolk*, part xii.: *Coleoptera*. By James Edwards, F.E.S. (*Trans. Norf. Soc.*, 1893, p. 427-508); "Additions," *ib. cit.* 1899, pp. 515-527.



<i>Oxypoda recondita</i>	<i>Sunius filiformis</i>
„ <i>spectabilis</i>	<i>Dianous cœrulescens</i>
„ <i>vittata</i>	<i>Stenus canescens</i>
„ <i>waterhousei</i>	„ <i>fuscicornis</i>
<i>Stichoglossa semirufa</i>	„ <i>picipennis</i>
<i>Thiasophila inquilina</i>	<i>Oxytelus maritimus</i>
<i>Ischnoglossa corticina</i>	<i>Acrognathus mandibularis</i>
<i>Ocalea badia</i>	<i>Deleaster dichrous</i>
<i>Calodera riparia</i>	<i>Acidota cruentata</i>
<i>Notothecta confusa</i>	<i>Micralymma brevipenne</i>
<i>Homalota agra</i>	
„ <i>autumnalis</i>	CLAVICORNIA.
„ <i>cadaverina</i>	<i>Bryaxis waterhousei</i>
„ <i>canescens</i>	<i>Euplectus piceus</i>
„ <i>cinnamoptera</i>	<i>Scydmanus godarti</i>
„ <i>corvina</i>	„ <i>poweri</i>
„ <i>decipiens</i>	<i>Eutheia plicata</i>
„ <i>gemina</i>	<i>Agathidium convexum</i>
„ <i>indubia</i>	<i>Anisotoma curvipes</i>
„ <i>pilicornis</i>	„ <i>oblonga</i>
„ <i>silvicola</i>	<i>Hydnobius strigosus</i>
„ <i>sordidula</i>	<i>Colon serripes</i>
„ <i>xanthopus</i>	<i>Hister quadrimaculatus</i>
<i>Gyrophæna lucidula</i>	<i>Abraeus granulum</i>
„ <i>strictula</i>	<i>Trichopteryx ambigua</i>
<i>Eurysa laticollis</i>	„ <i>brevicornis</i>
<i>Oligota flavicornis</i>	<i>Actidium coarctatum</i>
„ <i>pusillima</i>	<i>Hyperaspis reppensis</i>
<i>Conosoma pedicularis</i>	<i>Scymnus minimus</i>
<i>Tachinus elongatus</i>	<i>Phalacrus brisouti</i>
<i>Quedius umbrinus</i>	<i>Amphotis marginata</i>
<i>Philonthus addendus</i>	<i>Thalycra sericea</i>
„ <i>fuscus</i>	<i>Ips quadriguttata</i>
„ <i>punctus</i>	<i>Ditoma crenata</i>
„ <i>splendidulus</i>	<i>Cicones variegatus</i>
„ <i>thermarum</i>	<i>Laemophloeus bimaculatus</i>
<i>Cafius sericeus</i>	„ <i>pusillus</i>
<i>Lathrobium punctatum</i>	<i>Silvanus unidentatus</i>
<i>Medon fuscula</i>	<i>Monotoma formicetorum</i>
„ <i>obsoleta</i>	„ <i>quadrifoveolata</i>

*Monotama spinicollis**Lathridius carinatus**Corticaria transversalis**Cryptophagus bicolor**Cænoscelis ferruginea**Atomaria atra*,, *fimetarii*,, *versicolor**Megatoma undata**Heterocerus sericans*, Kies.

## LAMELLICORNIA

*Onthophagus nutans**Aphodius conspurcatus*,, *lividus*,, *tessulatus*,, *zenkeri**Heptaulacus testudinarius*

## STERNOXI

*Throscus carinifrons*,, *obtusus**Elater miniatus*,, *præusta*,, *sanguinolentus**Agriotes sordidus**Corymbites pectinicornis*

## MALACODERMA

*Podabrus alpinus**Axinotarsus pulicarius**Dolichosoma lineare**Haplocnemus nigricornis**Opilo mollis*

## TEREDILIA

*Dorcatoma flavicornis**Anitys rubens**Cis alni*,, *micans**Ennearthron affine*

## LONGICORNIA

*Callidium sanguineum**Obrium cantharinum**Molorchus minor**Leptura scutellata**Strangalia attenuata*,, *revestita*

## PHYTOPHAGA

*Orsodacna cerasi*,, *lineola**Bruchus luteicornis**Clythra quadripunctata**Chrysomela marginata**Thyamis absinthii**Hermeophaga mercurialis**Plectroscelis aridula*

## HETEROMERA

*Alphitophagus 4-pustulatus**Tribolium confusum**Clinocara tetratoma**Abdera quadrifasciata**Palorus depressus**Lissodema quadripustulata**Pyrochroa coccinea**Mordellistena brevicauda**Anthicus angustatus**Meloe cicatricosus*,, *rugosus*

## RHYNCHOPHORA

*Apion lævicolle*,, *livescerum*,, *schonherri**Trachyphloeus alternans**Omius mollinus**Sitones cambricus**Liosoma oblongulum**Eriirhinus scirpi**Bagous argillaceus*

*Bagous cylindrus*  
 „ *subcarinatus*  
*Sibinia arenariæ*  
*Mecinus collaris*  
*Coeliodes exiguus*

*Ceuthorhynchus verrucatus*  
*Hylastes angustatus*  
*Tomicus nigritus*  
*Xyleborus saxeseni*  
*Brachytarsus varius*

Taking the time-honoured groups individually, the following table will show at a glance the relative distribution of species, as far as is at present ascertained, throughout the Eastern Counties.

GROUP.	ESSEX.	NORFOLK.	SUFFOLK.	BRITAIN.
Geodephaga ... ..	173	196	191	310
Hydradephaga ... ..	60	95	82	130
Palpicornia ... ..	64	74	74	95
Brachelytra ... ..	385	371	429	778
Clavicornia ... ..	302	337	331	682
Lamellicornia ... ..	46	56	58	90
Sternoxi ... ..	33	36	35	76
Malacoderma ... ..	50	58	57	91
Teredilia... ..	28	24	32	57
Longicornia ... ..	34	33	32	59
Phytophaga ... ..	142	173	185	256
Heteromera ... ..	68	57	69	118
Rhynchophora ... ..	264	293	318	526
TOTAL ... ..	1,649	1,803	1,900	3,268

## SULPHATE OF LIME IN ESSEX SOILS AND SUBSOILS.

By T. S. DYMOND, F.I.C.

[*Read January 28th, 1905*]

IN his last Presidential address to the Essex Field Club, Mr. F. W. Rudler traced the existence of Selenite in certain clay strata to the oxidation of Pyrites in the London-clay, and the reaction of the resulting sulphuric acid with carbonate of lime, by which sulphate of lime is formed. The sulphate of lime crystallizes slowly from solution at the ordinary temperature in the form of selenite. I wish to suggest in this note that there is another possible source for the selenite, and at the same time briefly to discuss the practical bearing of the question upon Essex agriculture.

The selenite crystals appear to be most abundantly found in certain superficial clay strata overlying the London-clay. In sinking shallow wells at Upminster and other places in South Essex, deposits of clay loaded with selenite are sometimes met with.<sup>1</sup> The crystals are found in star like masses, each ray of which consists of characteristic twin crystals superimposed on each other. In the same part of the County, a dry bank under a thick hedge is often found to be encrusted with a white efflorescence of sulphate of lime, pointing to its abundance in the surface soil; if a drying wind occurs after rain, the surface of an arable field will appear white for the same reason, and the farmer finds the soil "capped" and hard. The water obtained from wells sunk into gravelly pockets of the London-clay is often excessively hard, the hardness being partly due to sulphate of lime. In one such water from Wickford I found the permanent hardness was equal to 93 parts of sulphate of lime per 100,000, and another from Ingrave to 112 parts. In such waters, however, part of the hardness is invariably due to sulphate of magnesia.

That such excessive quantities of sulphate of lime are not found associated with the Boulder-clay is sufficiently explained by its permeability to water. The rain water draining through the Boulder-clay dissolves from the surface and carries with it the sulphate of lime, and the water issuing from springs at the outcrop of the underlying gravel, contains appreciable, but not excessive, quantities of the salt. Through the London-clay water cannot easily percolate, and percolation is rather upwards

<sup>1</sup> Similar deposits were struck in cutting the new Woodford and Ilford railway.

through the superficial layers in order to replace water evaporated from the surface soil. When this occurs the sulphate of lime is left behind, either as an efflorescence on the surface or, it seems possible, as crystals of selenite in the subsoil.

In considering the source of the sulphate of lime in shallow wells and superficial strata of the London-clay, it will be necessary to enquire to what extent sulphate of lime exists in the surface soils of Essex. In conjunction with my former colleague, Mr. Frank Hughes, now of the Khedivial Agricultural Society of Egypt, I analyzed for sulphate some twenty Essex soils. The results of these analyses are expressed as sulphuric acid ( $\text{SO}_3$ ) per cent.; one per cent. of sulphuric acid is equal to 1.7 per cent. of sulphate of lime.

<i>Locality.</i>	<i>Sulphuric Acid.</i>	<i>Locality.</i>	<i>Sulphuric Acid.</i>
Bromley .. ..	.062	Orsett .. ..	.050
Bulphan .. ..	.030	Great Oakley ..	.048
Burnham .. ..	.080	Ramsden .. ..	.080
Cressing .. ..	.028	Saffron Walden (1)	.093
Dunton .. ..	.028	Saffron Walden (2)	.079
Elmstead .. ..	.043	St. Osyth .. ..	.043
Gosfield .. ..	.060	Tendring .. (1)	.035
Margaretting ..	.056	Tendring .. (2)	.050
Mucking .. ..	.029	Thaxted .. (1)	.040
North Ockendon ..	.039	Thaxted .. (2)	.045
Average .. ..	.051.		

Taking the top 9 inches of soil to weigh 3,000,000 lbs. per acre, the average quantity of sulphate of lime in the surface soil amounts to 2,610 lbs. The drainage through naturally or artificially well-drained land in a year of average rainfall in Essex probably amounts to 150,000 gallons per acre. From analyses of surface drainage waters the sulphate of lime contained in such a quantity of drainage water would amount to nearly 200 lbs., so that in a period of thirteen years the whole of the sulphate of lime would be exhausted.

Sulphate is as necessary an ingredient of plant food as phosphate. Taking the average produce of an Essex farm, an amount of sulphate will be used by crops each year equal to 44 lbs. of sulphate of lime per acre. The question may well be asked whether, in view of the exhaustion by drainage of the sulphate of the soil, Essex soils are not deficient in this ingredient of plant food. A series of field experiments have been carried out by the Essex Education Committee on the subject, but it

has been found that, with the exception of a gross-feeding crop like cabbages, or a crop specially rich in albuminoid like red clover, none of the ordinary crops of the farm responds to sulphate manuring. In spite of loss by drainage therefore a supply of sulphate in the soil, sufficient for most crops, is maintained.

There are two sources of supply of sulphate in the soil. In the first place, Berthelot and André shewed that the total amount of sulphur in the soil was nearly eight times that in the form of sulphate, the greater part being in the form of sulphur compounds produced by the decay of vegetable matter. Mr. Hughes and myself found that these in the presence of certain micro-organisms were converted by atmospheric oxidation into sulphuric acid. In the second place the supply of sulphate is maintained by rain. At Chelmsford the sulphuric acid thus supplied in a year of average rainfall was found to amount to 50 lbs. per acre, *i.e.* more than the average crop could require.

The sulphuric acid, whether produced by fermentation in the soil or supplied by rain, combines with the lime of the soil, producing sulphate of lime. It is owing to this constant exhaustion of the lime of the soil that dressings of lime have to be applied from time to time, and in the absence of such dressings on London-clay soil the land becomes impossible to cultivate. We may suppose that the liming of land has been carried on for centuries. Is it not conceivable that a part of the sulphate of lime that hardens the water, and crystallizes out as selenite in the superficial strata of the London-clay, may be due to the inter-action of sulphuric acid and lime in the surface soil?

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## FUNGI IN PAIRS.

By M. C. COOKE, LL.D., M.A., A.L.S., &c.

THE discovery of specimens of *Polyporus nidulans* growing on a tree near Loughton Station, at the last Fungus Foray, has reminded me of several instances in which two species of Fungi, that are closely allied, appear to be good and characteristic species in their extreme forms, but approximate so closely in other instances that it is almost impossible, sometimes, to determine to which of the two species the specimens should be referred. *Polyporus nidulans* (Fr.) has its fellow in *Polyporus rutilans* (Fr.), and the likeness is occasionally so great that some authors have regarded them as varieties of one species.

Amongst Agarics there are undoubtedly *Amanita phalloides* (Fries.) and *Amanita mappa* (Bat.) which may be distinguished from each other in their common forms, but where a large number come together, there will often be found specimens which could not with certainty be referred to either species. Then again there are *Clitopilus orcella* (Bull) and *Clitopilus prunulus* (Scop.), which approach each other so closely in some forms as to justify those mycologists in their doubts, who consider them one species. Nor can we forget such species as *Coprinus comatus* (Fr.) and *Coprinus ovalis* (Sch.), although the *comatus* form is comparatively permanent. Some of the species of *Russula* are distinct enough in their typical forms, but are very puzzling when their characteristics are reduced to the lowest point, and the species seem to coalesce. This is often the case with *Russula citrina* (Gill) and *Russula granulosa* (Cooke) from which *Russula ochroleuca* (Pers.) is chiefly distinguished by the rugose greyish stem. Then again *Russula emetica* (Fries) and the red forms of *Russula fragilis* (Pers) become critical when the flesh of the former does not appear reddish beneath the cuticle. We need not allude to *Hygrophorus lætus* (Fries) and *Hygrophorus houghtoni* (B. and Br.), since no one will now contend against their specific identity. If one might refer to such a genus as *Inocybe*, which seems full of doubts, then *Inocybe pyriodora* (Pers.) and *Inocybe incarnata* (Bres) are occasionally indistinguishable. We can scarcely introduce *Stropharia squamosa* (Fries.) and *Stropharia thrausta* (Kalch) as a case in point, because very few persons regard them as distinct species. It would be easy to multiply instances of this kind, but two species must not be forgotten, if they are really distinct, and these are *Pholiota terrigena* (Fries.) and *Pholiota cookei* (Fries.). Surely if we are right in our determination of the former, the latter is only a slender variety. There are two or three species of *Nolanea*, with a strong fishy odour, such as *Naucoria piceus* (Kalch) and *Nolanea pisciodora* (Ces), often very distinct in appearance, but occasionally very suspiciously alike. These are a few of the "curiosities of mycology," or, we might call them "puzzles for the curious," which will trouble the student, but should not discourage him, but rather stimulate to a further and better knowledge of the secrets of Isis, on whose statues of old was inscribed the legend "I am all that has been, that shall be, and no mortal has lifted the veil that covers me."

## THE ESSEX FIELD CLUB—REPORTS OF MEETINGS.

### THE 235th ORDINARY MEETING.

*Saturday, January 28th, 1905.*

This meeting was held as usual in the Technical Institute, Stratford, at 6.30 p.m., the President, Mr. F. W. Rudler, F.G.S., in the chair.

**New Member.**—Miss Eva Whitley, B.Sc., of 18, Westbourne Terrace, Hyde Park, W., was elected a member of the Club.

**Recent Additions to the Museum.**—Mr. W. Cole exhibited a specimen of *Putorius hibernicus*, the Irish Stoat, which has been only recently added to the British Fauna. For a long time it was regarded as a large weasel. It is remarkable for not turning white in winter, as the Common Stoat so generally does.

Also fine specimens of the Wild Cat (*Felis catus*) and of *Lepus timidus*, the Mountain Hare.

These specimens had been obtained and set up specially for the museum by Messrs. Sherrin Bros., the Club's taxidermists.

Mr. Cole also showed a specimen of the Grey Shrike (*Lanius excubitor*) employed by the Dutch hawk-catchers to give warning of the approach of a hawk. This specimen had been presented by Mr. J. E. Harting, F.L.S., to be added to his fine collection illustrating the modern practice of Falconry, already in the main hall of the Museum.

Mr. John Spiller, F.I.C., exhibited photographs showing the extraordinary damage to the East Coast of England by weather and sea action during the last few weeks, and made some explanatory remarks on the same.

**Papers Read.**—Mr. T. S. Dymond, F.C.S., read a paper entitled "Sulphate of Lime in Essex Soils and Sub-Soils." The paper was illustrated by a table showing the proportion of sulphuric acid in soils from 20 separate Essex stations. [*Ante p. 62.*]

The President congratulated Mr. Dymond on his appointment to his new but important post, that of Inspector under the Board of Education, to advise on matters of Education and of Nature-study in Rural Schools, and made some remarks on points in the paper. Mr. Spiller also spoke on the subject.

A vote of thanks was passed to Mr. Dymond for his paper.

Mr. F. J. Chittenden, of the County Technical Laboratories, Chelmsford, then read a paper entitled "The Bog-Mosses (Sphagnacæ) of Essex: a contribution to a Flora of the County."

Mr. Chittenden's explanations were accompanied by drawings on the black-board, and by a set of Essex specimens of the group. The paper will be published in the *ESSEX NATURALIST* in due course.

A discussion on the paper took place, carried on by the President, Mr. Barnard, the Author, and others, and Mr. Chittenden was cordially thanked for a very interesting addition to the County Monographs already issued under the auspices of the Club.

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### THE 236th ORDINARY MEETING.

*Saturday, February 25th, 1905.*

The fourth meeting of the winter session was held in the Technical Institute, Stratford, at 6.30 p.m., the President, Mr. F. W. Rudler, I.S.O., F.G.S., in the chair.



**Death of Professor Howes.**—The President said that the Council had received with great regret the news of the death of Prof. G. B. Howes, LL.D., D.Sc., F.R.S., &c., one of the Honorary Members of the Club. He made some very interesting and appreciative remarks on the life and work of the lamented scientist, and proposed that the meeting should unite with the Council in recording their sense of the loss the Club had sustained, and that a letter of condolence should be sent to Mrs. Howes by the Secretary. This was cordially approved.

**New Member.**—Mr. Mark Wilks, 24, Lower Clapton Road, N.E., was elected.

**Nomination of Officers and New Members of Council.**—In view of the annual meeting, nominations of officers and members of Council were made (See report of Annual Meeting on April 8th).

**New Cockroach in Essex.**—The Secretary exhibited on behalf of Mr. E. C. Horrell, F.L.S., specimens of *Leucophaea surinamensis*, which had occurred in a garden near Chelmsford (See "Notes," E.N. Vol. XIII, p 365).

**Injurious Fungi on Hornbeam Trees.**—Mr. Robert Paulson exhibited some photographs he had made of twigs of Hornbeam attacked by *Corticium comedens*. This fungus does much harm, and Mr. Paulson made some remarks on the life-history of the pest. He also showed a photograph of the "Witches' Broom" caused by the attacks of *Enrixcus carpini* on hornbeams, and of *Stereum hirsutum*, found on old stumps.

Mr. Cole said that the late Miss Ormerod had described the Witches' Broom as being caused by a Mite (*Acarus*), belonging to the Phytopti, in a paper in volume x. (1877) of *The Entomologist* (pp. 83-6), "*Phytoptus* of the Birch-knots." Miss Ormerod traced the development of the infected buds, which grow clustered together, and their abnormal growth in the course of years caused the buds to expand from a small cluster to a great bunch of twigs sometimes as much as a yard in diameter. Mr. Cole said that the matter evidently needed investigation. Of course it was possible that the "Witches' Broom" might be caused in two ways or it might be a case of dual parasitism.

**Medallion Portrait of Peter Muilman.**—Mr. J. Avery exhibited a medal struck to commemorate the 40th Marriage-day of Peter Muilman, patron of the well-known *History of Essex, By a Gentleman* (1770). It was believed that no other portrait of Muilman was in existence, and the medallion was consequently of very considerable interest.

The several exhibitors were thanked for their communications.

**"The Family and Life of Gilbert of Colchester."**—Professor Silvanus P. Thompson, D.Sc., F.R.S., &c., then delivered a Lecture on this subject, which was illustrated by the exhibition of rare books, autographs, and by a series of lantern-slides. The Lecturer dwelt principally on the many interesting problems connected with the pedigree of the family and of Gilbert's professional life in London. The lecture was a measure supplemental to Professor Thompson's former lecture which was printed in volume v. of the *ESSEX NATURALIST*, and it is to be hoped that a full abstract of the Address may be published at some future time.

The Lecturer was most cordially thanked by the President, and Professor Meldola made some remarks upon Gilbert's position in the history of scientific thought, and referred to his high character as probably the first real experimentalist in English science.

The vote of thanks was carried by acclamation, and Professor Thompson replied.

**The Hymenomycetal Fungi of Essex.** — The Secretary read an abstract of a paper by Dr. M. C. Cooke, A.L.S., &c., and Mr. George Massee, F.L.S., being a "Revised List of the Hymenomycetal Fungi of Essex; a contribution to a Flora of the County." The list will appear in the *ESSEX NAT.*, and will be probably reprinted in separate form to serve as a check-list at the Fungus Forays of the Club.

## THE 25th ANNUAL GENERAL MEETING AND SPECIAL MEETING.

SATURDAY, APRIL 8TH, 1905.

The 24th Annual Meeting of the Club was held at the Municipal Technical Institute, Stratford, at 4 p.m., Mr. F. W. Rudler, President, in the Chair.

The minutes of the 24th Annual Meeting, held on April 16th, 1904, and printed in the *ESSEX NATURALIST*, Vol. xiii., pp. 262-3, were read and confirmed.

The Secretary submitted the Annual Report of the Council for the year 1904.

Mr. Rudler said that the Council desired to add to the report a special paragraph referring to Messrs. W. and B. G. Cole and the Misses Cole, and he read the draft of the same, which is appended to the report.

Mr. David Howard, J.P., the Treasurer, submitted his financial statement for the year 1904.

The report and treasurer's statement were unanimously received and adopted.

Both the report and statement are printed in the *Year-book and Calendar for 1905-6*, and this plan will be adopted in the future.

The Secretary presented the account of the Tea Fund for the Session 1904-5. The receipts had been £3 1s. 6d. and the expenditure £5 7s. 6d. (including a balance of £1 15s. 3d. from former session), leaving an adverse balance of £2 6s.

At the Meeting on February 7th last, the following Members retired from the Council by the Rules:—**Messrs. ANDREW JOHNSTON, J.P., F. W. READER, PERCY CLARK, and ALFRED LOCKYER.** The first two offered themselves for re-election, and were duly nominated. To fill the vacancies, **Mr. VICTOR TAYLOR and Mr. J. M. WOOD, C.E.** were nominated.

As OFFICERS for 1905, the following were nominated:—

*President*—**Mr. MILLER CHRISTY, F.L.S.**

*Treasurer*—**Mr. DAVID HOWARD, J.P., F.C.S., Pres.I.C.**

*Hon. Secretaries*—**Mr. W. COLE and Mr. B. G. COLE.**

*Librarian*—**Mr. THOMAS W. READER, F.G.S.**

*Auditors*—**Mr. WALTER CROUCH, F.Z.S., and Mr. J. D. COOPER.**

No other Members having been proposed, the above-named gentlemen stood elected as Members of the Council and Officers for 1905, and were so declared by the Chairman.

The Chairman said that the Council recommended the election of **Prof. SILVANUS P. THOMPSON, D.Sc., F.R.S., &c.**, as one of the Honorary Members, to fill the vacancy occasioned by the lamented death of **Prof. G. B. Howes, F.R.S.**, and the proposal was unanimously adopted by the meeting.

The President intimated that he would reserve his address until the evening meeting, in accordance with the announcement made in the circular.

Mr. Howard said that they ought to express to Mr. Rudler the best thanks of the Members and Council, for the care and high scientific qualities which he had devoted to the Club during his two years of office. (Applause.)

The Rev. W. S. Lach-Szyrma also emphasised the debt they owed to their retiring President, and begged to move a vote of thanks to the several Officers for their work. He considered it a remarkable fact that a local Society should maintain a vigorous life during so long period as 25 years, and still show full power for future work. He thought that they all recognised the excellent efforts of their Officers.

The thanks to the President and Officers were carried amidst applause.

Mr. Christy desired to thank the Club for the honour done to him in choosing him as President. He had been connected with Club ever since its foundation, and felt a most sincere interest in its welfare. He hoped that a strong effort would be made to increase the membership of the Club, and to spread its influence more widely in the County. He would submit some proposals to the Council, with this end in view, during the year.

The meeting was then declared *SPECIAL*, in order to consider and adopt the Amended Rules. The Secretary had summarised the alterations and additions to the rules in the circular calling the Meeting, and proofs of the Amended Rules were on the table.

On the proposal of the President the Rules were adopted unanimously by the Meeting.

Copies of the Amended Rules have since been sent to all Members of the Club, and the Rules are printed in the *Year-book*, a copy of which will be sent to each Member.

The Meeting then adjourned for tea, to re-assemble in the evening.

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## THE 237th ORDINARY MEETING.

*Saturday, April 8th, 1905.*

The Annual Meeting having been held in the afternoon, an Ordinary Meeting was held after tea, at 6.30 o'clock, Mr. F. W. Rudler, V.P., in the chair.

**New Member.**—Mr. Frank Thompson, Slyder's Gate, Loughton, was elected a Member.

**Exhibits.**—Mr. W. H. Dalton, F.G.S., exhibited a considerable assortment of fossils and minerals, from various parts of the world, which he had obtained during his recent professional journeys:—

(1) He drew special attention to marl crowded with small *Rissoa*, &c., from the Miocene of Frankfort-on-Main, which he had brought for comparison with similar accumulations on the present shores of Essex.

(2) Also a small collection of shells gathered in the course of a few hours delay on the shore of the Okhotsk Sea, on the eastern side of the island of Sakhalin. Their resemblance to, if not specific identity with, our British *Myadæ*, *Tellinidæ*, *Mactridæ*, *Buccinidæ*, &c., is remarkable, in view, less of the wide difference of longitude between Sakhalin and Essex, than of the difficulties, in respect of temperature, to any interchange of marine forms across either the Polar or the Equatorial seas.

(3) Land and river shells from the northern parts of Lower Burma, with some forms generically similar to those in England, mixed with others of very unfamiliar aspect. The aquatic Gastropoda show the most difference, whilst the *Cyclas*, *Anodon* and *Unio* are much like those of the English rivers.

Some of our entomological members took much interest in a trayful of scorpions, beetles and other "nasty things" (as Mr. Dalton called them) from the Burmese jungles.

It may be mentioned here that on the same part of the Sakhalin shore there was found the skull of a large whale, one of the Ear-bones from which Mr. Dalton has placed with our fossil Ear-bones from the Crag in the Museum for comparison.

**Photographs of Essex Coast.**—Mr. John Spiller exhibited ten photographs, which had been presented for the Photographic Survey of Essex, by Mr. T. E. Freshwater, F.R.M.S. They were views of Walton-on-the-Naze, Frinton and Clacton, and might become interesting in connection with the rapid changes which are taking place in that part of our coast.

**Bifid Earthworm.**—Mr. Cole exhibited a very curious specimen of an Earthworm, with a bifid tail, which had been sent to the Museum by Mr. Walter B. Nichols. It had been found by Mr. Nichols' gardener, in his garden at Stour Lodge, Bradfield, Manningtree, Essex. Mr. Cole promised to give details of this curious "freak" after further examination and comparison with the recorded instances of like examples.

**Oil-painting of Romford.**—Mr. James Holden, Locomotive Superintendent of the Great Eastern Railway, sent for exhibition a large oil-painting of Romford Cattle Market about the middle of the last century. The picture was much admired.

**Ordnance Survey Maps in Museum.**—Mr. A. E. Briscoe, B.Sc., Principal of the Institute, called attention to the complete set of the 6in. Ordnance Survey Maps of Essex, which had been obtained for use in the Museum, and particularly in connection with the Photographic Survey of Essex. They would be placed in portfolios in a cabinet in the Museum, and he hoped that they would prove valuable and interesting for reference.

Mr. Rudler said that he considered the Club had been very fortunate in obtaining such ready help and co-operation from Mr. Briscoe, and the Education Committee, in the establishment of the very interesting scheme for a photographic survey. (Applause.)

**Presidential Address and Thanks to Mr. Rudler.**—Mr. Rudler then delivered his Presidential Address, which had been postponed from the Annual Meeting that afternoon. The subject was "Natural History Museums," and it was illustrated by lantern-slides, and by the exhibition of rare books relating to Museums. [The address is printed in *extenso* in the present volume, *ante* pp. 1 to 37.]

In the absence of the new President, Mr. Miller Christy, who had left early to catch the train to Chelmsford, Prof. Meldola proposed that a cordial vote of thanks be passed to Mr. Rudler, both for his eminent services during his two years in the Presidential chair, and for the admirable address which he had just delivered. The Club was indebted to Mr. Rudler for an appreciative and personal interest in its affairs which would always linger in the memories of the members, and was a matter for congratulation, that as one of the Permanent

Vice-Presidents they would still have the great benefit of Mr. Rudler's scientific knowledge and experience. The President's appreciation of the efforts the Club was making to establish a local museum was one of the best evidences that could be afforded that these efforts were being pursued on right lines, and Mr. Rudler's address would not only be most valuable in itself, but would be a great aid and encouragement in the future of the Museum.

The vote of thanks was seconded warmly by Mr. T. V. Holmes, and carried by acclamation.

Mr. Rudler replied and thanked Prof. Meldola and Mr. Holmes for their appreciation of his efforts, and the members for the way in which they had endorsed the remarks which had been made.

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## NOTES—ORIGINAL AND SELECTED.

### ZOOLOGY.

#### BIRDS.

**Dotterel at Fowlness.**—On Saturday, Sept. 2nd, 1905, a Dotterel (*Eadromias morinellus*), a bird of the year, was shot in Fowlness Island, and by the kindness of Mr. H. Matthams, of Fowlness, it was sent to me for identification and preservation.—HENRY LAVER, Colchester. [Christy (*Birds of Essex*) remarks that the Dotterel is a rare passing migrant in spring and autumn when on its way to or from its more northerly breeding stations among the Scotch mountains.]

**How the Wild Birds are returning to the London District.**—In the *Daily News* for September 28th, 1905, is a very interesting article on the return of the birds. The writer says :—

For some little time visitors to St. James's Park have enjoyed the beautiful spectacle of a kingfisher flitting about the lake, his brilliant plumage glistening rainbow-like in the sun as he darts after the small fishes in the water. Mr. C. J. Cornish, the well-known writer on wild birds in the Thames Valley, yesterday told a member of our staff that the kingfisher is not the only wild bird that is beginning to make its home in London after long absence.

'The presence of the kingfisher in St. James's Park may be accounted for,' he said, 'by the enormous increase of fish in the ponds there. In spite of the presence of cormorants and pelicans, the water swarms with fish. Roach and dace are fed from the bridge just as the gulls are in winter, and probably there is a large quantity of fry to attract the kingfisher. These birds are very bold when they find nurseries of young fish, and I have known them rob infant trout from the boxes of a hatchery. They have appeared before this on the pond at Battersea Park, and a pair nested two years ago in the grounds of Chiswick House. If the fish supply continues the kingfisher is not likely to desert St. James's Park. London is becoming increasingly attractive to many kinds of

wild birds, especially those that frequent the neighbourhood of water. The universal protection given to them leads them to have no fear of mankind, and the many new lakes and reservoirs, such as the West Middlesex reservoir, near Ranelagh, provide them with their natural hunting and nesting places. The parks, too, afford perfectly safe homes for many birds. For instance, the wood-pigeon—quite a different bird from the tame pigeons of St. Paul's—now abounds in many parks, and is becoming almost domesticated. It is even changing its habits, and now builds on chimneys and roof cornices. Then, to go back to water-birds, on the Serpentine and the ponds in St James's Park, are not only wild ducks and water-hens, but the coot, the pochard, or red-headed diving duck, and the tufted duck, the male of which, by its bright black and white plumage, is very conspicuous. This species is increasing quite as fast in and round London as in the country. It is common on the Serpentine, in St. James's Park, in Wanstead Park, and on the Penn Ponds at Richmond. Three years ago I was invited by the chief engineer of the Middlesex Waterworks to visit the reservoirs at Ranelagh, and there I saw at least seventy tufted ducks which flew about as if on a preserved Norfolk mere. There were also a pair of great crested grebes and many coots. Dabchicks, the smallest of the grebes, breed in St. James's Park, and also at the Penn Ponds and Wanstead. This year there were three broods of small water-hens in the few yards of running water below the Serpentine."

Mr. Cornish added that we could not hope to see all kinds of wild birds returning, such as the insect-feeders—among them all the warblers, the nightingale, the whitethroat, the blackcap, and the chiff-chaff. "There is no suitable food for them in the parks, as there are no bushes, undergrowth, and long grass of the kind which harbours their food. The ground in the shrubberies is dug up, and dug ground is hopeless for them. One of the few places where the small warblers are found is Chiswick Eyot, where this summer the whitethroat, reed warbler, and sedge warbler all nested. It is to be hoped that this eyot, with its fine osiers, will never be built upon. Flocks of peewits come into the market gardens near Chiswick, and have greatly increased since the protecting Act was passed."

#### FISHES.

**Salmon near Southend.**—In the *Daily Mail* of June 3rd, 1905, it is noted that a "report has been received by the City of London Piscatorial Society from a member residing at Leigh to the effect that a small salmon has been captured off the Knock Buoy, Southend. The fish, it is stated, was about eighteen inches in length."

Dr. Laver says that salmon are still taken in nets on various parts of the coast, and that few years pass without

the fish being captured in the "Keddles" on the sands of Fowlness.

#### MOLLUSCA.

**Note on *Crepidula fornicata* in Essex.**—In the October part of the *Journal of Conchology* (Vol. II., 227), our correspondent, Mr. J. E. Cooper, makes the following remarks, which may be taken as supplementary to the observations on the shell in the E.N., Vol. x. "*Crepidula fornicata* L., the 'Crow-Oyster,' originally introduced with American oysters, has been found in several of the rivers of Essex for eleven years or more. It would appear that the conditions in the Crouch river are particularly favourable to it, as it is fast becoming a nuisance to the oyster-men at Burnham-on-Crouch. In some parts of this river every pebble and old shell has one or more (generally more) specimens in it. Clusters of five or six, one on the back of the other, are common; one group found this year had no less than nine in this position.<sup>1</sup> Some pebbles carry a cluster on both sides; even the neck of a broken one gave foothold to two inside and three outside. The lowest shell of a group is obliged to adapt its form to the pebble or shell to which it is attached; consequently some curious forms occur. Where the base is an old oyster, the bottom *Crepidula* is remarkably flattened, but whatever the shape of the lowest may be those above it are usually normal in form."

#### INSECTS.

**Gnorimus nobilis in Hainault Forest.**—This very beautiful "Rose-beetle" is decidedly rare in Essex. Mr. Harwood (*Victoria History*) says that single specimens occurred near Colchester in 1899 and 1900, and that a Mr. West took one near Blackwall (!). Mr. Braithwaite noted the capture of a specimen flying in a forest glade near Loughton in 1880 (E.N., xi., 54), and in the E.N., vol. x., p. 411, I recorded one from Lords Bushes, Epping Forest. I then suggested that the larva of the beetle had possibly been introduced with shrubs or plants in a neighbouring garden or plantation, but my brother, B.G.C., has recently happened on a record in *Kidd's Own Journal* for August 14th, 1852, of a specimen or specimens occurring in Hainault Forest just at the time of the destruction of the

<sup>1</sup> I have placed in our Museum a set of eleven specimens so attached, taken *in situ* in the Colne estuary.—W. COLE.

woodlands. This would seem to indicate that the *Gnorimus* was indigenous in the forest in the old days, and that the specimens occasionally still found are natives to and bred in the county.  
—WILLIAM COLE.

#### BOTANY.

**Euphorbia esula** Lim. in Essex.—In the *Flora of Essex* Gibson remarks in a note upon *Euphorbia esula* that the distribution of that plant on the Continent renders it not improbable that it is to be found in Essex, but up to that date (1862) there was no record of its occurrence. Since then Mr. Turner has found it at Witham, where it still grows, as has been announced in the ESSEX NATURALIST. I now have to record two other localities for the plant. Miss Harrison, of Great Saling, during a field meeting of the Braintree Ramblers at Danbury found it near Lingard Common, and a few days afterwards I found it in a disused garden at Broomfield. It may, of course, have been an escape in the latter case, but I do not know that it is ever planted for ornament. It is interesting to note that in neither of the localities in the county does the plant occur in "woods," the habitat generally given in British Floras.—F. J. CHITTENDEN, Biological Laboratory, Chelmsford, September 1st, 1905.

#### ANTHROPOLOGY.

**The Deneholes of Essex.**—The *Times* for September 30th, 1905, gave space for a long and very interesting special article under the above title. The writer makes full acknowledgment of the researches of the Essex Field Club as recorded in the first volume of the ESSEX NATURALIST, and fully agrees with the views of Messrs. T. V. Holmes and W. Cole, on the probable object of the pits. He says :—

"It is enough to say that whatsoever may have been the original purpose of these excavations, or the successive uses to which they have been put, no sane man ever made them simply for the purpose of obtaining chalk. . . . It follows that we are driven back into the spacious field of probability, conjecture, and tradition. The chalk-quarry theory must clearly be discarded. If the elaborate shape and similar design of the chambers were not enough to disprove it, a dozen arguments could be added. Chalk-wells, sunk deep into the chalk, in order to obtain pure chalk, free from 'pipes,' we know; but they are believed to be modern, and the essence of them is that they should be deep in the chalk, whereas these are deeper underground, but not deep in the chalk. Other excavations in the chalk are known, near Brandon, on the borders of Norfolk and Suffolk, at Crayford, Chiselhurst and elsewhere. But they are none of them



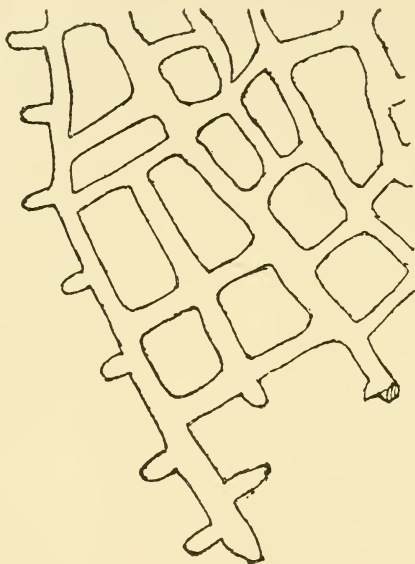
really similar to the Grays holes; those at Brandon were clearly shown to have been made in search of flints; here there are few flints, those that exist appear to have been disregarded, and there are no chippings. In fact, each set of Dene or Dane-holes must be judged by its own surroundings primarily."

The writer discusses the various theories which may be advanced respecting the precise age of the deneholes, and urges the desirability of further investigation to complete the work begun by the Club.

**Visit to the Deneholes, Hangman's Wood.**—The Croydon Natural History and Scientific Society having decided to visit the deneholes of Hangman's Wood, Grays, on June 4th, 1904, were good enough to invite me to join them. Dr. H. C. Male, the director, had made the necessary arrangements for the descent. We entered the pits by the shaft of No. 4 (Plan of Deneholes, *ESSEX NATURALIST*, vol. i.). The party appeared to be much interested in what they saw. When in No. 5, an attempt was made to take a photograph, which was unfortunately unsuccessful owing to the variability in the amount of the light afforded by magnesium wire. Reference to the denehole plan will show that No. 2 is a five-chambered pit, the position of the sixth chamber being represented but by a very slight concavity. But when we were working in these pits nothing appeared to give any presumption as to the cause of the absence of the sixth chamber. For the other chambers are rather below than above the average size, and a sixth chamber of more than the usual length might have been made without too near an approach to a neighbouring pit. In June this year, however, the reason for the non-excavation of the sixth chamber was almost certainly revealed by the appearance, in the slight hollow representing it, of an area of a few inches in extent consisting of Thanet Sand, and marking the existence of a "pipe" in the chalk there. These pipes, as every one knows, are extremely varied in shape and in the way they ramify. There is a large one shown in the roof of another part of No. 2, the existence of which no doubt caused the original excavators to desist working at the sixth chamber at the sight of the slightest quantity of sand in the chalk six or seven feet above the floor.—T. V. HOLMES, F.G.S.

**The Chislehurst (Kent) Caves.**—At the meeting of the the Club on October 29th, 1904, Mr. T. V. Holmes exhibited a

plan of these old workings for chalk. He said that since he made the remarks on these caves at the meeting on April 16th (E.N., vol. xiii., pp. 263-4), he had received the plan shown. An old friend of his, Mr. R. O. Heslop, F.S.A., of Newcastle-on-Tyne, wrote to him asking if he knew anything about these caves, and adding that Mr. T. E. Forster, a well-known mining engineer of that city, was much interested in them.



#### CHISLEHURST CAVES

Plan of a small group of the more remote galleries, but thoroughly typical of the general system of excavation. Scale 33 feet to one inch.

*From T. E. Forster's Plan.*

He (Mr. Holmes) sent to Mr. Heslop an account of these caves resembling that given in the *ESSEX NATURALIST*, which Mr. Heslop forwarded to Mr. Forster. On May 13th, Mr. Forster wrote expressing agreement as regards the modes of construction and the objects of the makers of these Chislehurst Caves, and very kindly forwarding the plan exhibited, which is dated January, 1904. Being the work of a man specially qualified to make an accurate plan of such workings, its testimony is decisive. It clearly shows that whatever may be the apparent

irregularities as regards the size and direction of the galleries, but one general plan of working prevails throughout. One published account of these caves states that the positions of some seventy denehole shafts appear in the ground above them. But the plan shows that any hollows giving that impression must be either surface workings for sand and gravel, or indicate the positions of the downfalls of sand into the chalk beneath. For *in themselves* these hollows furnish no evidence whatever of the existence of denehole shafts, though similar cavities may be found at the surface when deneholes exist. In this case the plan shows no trace of any intersection of deneholes in the workings, a fact decisive against the denehole hypothesis. Judging from the plan, the area occupied by these excavations must be between fifteen and twenty acres. And the point in them most remote from their present entrance is about 300 yards away, if measured in a straight line. It is also noticeable that though the same general plan of working prevails throughout, the galleries within a certain distance of the entrance are on the average higher and broader than those which are more distant. And to the most remote belong the little group here given, to show the general arrangement of the galleries.

These caves were visited by the Geologists' Association on April 26th, 1902, Messrs. T. V. Holmes and C. W. Osman being the directors and reporters of the excursion, an account of which may be seen in *Proc. Geol. Assoc.*, vol. xvii. The reporters look on the caves as workings for chalk. In the *Journal of the British Archaeological Association* for December, 1903, there is a paper by Mr. W. J. Nichols, in which they are considered to be deneholes. And in the *Journal of the British Archaeological Association* for August, 1904, there is a paper about them by Messrs. T. E. and R. H. Forster, in which the view that they are excavations for obtaining chalk is upheld. It is to this Mr. T. E. Forster that we are indebted for the plan which so decisively settles their affinities.

#### MISCELLANEA.

**An Ancient Municipal Enterprise.**—Our esteemed member, Mr. J. C. Shenstone, F.L.S., contributed to the *Saturday Westminster Gazette* of August 12th, 1905, an interesting article under the above title, from which we cull a few paragraphs:—

“It frequently happens that when the full force of some great social

development is first realised it is regarded as a revolutionary movement suddenly sprung upon the world. A search into its history, however, might show that the movement originated in much older times, but that, progress being slow in its earlier stages, it passed unnoticed until, suddenly gaining force, the world became aware of the wide changes involved.

“Most people would regard our modern municipal enterprises as modern innovations, but there is one—the Colchester Oyster Fishery—which, there is every reason to believe, dates back to the time of the ancient Briton. It is quite certain that the “Colchester Native” enjoyed a wide reputation in the days of ancient Rome, and it has even been humorously suggested that Julius Cæsar first visited Britain in order to obtain control of the supplies of this much-appreciated dainty.

“The first existing documentary evidence of this ancient fishery takes us back to the year 1189, when amongst the privileges confirmed to the municipality of Colchester was the right to fish from ‘North Bridge to West Ness.’ Other documents clearly indicate that this privilege had been enjoyed by the town from a much earlier time, for the Colchester Red Paper Book contains a proclamation made in Colne Waters in 1,256 by the Bailiffs of Colchester which referred to the fishery rights as having been granted by ‘many Noble Kings of England from time out of memory.’ There is little doubt that the fishery existed in Saxon times, though probably then maintained by tradition and custom. The shells of the Colchester Native have been found in many Roman stations, and even in Rome itself, whilst at Gloucester the shells of the Essex native are said to have been found near to the officers’ quarters in the camp, the shells of a common oyster having been found about the quarters of the rank and file. Hence a considerable trade was done in these bivalves in the Roman period of our history, and had not the fishery been under municipal control at that time the fisheries would assuredly have been exhausted.

“There can be no doubt that Colchester was inhabited by an advanced people at the time of the Roman Invasion, and that the fishery was under some kind of control. Oyster-shells have been found amongst the refuse of the earliest British settlements; to find the beginnings of this enterprise we should possibly have to go back to the days of the “painted savage” who figured so large in the histories of our school days.

“The later developments of the Colchester oyster industry can be clearly and completely traced for over seven centuries in the written records of the borough. The first document in which we find the fishery mentioned is the Charter of Richard I., 1189. The fishery rights are confirmed in this and all succeeding charters, but it is to the ancient Court Rolls to which we must turn to learn how the industry grew to its present proportions.”

**A Stroll in Epping Forest Fifty Years Ago.**—This pleasantly written story of a ramble is quoted from *Kidd's Own Journal* for 1853 (vol. iii.). There is reason for identifying the writer with the late Mr. De la Chaumette, of Tottenham. “Bombyx Atlas” was an enthusiastic collector of Continental lepidoptera, and his stories of butterfly-hunting in Switzerland, in the form of the auto-biography of his fine old dog “Fino,” are

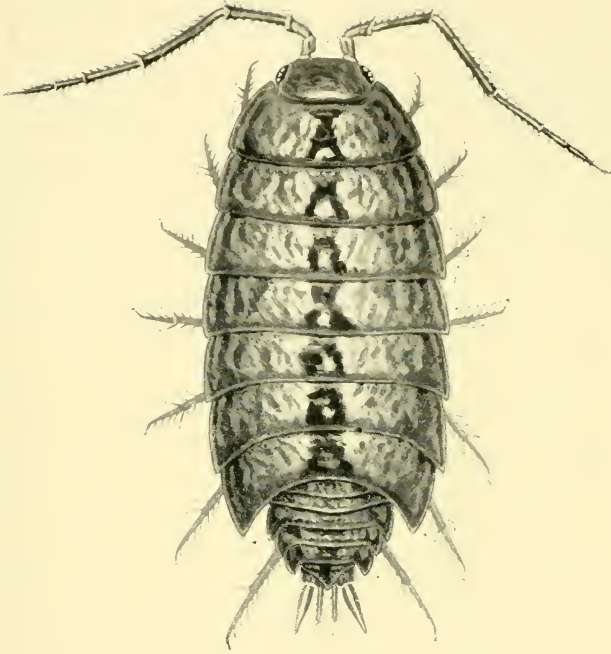
amongst the most racy and amusing narratives of the kind we have ever read :—

“ When Old Sol arose on the morning of the 2nd of May, he found myself, my youngest son, and old ‘ Fino,’ enjoying a substantial breakfast ; discussing thereat the probable pleasures of a day which we had devoted, in our mind’s eye, to a merry ramble. It was agreed that my companion should look after water-beetles, and that whilst he was so engaged, I should secure any other stray beetle or butterfly, &c., &c., that might cross my path—‘ Fino’ keeping order among the rabbits. Well, our various *instruments de chasse* being ready, off we started, about five o’clock a.m. Our route lay direct to the ‘ Seven Sisters, and thence to the Tottenham Station, which we crossed ; and on to the Ferry House. It certainly was a glorious morning, although there was a cool easterly wind stirring, and we did not regret having put in practice an idea (which we at one moment entertained) of going *sans veste*. Passing forwards, we reached Walthamstow, and here the beams of the sun began to be felt. This refreshed us, and thus accompanied, a most lovely walk we had. Onward still further, and we came to the Woodford Road, which runs through part of the Forest. Here it was decidedly warm. Turning to our left, we followed up the road, meeting now and then a brood of pretty little goslings, which seemed much to interest ‘ Fino,’ but the old fellow was desperately alarmed when the fond mother flew at him, with outstretched neck and wings, hissing close to his very nose. He took all this, however, as he generally does everything else, very good-temperedly, and after a time, made tolerable friends with Mrs. Goose and her happy family. He was not so successful, however, with an old hen further on. *She* would listen to no accommodation, and to avoid a row, ‘ Fino’ made a bolt of it. In good time we reached the turnpike, and in a few minutes more the ‘ Bald Face Stag’ (an old acquaintance of ours). We can indeed recollect the said ‘ Bald Face’ for some *few* years ! Here we were ushered into a room we knew full well ; and looking at our watch, found it half-past seven o’clock. We rested near a good fire, just half an hour—*pour rafraichir la memoire*—and having requested dinner to be ready at half-past two, we started again, neither knowing nor caring which way we went, so long as we kept within scent of the ‘ Bald Face Stag.’ We now struck off to the left, and ‘ Fino’ soon spied some rabbits. Literally mad with delight, nothing could stop him—off he went like a greyhound. But it was all of no use, the little rabbits only laughed at him, and this made him still more mad. We rambled for some time, just where fancy or ‘ Fino’ led—now in a swamp or a bog, now fishing in little ponds, searching under stones or the bark of trees, &c., &c., until our hearts were gladdened by the sound of ‘ Cuékoo, Cuékoo !’ the first time we had heard it this year. It was just eleven o’clock. Suddenly, a peculiar bark was heard from old ‘ Fino,’ and looking round, we saw his tail wagging at an unusually brisk rate. On nearing the spot we found him contemplating a snake some four feet long. At our approach it slipped into its hole, and then, good-bye ! After this we broke into a singular field or rather opening in the forest, where an aged bird-catcher was plying his vocation. ‘ Good morning, old gentleman !’—‘ Good morning, sirs !’ and we soon entered into a familiar chat with our ornithological acquaintance. More than three-score years and ten had evidently passed over his grey head, whilst his manners and language betokened him to be a man who had seen better days. Not that he was to be pitied ! By no means ! Yet did he seem a man of gentler birth than bird-catchers generally are. We learned from him that his early life had been spent near Liverpool, and

that he had always loved birds, and knew full well their different songs—but that he now took them, more by way of amusement and recreation than from necessity. Also, that both himself and his wife had got a tolerable independence. I asked him if he had heard the nightingale this season, and he told me, ‘Yes, on the 21st April, for the first time.’ We now parted from our friend, as he said he was going to repose for about two hours before his dinner, as he was *getting* old, and felt rather tired. On looking around, we perceived a stone on which was marked ‘Loughton Parish.’ We struck again through the forest, retracing our steps. Hereabouts, old ‘Fino’ made an awkward leap of it. He was after the rabbits and springing over a hedge, without having sufficiently calculated his leap, or looking before he leaped. He leaped, and fell, nose foremost, into a soft bog. He was very wroth, but a pond being near at hand, he soon washed his proboscis and forgot all about it. At length we found ourselves *au point de depart*; and being half-an-hour earlier than the time appointed, we turned down a sweetly pretty lane to the right. Here on a sunny bank, ‘Fino’ found another kind of sport, in the shape of some little fawn-colored mice, which, however, I could not allow him to hunt or annoy. We again turned back, and reached the ‘Bald-Face Stag,’ precisely at the hour appointed—very hot, rather tired, very thirsty, and with an *appetit de loup*. We were shown into a snug little room, and ‘Fino’ soon curled himself round in a corner, dreaming of his glorious sport with the rabbits. Whilst dinner was getting ready, we recollected that we had seen *atalanta*, *rhamni*, *persicariæ*, *tiliæ*, *verbasci*, *menthastri*, *urticæ*, *polychloros*, *bucephala*; that we had taken *rhizolitha*, and obtained some interesting larvæ, and our beetle-bottle contained *Cicindela campestris*, *Scarabæus eremita*, *Aphodius gagates*, and many others, as well as a quantity of water-beetles. After a while, dinner was announced. Just fancy, Mr. Editor, a beautiful knuckle of veal, done to a nicety, some delicious spring pork, tender brocoli, Guinness’s best, and Charrington’s super-extra, just to relish a capital cheese. Then, an adjournment to a neat little alcove in the garden, where we enjoyed a fine Havannah, and some brilliant sherry; old ‘Fino,’ in the meanwhile, snoring at our feet, having first disposed of the residue of the veal and pork. Jolly were we all—and merry. At a quarter past four o’clock we started on our return home, arriving at a quarter past seven. An early supper and a sound sleep, saw us next morning in tip-top spirits.—BOMBUX ATLAS, *Tottenham*, May 13th, 1853.”

**Rustic Criticism of Geologic Theory.**—Sir Archibald Geikie tells the story in his *Scottish Reminiscences*, recently published. “I was quite sure you had been in our neighbourhood,” a friend said to him :—

“‘I met the old farmer of G—,’ who had a strange tale to tell me. ‘Dod! Mr. Caitcart,’ he began, ‘I ran across the queerest body the ither day. As I was comm’ by the head o’ the cleugh I thocht I heard a wheen tinkers quarrelin’, but when I lookit doon there was jist ae wee stoot man. Whiles he was chappin’ the rocks wi’ a hammer; whiles he was writin’ in a book, whiles fechtin’ wi’ the thorns, and miscar’ them for a’ that was bad. When he cam’ up frae the burn, him and me had a long confab. Dod! he tell’t me a’ about the stanes, and hoo they showed that Scotland was ance like Greenland, smooered in ice. A vary enterteenin’ body, Mr. Caitcart, but—an awful awfu’ leear.’”

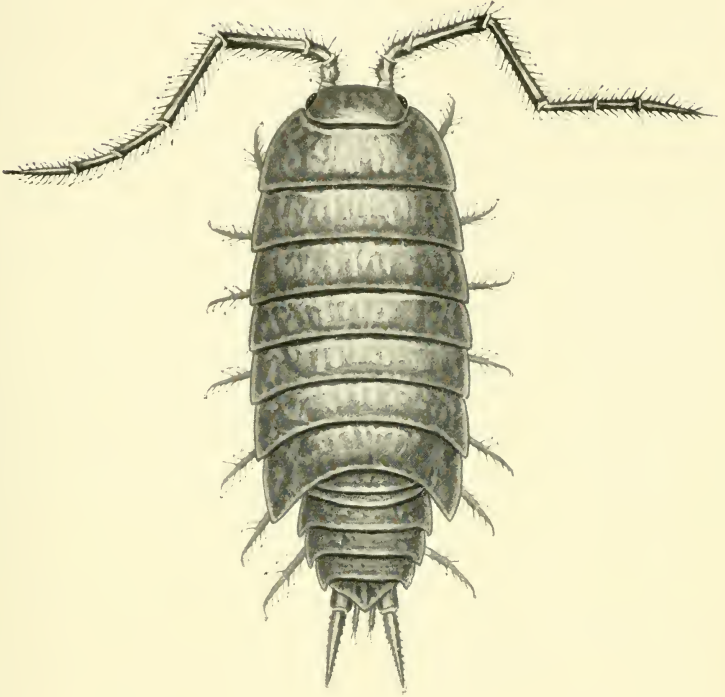


PHILOSCIA MUSCORUM Scopoli.

*Length, nine millimetres.*



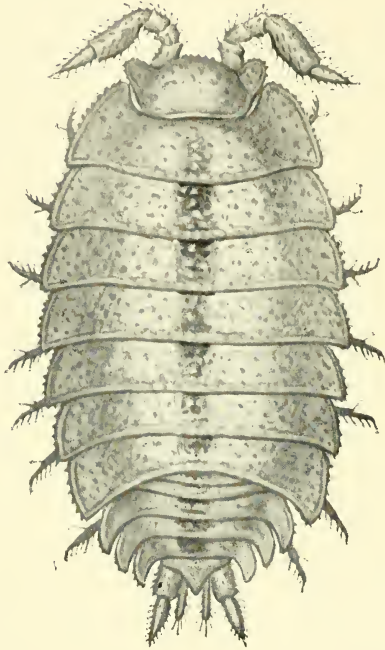




PHILOSCIA COUCHII Kinahan.

*Length, nine millimetres.*

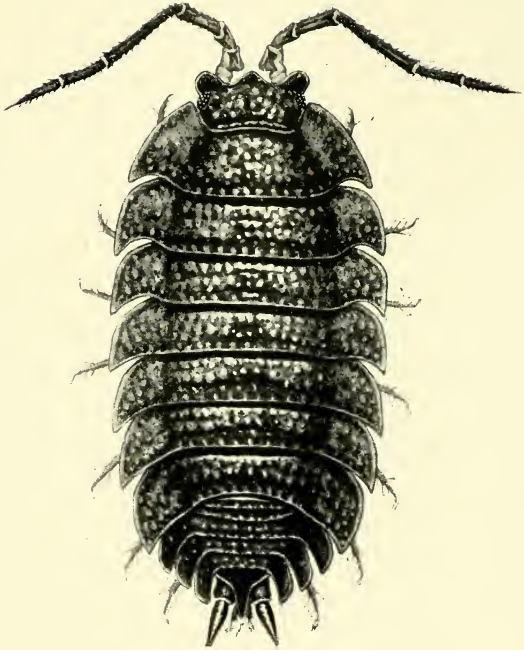




PLATYARTHUS HOFFMANNSEGGII Brandt.

*Length, three millimetres.*

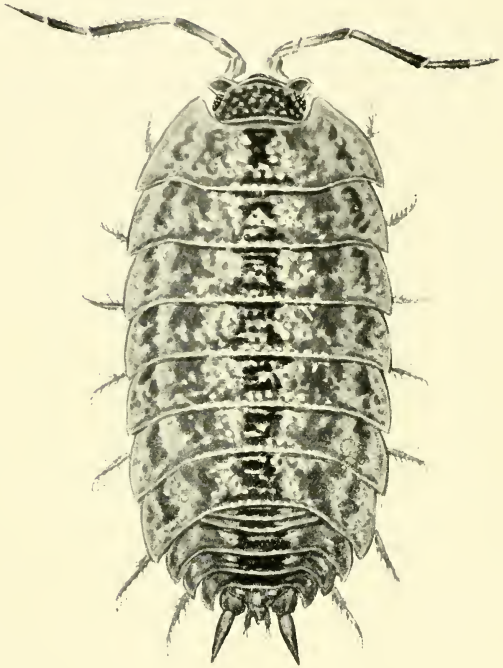




PORCELLIO SCABER Latreille.

*Length, fourteen millimetres*





PORCELLIO PICTUS Brandt and Ratzburg.

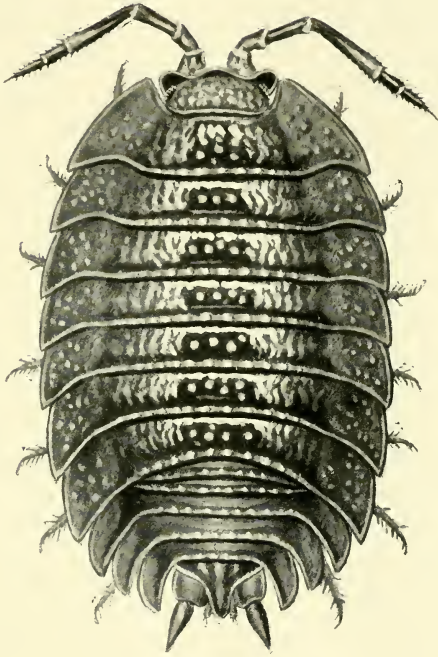
*Length, thirteen millimetres.*

Charles Sillem, del. ad nat.

F. W. Reader, sculpt.







PORCELLIO DILATATUS Brandt.

*Length, fifteen millimetres.*



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# THE WINTER SESSION OF THE CLUB.

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The members and friends of the Club are reminded that the **Winter Session** will commence on **Saturday, October 28th, 1905**, at the Essex Museum of Natural History, Romford Road, Stratford, Essex.

The Secretaries will be glad to have intimation of **Papers** and **Exhibitions** intended to be brought before the Club. Early notices of this kind would greatly facilitate the arrangements for the meeting.

Members and friends of the Club will find these monthly meetings excellent opportunities of inspecting the Museum, which is open from 10 a.m. to 10 p.m.

Tea and light refreshments are served at 5.30 p.m. The cost is defrayed by voluntary subscriptions to the Tea Fund.

The meeting-room is provided with an excellent electric lantern for the display of lantern slides.

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B. G. COLE } *Hon. Secretaries.*

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[OCTOBER, 1905.

*The*

# Essex Naturalist:

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OF THE

ESSEX FIELD CLUB,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary and Curator.*

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<i>[This Part contains the third Instalment (6) of the Twenty-five Plates by Mr. C. Sillem, for the illustration of the Monograph on the British Woodlice.]</i>	
<i>[Title-page and Index to Volume XIII. is inserted loosely.]</i>	

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*The Authors alone are responsible for the statements and opinions contained in their respective papers.*

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and Advertisements to Messrs. BENHAM and Co., Printers, Colchester.

## The Year-Book and Calendar of the Essex Field Club for 1905-6.

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The Council has decided to issue annually a new publication, to be entitled *The Year-book and Calendar*, of which the first volume, containing four plates, has been sent out to Members. Additional copies may be had from the Hon. Librarian, price 1s., and to Members 9d., post free. It will be published yearly hereafter on the 20th April—that is, shortly after the close of the Club's official year.

Those friends of the Club wishing to extend its sphere of usefulness will find a few copies of the *Year-book* excellent agents for propagandism.

The *Year-book* represents the *business side* of the Club's work. It contains *no scientific matter*, which will continue to appear in the *Essex Naturalist*, as hitherto.

The contents of the *Year-book* includes a Calendar of Fixtures for the year, an illustrated Record of the Club's Work in the Past, the Report of the Council and the Treasurer's Accounts for the past year, the Rules, the List of Members, and similar information. Suggestions for the improvement of future issues are invited.

It should be remembered that the *Year-book* is of the nature of a supplement to the *Essex Naturalist*, and the annual copies should be preserved to range with our Journal.

## THE BRITISH WOODLICE.

By WILFRED MARK WEBB, F.L.S., and CHARLES SILLEM.

(With Plates I.—XXV., and numerous other Illustrations.)

[Continued from page 56.]

In 1857 Kinahan read a paper before the British Association (32) in which he described fourteen species of woodlice from the British Islands, and eleven years later when Bate and Westwood published their book (1), the number had risen to seventeen. One of the species (*Oniscus fossor*), however, was doubtful, and although Dr. Scharff in 1894 (63) rejected it, his list contained also seventeen species, for in the meantime the Rev. T. R. R. Stebbing had found *Ligidium hypnorum* in Surrey (70).

Since then the Rev. Canon Norman, Dr. Scharff, the Rev. T. R. R. Stebbing, and one of the present writers, have added other species, as will be seen from the following pages, in which all those found, up to the present time in the British Islands are described and figured.

We shall now consider in detail the British genera and species of woodlice and give their synonymy and distribution.

### Order—ISOPODA.

Tribe—ONISCOIDA.

Section—LIGIÆ.

THE TWO DIVISIONS OF THE TAIL APPENDAGES ALIKE IN SHAPE.

Family—LIGIIDÆ.

**Flagellum with ten or more joints; tail appendages wholly visible; head without lateral lobes.**

*Genus*—**LIGIA** Fabricius, 1798 (27), p. 301.

*Abdomen broad; body large; habitat, the sea-shore.*

The genus *Ligia* agrees with *Ligidium* alone, in that the flagellum of the larger antennæ has more than ten joints. In both genera, there are no lateral lobes to the head, and the tail appendages are wholly visible from the upper surface of the body. The latter in *Ligia* is, however, very many times bigger than in *Ligidium* and shows no abrupt decrease in the width of its segments when the abdomen is reached.

*Ligia oceanica* Linné (The Quay-louse). PLATE I.

- 1767 *Oniscus oceanicus* Linné (43), p. 1061.  
 1793 *Cymothoa oceanica* Fabricius (26), p. 509.  
 1815 *Ligia scopulorum* Leach (38), p. 374.  
 1868 *Ligia oceanica* Bate and Westwood (1), p. 444.  
 1898 *Ligia oceanica* Sars (59), 156, pl. LXX.

There is but one British species of *Ligia*, and this, the largest member of the whole tribe to be met with in these Islands, usually attains a length of two centimetres, while adult males may be nearly half as long again. It is the *Oniscus oceanicus* of Linnæus and lives on the sea shore, where it may be found at low tide beneath stones and rubbish in the crevices of timber. *Ligia* forms a connecting link between the woodlice proper and the many Isopods which actually live in the sea.



FIG. 35.—FLAGELLUM  
AND LAST PEDUNCULAR  
JOINT OF THE ANTENNA  
OF *Ligia oceanica*.

The colour of the animals is a greenish grey, and the compound eyes are almost black, so that they are very conspicuous; there are from eleven to fourteen joints to the flagellum of the outer antennae and this feature, taken in conjunction with the large size and habitat, is sufficient to identify the species in question.

On the coast of Essex the name "quay-lowers" is given to these crustaceans, "lowder" being apparently an old plural of louse.

It is worthy of mention that Mr. Webb, when in charge of the Marine Biological Station at Brightlingsea, examined a very large male specimen of *Ligia oceanica*, in which the maxillæ were duplicated and consisted of four pairs instead of two.

## BRITISH LOCALITIES:—

*England*: Brightlingsea; (W.M.W.): Maldon; (W.M.W. from R.M.): Southend; (J.A.M.): Whitstable; (W.M.W.) Herne Bay; Margate; Dover; Folkestone; (J.A.M.)

*Scotland*: Shetland to Cornwall; (Norman, 49).

*Ireland*: East Coast; West Glengarriff; Castletown; Berehaven; Bundoran; (Scharf, 63).

## FOREIGN DISTRIBUTION:—

*Europe*: France; (25); Spain: (12): Denmark, Prussia, Norway, Faroe Islands, Belgium; (59).

*Africa*: Morocco; (16).



Genus—**LIGIDIUM** Brandt, 1833 (3), p. 173  
Zia, Koch (34).

*Abdomen narrow ; habitat, wet moss.*

In *Ligidium* there are numerous joints to the flagellum, lateral lobes are absent from the head, and the tail appendages are completely to be seen. All the segments of the abdomen are distinctly narrower than those of the thorax and in this it agrees with *Trichoniscus*, *Trichoniscoides*, *Philoscia*, and *Metoponorthus*. In these, however, the flagellum has never more than seven joints, the tail appendages (as in all genera but *Ligia* and *Ligidium*) are partially hidden by the last segment, and in all the four but *Philoscia* there are lobes to the head.

**Ligidium hypnorum, Cuvier. PLATE II.**

- 1792 *Oniscus hypnorum* Cuvier (9), pl. XXVI., figs. 3–5.  
1793 *Oniscus agilis* Persoon, quoted by Koch in Panzer (51), part 5, pl. XXIV.  
1830 *Ligia hypnorum* Bosc (2), p. 179.  
1833 *Ligidium persoonii* J. F. Brandt (3), p. 174, pl. IV., figs. 6–7.  
1840 *Zia agilis* Koch (34), part 34, pls. XXII. and XXIII.  
1844 *Ligidium persoonii* Zaddach (77), p. 17.  
1853 *Ligidium persoonii* Lereboullet (39), p. 14, pl. I., fig. 1, pl. II., figs. 20–31.  
1857 *Ligidium persoonii* Kinahan (32), p. 275, pl. XXI., fig. 14, pl. XXII., fig. 9.  
1873 *Zia saundersii* Stebbing (70), p. 286.  
1873 *Ligidium agile* Norman (48), p. 419.  
1885 *Ligidium hypnorum* Budde-Lund (8), p. 254.  
1898 *Ligidium hypnorum* G. O. Sars (59), p. 158 pl. LXXI.

This species, which like the last, is the only British representative of its genus, was added to our fauna in 1873 by the Rev. Thomas R. R. Stebbing (70) who found specimens in the neighbourhood of Copthorne Common, Surrey. Up to the present time, when we are pleased to announce that we discovered it in the spring of 1902 at Warley in Essex, *Ligidium hypnorum* has not been recorded from any other place in the British Islands.

As the name of the species implies, it lives in wet situations and in its turn connects *Ligia* with the forms which inhabit drier places. *Ligidium hypnorum* might be mistaken for *Philoscia muscorum*, but as already pointed out in the generic description, the latter has but a few (three) joints to the flagellum, instead of from ten to thirteen. From *Ligia*, the species under consideration is distinguished by its small size, narrow abdomen, and habitat.



FIG. 36.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Ligidium hypnorum*

## BRITISH LOCALITIES:—

England: Warley, Essex; (W.M.W.): Copthorne Common, Surrey; (Stebbing, 70).

## FOREIGN DISTRIBUTION:—

Europe: France; (25): Sweden, Denmark, Germany; (59): Turkey; (8).

## Family—TRICHONISCIDÆ.

Flagellum with less than ten joints; head with lateral lobes; tail appendages partly hidden.

Genus—TRICHONISCUS Brandt, 1833 (3), p. 174.

Abdomen narrow; eyes compound; flagellum, usually with more than three joints

In *Trichoniscus* the flagellum may have from seven to four (rarely three) joints. As in *Trichoniscus* and *Haplophthalmus* there are lateral lobes to the head, though these are not very pronounced; the body is also of small size, the abdomen narrow with both divisions of the tail appendages equally so, and almost of the same length though slightly covered by the last segment. The compound eyes distinguish *Trichoniscus* from the two genera named, and from *Platyarthrus*, while its small size and the character of its tail-parts mark it out from all others.

**Trichoniscus pusillus** Brandt. PLATE III.

- 1833 *Trichoniscus pusillus* Brandt (3), p. 174, pl. IV., fig. 9.  
 1838 *Itea riparia* Koch (34), part 22, pl. XVII.  
 1844 *Itea laevis* Zaddach (77), p. 16.  
 1857 *Philougria celer* Kinahan (32), p. 281, pl. XXII., figs. 1-4.  
 1858 *Philougria riparia* Kinahan (33), pp. 191 and 198, pl. XXIII., fig. 1.  
 1868 *Philougria riparia* Bate and Westwood (1), p. 456.  
 1898 *Trichoniscus pusillus* Sars (59), p. 161, pl. LXXII, fig. 1.

This tiny species is found commonly amongst the roots of the herbage in very moist places. It presents a horny translucent appearance and is of a reddish brown colour. It runs with considerable speed, and when it is moving, the white irregular lines with which it is beset are not evident. *Trichoniscus pusillus* is very much like *Trichoniscus vividus* in colour but the latter species is nearly twice as big and has from five to seven joints to the flagellum, while the former has never more than four. *Trichoniscus roseus* is also much larger and its bright red colour (which it loses, however, when preserved in alcohol) is another means of distinguishing it from the species under consideration.

Professor Sars in his *Crustacea of Norway* (p. 162) describes from Christiania, under the name of *Trichoniscus pygmaeus*, a still smaller species. As this may possibly be discovered in this country a brief comparison between it and *Trichoniscus pusillus* may be of value. The former reaches a length of but two millimetres; it is "whitish, semi-pellucid with a few light brown pigmentary ramifications across the segments and a double row of irregular opaque patches along the middle of its back" (p. 163). Its body is covered with minute tubercles and there are only three joints to the flagellum; its movements are by no means rapid.

The body of *Trichoniscus pusillus* is smooth and polished. It has four joints to the flagellum—Dr. Scharff (63) says three or four—and it moves quickly.

BRITISH LOCALITIES:—

England: Brightlingsea; Warley; (W.M.W.): Epping Forest; (Bate and Westwood, 1); Hanwell; Southall; Kew Gardens; Langley; Burnham Beeches; Dropmore; Skirmett; Bluebell Hill, Maidstone; (W.M.W.): Chislehurst; Plymouth; Polperro; Looe; (Bate and Westwood, 1); Hertfordshire; Northumberland; Durham; (Norman, 49); Exeter; (Parfitt, 53).

Scotland: Edinburgh; (Scott, 68); Cumbrae; (D. Robertson, 57).

Ireland: Connemara; (Norman, 49); Dublin; Wexford; Cork and Kerry; (Percival Wright teste Bate and Westwood, 1); Tyrone; Waterford; Portlaw; Kilkenny; Wicklow; (Kinahan 33).

FOREIGN DISTRIBUTION:—

Europe: France; (25); Spain; (15); Italy; (19); Norway; Sweden; Denmark; Germany; (59).

Africa: Algeria; Tunis; Azores; (24).

America: Niagara; North America; (59).

**Trichoniscus vividus**, Koch. PLATE IV. (from a spirit specimen).

1840 *Itea vivida* Koch (34), part 34, pl. IV.

1858 *Philougria vivida* Kinahan (33), pp. 197 and 198, pl. XXIII., fig. 2.

1868 *Philougria vivida* Bate and Westwood (1), Vol. II., pp. 458 and 459, figs.

This species is claret-brown in colour and under a lens it is seen to be marbled with white, indeed in appearance it is much like *Trichoniscus pusillus* though twice the size. There are important differences between the two species as regards the number of joints to the flagellum. These vary from five to seven in *Trichoniscus vividus* while in the other, as already pointed



FIG. 37.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Trichoniscus pusillus*.

out, there are not more than four. The body is practically speaking smooth for it bears only very small tubercles, widely separated. In *Trichoniscus vividus* the antennæ lack the bristles which characterise those of the other species in the genus. The species under consideration was discovered by Dr. Kinahan in March, 1858, at Portlaw, Co. Waterford and is active even amongst the snow.



FIG. 38.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Trichoniscus vividus*.

BRITISH LOCALITIES:—

Ireland: Portlaw, Co. Waterford; (Kinahan, 33): Cappagh, Co. Waterford; (Scharff, Irish Nat., Vol. IX., p. 158): Borris, Co. Carlow; (Scharff, 64.)

FOREIGN DISTRIBUTION:—

Europe: Spain; (12).

*Trichoniscus roseus* Koch. PLATE V.

- 1838 *Itea rosea* Koch (34), part 122, pl. XVI.  
 1858 *Philougria rosea* Kinahan (33), pp. 197 and 199, pl. XXIII., fig. 3.  
 1858 *Philougria rosea* Bate and Westwood (1), p. 460  
 1898 *Trichoniscus roseus* Sars (59), p. 163, pl. LXXIII, fig. 1.

The third British species of *Trichoniscus* is of a deep pink colour and has a light yellow stripe down the back (in some habitats the animals are said to be quite white). Arranged in transverse rows upon the body are large tubercles, each of which under strong magnification will be found to end in a tiny hair. It is distinguished from *Trichoniscus pusillus* by the larger size of its body, which is also comparatively broader, and from *Trichoniscus vividus* by the four joints of the flagellum of its antennæ which latter have strong bristles upon them. In the former species there are five or more joints to the flagellum and the antennæ, though hairy, lack the bristles. *Trichoniscus roseus* is to be looked for in old gardens.

BRITISH LOCALITIES:—

England: Warley; (W.M.W.): Maldon; W.M.W. from R.M.); Stanmore; Hanwell; Ealing; Wimbledon; (W.M.W.): Berkhamsted; Torquay; (Norman, 49): Plymouth; (Bate and Westwood, 1 and B.M.): Grassendale, near Liverpool; (R.W.): Newtownards; (R.W., Irish Nat, 1904, p. 260.)



FIG. 39.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Trichoniscus roseus*.

*Scotland*: Tarbert; (Scott, 68).

*Ireland*: Dublin; Ballyfinder, Co. Down; (Scharff, 63): Templeogue; Dundrum; Blackrock; Rathgar, Co. Dublin; Bray, Co. Wicklow; (R.F.S.): Oakleigh; Kerry; (R.W.): Belfast; (Welch, Irish Nat., 1896, p. 213.): At the grave of Josiah Welch (grandson of John Knox), Castle Upton; Richhill, Co. Armagh; Castleconnell Ferry; (R.W.): Glenade House, Co. Antrim; (R.W. from R. Ll.; Praeger).

FOREIGN DISTRIBUTION:—

*Europe*: France; (25): Spain; (12): Italy; (59): Denmark; Germany; Holland; (39): Dalmatia; (18).

*Africa*: Algeria; Tunis; (24).

Genus—**TRICHONISCOIDES**, Sars, 1898  
(59), p. 164.

*Abdomen narrow; eyes simple; (or wanting); flagellum, with four joints.*

The members of this genus are very much like those of *Trichoniscus*. In the latter, however, the hinder legs are longer in proportion and the eyes are compound.

**Trichoniscoides albidus** Budde-Lund.

PLATE VI.

1879 *Trichoniscus albidus* Budde-Lund (7) p. 9.

1898 *Trichoniscoides albidus* Sars (59), p. 165, pl. LXXIII., fig. 2.

We are able to include this species, as a specimen was found by Mr. Webb at Eton Wick in the summer of 1898. It is one of a number of species which the Rev. Canon Norman (49, p. 18) suggested as likely to be British. It is the only representative of its genus, which does not differ in any very important characters from the others in the family. The narrow elongated body will serve to separate it from *Trichoniscus vividus* and *Trichoniscus roseus*, but on account of its size, which is much the same as that of *Trichoniscus pusillus* and the two British species of *Haplophthalmus*, it will be advisable to give some further points of distinction. From the first its white colour will serve to differentiate it; the other two lack the narrow abdomen seen in *Trichoniscoides albidus*. Moreover, not one of the three shows the serrations on the side plates which characterise the species under



FIG. 40.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Trichoniscoides albidus*.

consideration. *Platyarthrus hoffmannseggii* is small and white and the edges of its side plates are toothed, but it is oval in shape, possesses no eyes, and its stout antennæ have but a single joint to the flagellum instead of four. On the Continent this species has been found in rich soil.

BRITISH LOCALITIES:—

England: Eton; (Stebbing, 71a, p. 113).

FOREIGN DISTRIBUTION:—

Europe: France; Wimereux and Lyons, Forêt (25); Norway; Denmark; (59)

Genus—**HAPLOPHTHALMUS** Schobl, 1850 (66), p. 449. Abdomen broad (comparatively); eyes simple; flagellum with three joints; back with longitudinal ridges.

The body of *Haplophthalmus* is long in proportion to its width, but there is no abrupt decrease in the breadth of the abdomen as seen in *Trichoniscus* and *Trichoniscoides*. The eyes are simple as in the latter genus and the lateral lobes of the head are rather large, while the side plates of the body are well separated.

**Haplophthalmus mengii** Zaddach. PLATE VII.

1844 *Itea mengii* Zaddach (77), p. 16.

1860 *Haplophthalmus elegans* Schobl (66), p. 449.

1885 *Haplophthalmus mengii* Budde-Lund (8), p. 250.

1895 *Haplophthalmus mengii* Sars (59), p. 167, pl. LXXIV., fig. 1.

The Rev. Canon Norman discovered two specimens of this species in Ireland in June, 1899 (50); in the previous year one of us (Mr. Webb) found a single example at Eton Wick.



FIG. 41.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Haplophthalmus mengii*.

The main differences between the members of this genus and their allies are set forth in the generic description and incidentally elsewhere, so we shall content ourselves with giving the distinctive points of the two British species. *Haplophthalmus mengii* has a number of raised longitudinal ribs on each segment of the thorax, the outer ridges being somewhat broken. There are also two prominent ribs upon the third segment of the abdomen.

BRITISH LOCALITIES:—

England: Eton; (Stebbing, 71a, p. 114).

Ireland: Corcumroe Abbey; Co. Clare (Norman, 50).

FOREIGN DISTRIBUTION:—

Europe: France; (25); Norway; Prussia; Germany; Bohemia; (59).

**Haplophthalmus danicus** Budde-Lund. PLATE VIII.

- 1870 *Haplophthalmus elegans* Budde-Lund (6), p. 228 (not *Haplophthalmus elegans* Schobl).  
 1879 *Haplophthalmus danicus* Budde-Lund (7), p. 9.  
 1881 *Haplophthalmus mengii* Weber (76), p. 192, pl. V., figs. 7-9 (not *Itea mengii* Zaddach).  
 1885 *Haplophthalmus danicus* Budde-Lund (8), p. 250.  
 1898 *Haplophthaimus danicus* Sars (59), p. 168, pl. LXXIV., fig. 2.

This species was added to the British list by the Rev. Canon Norman (49), who found a colony in his garden at Berkhamsted. It has rows of tubercles on its thorax instead of ridges, and there are no ribs at all upon the abdomen. The front of the head projects further comparatively and forms a more acute point than in *Haplophthalmus mengii* and it is not so purely white in colour as the latter species.

## BRITISH LOCALITIES:—

*England*: Warley Place; (W.M.W. from Miss Willmott): Queen's Cottage, Kew Gardens; Stanmore; Hanwell, garden at Odstock, Bennett's Nurseries; (W.M.W.): Berkhamsted; (Norman, 49).

## FOREIGN DISTRIBUTION:--

*Europe*: France; (25); Denmark; Holland; Germany; (Dollfus, Feu de Jeun, Nat., April, 1895); Norway; (Sars, 59).

## Section—ONISCI.

THE OUTER DIVISIONS OF THE TAIL APPENDAGES BROADER THAN THE INNER ONES.

## Family—ONISCIDÆ.

Tail appendages projecting when the animal is walking.

(1.) Unable to roll up into a complete ball.

*Genus*—ONISCUS Linné 1746 (41), p. 360.

*Flagellum*, with three joints; *abdomen* broad; *head* with lateral lobes.

The characters given above taken in conjunction with the size of the animals will serve to distinguish the members of this genus.

**Oniscus asellus** Linné (The "Common Slater.") PLATE IX.

- 1761 *Oniscus asellus* Linné (41), p. 500, No. 2058.  
 1792 *Oniscus murarius* Cuvier (9), p. 22, pl. XXVI.  
 1838 *Oniscus fossor* Koch (34), part 22, pl. XXII.  
 1863 *Oniscus asellus* Bate and Westwood (1), p. 468.  
 1868 *Oniscus fossor* Bate and Westwood (1), pp. 471-2.  
 1898 *Oniscus asellus* Sars (59), p. 171, pl. LXXV.



FIG. 41.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Haplophthalmus danicus*.

*Oniscus asellus* is one of the largest of our woodlice and it is also probably the commonest, though *Porcellio scaber* is in many places quite as abundant. The body of *Oniscus* is broad and expanded and the colour is usually a slate grey with yellowish markings more or less regularly arranged.

From the genus *Porcellio* the species with which we are concerned is at once distinguished by the three jointed flagellum. *Porcellio* has but two joints and has besides a prominent lobe projecting from the middle of the head, which is not seen in *Oniscus*. *Philoscia*, although it has three joints to the flagellum, has a narrow abdomen and lacks entirely the lateral lobes which are a feature of the other genera of Oniscidæ.



FIG. 43.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Oniscus asellus*.

*Oniscus fossor* of Koch (34) was recognized by Kinahan and by Bate and Westwood as a species. Dr. Scharff submitted specimens to Professor Budde-Lund who found no differences between them and *Oniscus asellus*. The former (63) mentions, however, that the characteristics of the supposed species are those of young examples of *Oniscus asellus*, and Professor Sars (59, p. 173) seems to be of the same opinion. Many young examples of *Oniscus asellus* that we have examined have a curious whitish transverse band owing to the light colour of the dorsal plates of the first abdominal segments. The flagellum also does not seem to shew in young animals a distinct division into three joints.

#### BRITISH LOCALITIES:—

*England*: High Beach, Epping, including an albino; Maldon; Brightlingsea; Iver; Hanwell; Eton; Kew; Pamber Forest; Kingston-on-Soar; Bluebell Hill, Maidstone; (W. M. W.): Lynmouth; (W. M. W. from J. T. C.).

*Scotland*: (Scharff, 63). Dinnet, Aberdeenshire; (W. M. W. from Madame Christen

*Ireland*: (Scharff, 63). Yellow form with black spots, Donegal. (R. W.)

#### FOREIGN DISTRIBUTION:—

*Europe*: Almost throughout; (12): France; (25): Spain; (12): Sweden; Norway; Denmark; Germany; Holland; Italy; Iceland; (59): Faroe Islands; Thornsharn; (R. F. S.)

*Africa*: Azores; (24).

*America*: Greenland; (59): North America; (Budde-Lund).



Genus—**PHILOSCIA** Latreille, 1804 (37), p. 43.

*Flagellum with three joints; abdomen narrow; head without lateral lobes.*

If any further differences of an obvious kind be required to distinguish *Philoscia* from *Oniscus*, one at least will be found in the much greater development of the hinder legs in the former genus.

**Philoscia muscorum** Scopoli. PLATE X.

[Not of Lereboullet, which is an *Oniscus*, see Bate and Westwood (1).]

- 1763 *Oniscus muscorum* Scopoli (67), p. 415.  
 1793 *Oniscus sylvestris* Fabricius (26), p. 397.  
 1793 *Oniscus agilis* Koch in Panzer (51), part 9, pl. XXIV.  
 1833 *Philoscia marmorata* Brandt (3), p. 183.  
 1838 *Ligia melanocephala* Koch (34), part 22, pl. XVIII.  
 1847 *Zia melanocephala* Koch (38), part 40, pl. 1. ?, p. 212.  
 1868 *Philoscia muscorum* Bate and Westwood (1), p.  
 1898 *Philoscia muscorum* Sars (59), p. 174, pl. LXXVI, fig. 1.

This species lives chiefly at the roots of grass and under the stones or sticks that lie among it. *Philoscia muscorum* has a very smooth and shining body, and its long legs enable it to move very rapidly. The ground colour of its dorsal surface varies from light yellow to deep brown. There are characteristic dark markings down the middle of the thorax and on the sides, between which are lighter patches. In dark coloured specimens the markings are by no means so evident.

BRITISH LOCALITIES:—

*England*: High Beach, Epping; Warley; (W.M.W.): Maldon; (W.M.W. from R.M.): Kew; Langley; Hanwell, yellow variation; Bluebell Hill, Maidstone; (W.M.W.): Liphook; (C.S.): Pamber Forest; Kingston-on-Soar; (W.M.W.)

*Scotland*: (Scott, 68).

*Ireland*: Almost throughout; (Scharff, 63).

FOREIGN DISTRIBUTION:—

*Europe*: France; (25); Spain; (12); Sicily; (19); Hertsogovina; (22); Sweden; (21); Norway; Denmark; Prussia; Germany; Holland; Poland; Austria; Italy; (59); Sardinia; (21).

*Africa*: Algeria; Tunis; (24).



FIG. 44.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Philoscia muscorum*.

**Philoscia couchii** Kinahan. PLATE XI.

- 1858 *Philoscia couchii* Kinahan (33), p. 195, pl. XXIII., fig. 4.  
 1868 *Philoscia couchii* Bate and Westwood (1), p.  
 1885 *Ligidium couchii* Budde-Lund (8), p. 257.  
 1885 *Philoscia longicornis* Budde-Lund (8), p. 221,  
 1897 *Philoscia couchii* Dollfus (21), p. 72, pl. I., fig. 1.

*Philoscia couchii* is an inhabitant of the sea-side; it is smaller than the last species, its colour to the naked eye is a uniform lead-grey, and its antennæ are very large (compared with its size) and hairy.

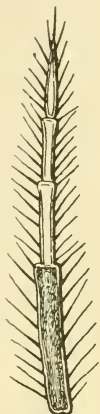


FIG. 45.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Philoscia couchii*.

This species was discovered by Professor Kinahan when in the company of Messrs. Bate and Westwood near Polperro in Cornwall in the year 1858, and dried specimens presented by him are in the British Museum (Natural History).

## BRITISH LOCALITIES:—

England: Talland Cove; Polperro; (Bate and Westwood, 1): Salcombe, Devon; (Norman, 49): Meadefoot, Torquay; (Stebbing in 49).

## FOREIGN DISTRIBUTION:—

Europe: France; (25): Spain; (12): Sicily; (19): Sebastopol; (Norman, 49).

Africa: Azores; Canaries; Morocco; Algiers; Tunis; Egypt; Senegal; (24).

Atlantic Isles: Canaries; Azores; (21),

Asia: Syracuse; Bazone (18).

Genus—**PLATYARTHURUS** Brandt, 1833 (3), p. 174.

[*Typhloniscus* Schöbl (66), p. 279.]

Flagellum with one joint; eyes wanting; abdomen broad; habitat, ants' nests.

The broad body, which is much flattened, and the very thick antennæ distinguish *Platyarthrus* from the other small woodlice (Trichoniscidæ).

**Platyarthrus hoffmannseggii** Brandt. PLATE XII.

- 1833 *Platyarthrus hoffmannseggii* Brandt (3), p. 174, pl. IV., fig. 10.  
 1844 *Itea crassicornis* Koch (34), part 36, pl. V.  
 1860 *Typhloniscus steinii* Schöbl (66), p. 232.  
 1868 *Platyarthrus hoffmannseggii* Bate and Westwood (1), p.  
 1898 *Platyarthrus hoffmannseggii* Sars (59), p. 175, pl. LXXVI., fig. 2.

Up to the present this is the only woodlouse which has been found in the nests of British ants. It is small and oval, its

colour is white, and its body is covered with tubercles. The edges of its side plates are toothed, its flagellum has but a single joint and it has no eyes.

Miss Kate Hall tells us that, if very hungry, ants in captivity will kill and eat *Platyarthrus*. With regard to its own food, Lord Avebury has favoured us with the opinion that it lives on the spores of the lower plants, such as would be found in the ants' nest.

BRITISH LOCALITIES :—

*England* : Warley ; Hanwell ; West Drayton ; Langley ; Kingston-on-Soar ; Bluebell Hill, Maidstone ; (W.M.W.) : Berkhamsted ; Salcombe ; Devon ; Cheddar Cliffs, Somerset ; (Norman, 49) : Ide, near Exeter ; (Parfitt, 53) : Torquay ; (Stebbing in 49) ; Lulworth Cove ; (Rev. A. R. Hogan *teste* Bate and Westwood, 1) : Hammersmith ; Oxford ; Berry Head, Torquay ; Plymouth ; (Bate and Westwood, 1) : In the nest of *Myrmica rubra*, Newton Ferrers (E. E. Lowe).

*Scotland* : Banff ; (Thomas Edward in 49).

*Ireland* : Leixlip, Co. Dublin ; Lissmore, Co. Waterford ; Glengariff, Co. Cork ; (Scharff, 63) : Bagenalstown, Co. Carlow ; (64).

FOREIGN DISTRIBUTION :—

*Europe* : France ; (28) : Spain ; (12) : Denmark ; Germany ; Holland ; Bohemia ; Austria ; Tyrol ; Helvetia ; (59).

NOTE.—In the genera which follow, air-tubes or air-cavities (tracheæ) are present in the outer plates of the abdominal appendages, 1 and 2, or 1 to 5. The appendages in question have in consequence a milk-white appearance in the living animal owing to the fact that the enclosed air reflects white light. Considerable interest attaches to the study of these tracheæ, which have the same function as those of insects, but which have been independently developed. To emphasise the latter fact the structures are often termed “pseudo-tracheæ.”



FIG. 46.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Platyarthrus hoffmannseggii*.

Genus—**PORCELLIO** Latreille, 1804 (37), p. 45.

*Flagellum, with two joints; abdomen, broad; frontal lobe projecting.*

*Porcellio* is easily separated from the previous genera—*Oniscus*, *Philoscia*, and *Platyarthrus*—by its two-jointed flagellum. The fact that the abdomen is not abruptly narrowed separates it from *Metoponorthus*, which also lacks the prominent frontal lobe so characteristic of *Porcellio*. The species of this genera might be confused with *Cyclisticus* which has two joints to the flagellum and a broad abdomen, but the latter genus has the power of rolling itself into a ball, while its frontal lobe is very small, and the first segment of its thorax is comparatively larger than in any species of *Porcellio*.

**Porcellio scaber** Latreille. PLATE XIII.

- 1804 *Porcellio scaber* Latreille (37), p. 45.  
 1818 *Oniscus granulatus* Lamark (36), p. 261.  
 1818 *Porcellio nigra* Say (62), p. 432.  
 1840 *Porcellio brandtii* Milne-Edwards (46), p. 168.  
 1840 *Porcellio dubius* Koch (34), part 34, pl. VIII.  
 1847 *Porcellio asper* Koch (35), p. 207, pl. VIII., fig. 98.  
 1857 *Porcellio montezumæ* Saussure (60), p. 207.  
 1865 *Porcellio paulensis* Heller (31), p. 136, p. XII., fig. 5.  
 1868 *Porcellio scaber* Bate and Westwood (1), p.  
 1876 *Porcellio graniger* Miers (44), p. 223.  
 1885 *Porcellio graniger* Budde-Lund (8), p. 149.  
 1898 *Porcellio scaber* Sars (59), p. 176, pl. LXXVII.

The body of *Porcellio scaber* is densely covered with tubercles. Its colour is usually of a very dark grey, but at times it is quite red or variegated with yellow. Albino specimens have been recorded. The two joints of the flagellum are of the same length and together equal that of the last joint of the peduncle. Air-tubes are present in the outer plates of the first two abdominal appendages.

BRITISH LOCALITIES:—

*England*: High Beach, Epping; Warley; Brightlingsea; (W.M.W.): Maldon; (W.M.W. from R.M.): Langley; Kew; Skirmett; Pamber Forest; (W.M.W.): Liphook; (C.S.): Stoke-on-Trent; Kingston-on-Soar; (W.M.W.)

*Scotland*: Dinnet (W.M.W. from Madame Christen.

*Ireland*: Common everywhere; (Scharff, 63.)

FOREIGN DISTRIBUTION:—

FIG. 47.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Porcellio scaber*.



*Europe*: Throughout; (59): France; (28): Spain; (15): Iceland; (59): Faroe Isles—Thorsham and Naalsole—(R.F.S. and B.M., N. Annadale).

- America*: Greenland; North America; Sandwich Isles; (B.M.); Mexico; (59): St. Paul; St. Croix; (59); Ascension; Tristan; d'Acunha; (23)  
*Asia*: Ceylon; Kamtschatka: (23).  
*Australia*: Melbourne; Sydney; Tasmania; New Zealand; (B.M., Chilton).  
*Africa*: Azores; Canaries; Cape of Good Hope; (24)

**Porcellio pictus** Brandt and Ratzeburg. PLATE XIV.

- 1833 *Porcellio pictus* Brandt and Ratzeburg (4), p. 78, pl. 12, fig. 5.  
 1839 *Porcellio melanocephalus* Koch (34), part 28, pl. XVIII.  
 1853 *Porcellio melanocephalus* Schnitzler (65), p. 24.  
 1856 *Porcellio mixtus* Fitch (29), p. 120  
 1868 *Porcellio pictus* Bate and Westwood (1), p.  
 1898 *Porcellio pictus* Sars (59), p. 177, pl. LXXVII., fig. 1.

There are tubercles on the body of *Porcellio pictus*, which is a striking looking animal. Its head is black with the lateral lobes curved outwards; there is a dark band down the middle of the back and commonly two others on each side, with more or less conspicuous yellow markings between.

The distal (terminal) joint of the flagellum is but half the length of the proximal one and the last peduncular joint is longer than the two combined.

The abdominal appendages—1 and 2—are provided with air-tubes.

BRITISH LOCALITIES:—

*England*: Maldon; (W.M.W. from R.M.): Chislehurst; (Bate and Westwood, 1): Cooper's Hill, near Cheltenham; (Norman, 49): Exeter; (Parfitt, 53): Kent; (Bate and Westwood, 1.)

*Scotland*: Between Leith and Portobello; (Scott, 68): Cumbrae (Scott, 68a): Ayrshire; (Boyd in Norman, 49): Banff; (T. Edwards in Norman, 49).

*Ireland*: Dublin; Belfast; Bate and Westwood, (1): Galway Maryborough; Queen's Co., Castel; and Caher Co. Tipperary; (R.F.S.)

FOREIGN DISTRIBUTION:—

*Europe*: France; (25): North, West-Central, and East Europe; (8): Sweden; Norway; Denmark; Germany; Hungary; Russia; 59.

*North America*: (8).

**Porcellio dilatatus** Brandt. PLATE XV.

- 1833 *Porcellio dilatatus* Brandt and Ratzeburg (4), p. 78, pl. 12., fig. 6.  
 1840 *Porcellio scaber* Milne-Edwards (not Latreille) (46), p. 167.  
 1868 *Porcellio dilatatus* Bate and Westwood (1), p.  
 1898 *Porcellio dilatatus* Sars (59), p. 179, pl. LXXVII., fig. 2.



FIG. 48.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Porcellio pictus*.

The fact that *Porcellio dilatatus* is more than half as broad as it is long at once distinguishes it from the other species of *Porcellio*. It is tuberculated and of somewhat a lighter grey than *Porcellio scaber* usually is. The two species agree in having the two joints of the flagellum equal, but the last peduncular joint, as in *Porcellio pictus*, is longer than the flagellum.



FIG. 49.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Porcellio dilatatus*.

As in the two preceding species, air-tubes are found in the outer plates of the appendages on the first two abdominal segments. *Porcellio dilatatus* is to be looked for near houses.

BRITISH LOCALITIES:—

England: Maldon; (W.M.W. from R.M.): Eton; (Stebbing from W.M.W., 71a): Berkhamsted; (Norman, 50): Headley, Surrey; Ventnor; (Stebbing in Norman, 49).

Ireland: Dublin; (Scharff, 63): Dundrum; (Scharff in Norman, 50): Galway; Roundstone; (R.F.S.): Belfast; (C. W. Buckle, Irish Nat., Vol. XI. (1902), p. 43).

FOREIGN DISTRIBUTION:—

Europe: France; (25); Spain; (12); Denmark; Norway; Germany; Poland; Holland; (59).

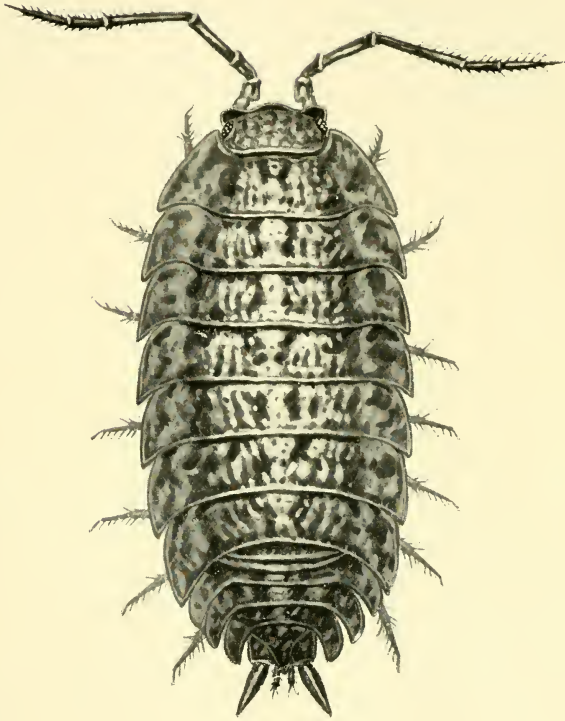
Africa: Madeira; Azores; (24).

Australia: New Guinea; (59).

*Porcellio rathkei* Brandt. PLATE XVI.

- 1833 *Porcellio rathkei* Brandt (3), p. 177, fig. 10.  
 1833 *Porcellio ferrugineus* Brandt (3), p. 178.  
 1840 *Porcellio trilineatus* Koch (34), part 34, pl. IX.  
 1853 *Porcellio trivittatus* Lereboullet (39), p. 54, pl. I., figs. 13 and 14.  
 1853 *Porcellio tetramoeris* Schnitzler (65), p. 24.  
 1853 *Porcellio striatus* Schnitzler (65), p. 24.

There is often a light band down the back and one on either side of it near the margin in *Porcellio rathkei* (especially in the males), with other more irregularly arranged light patches between. Unlike the three species previously considered, the present one has a smooth body. The distal joint of the flagellum is the longer, and the flagellum itself is equal in length to the last joint of the peduncle.

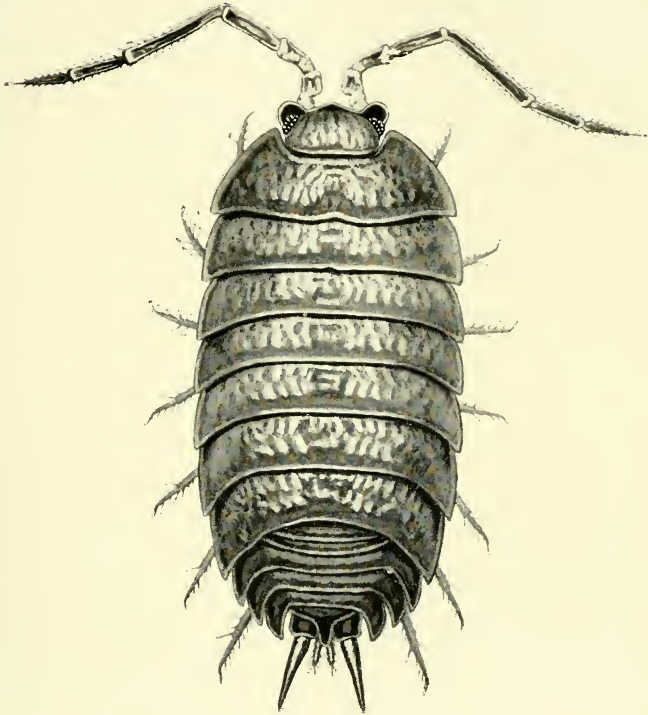


PORCELLIO RATHKEI Brandt.

*Length, twelve millimetres.*



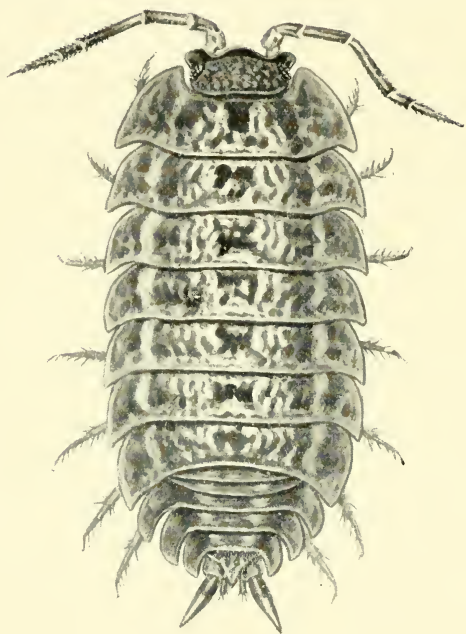




PORCELLIO LAEVIS Latreille.

*Length, sixteen millimetres.*

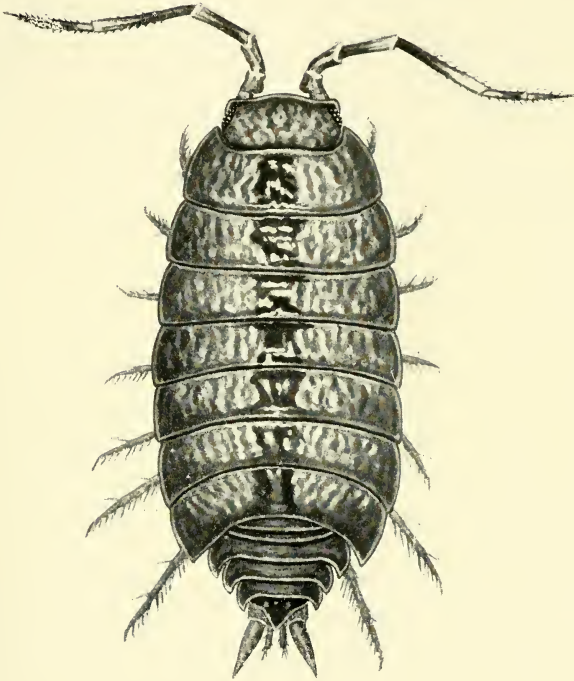




PORCELLIO RATZEBURGII Brandt.

*Length, eleven millimetres.*

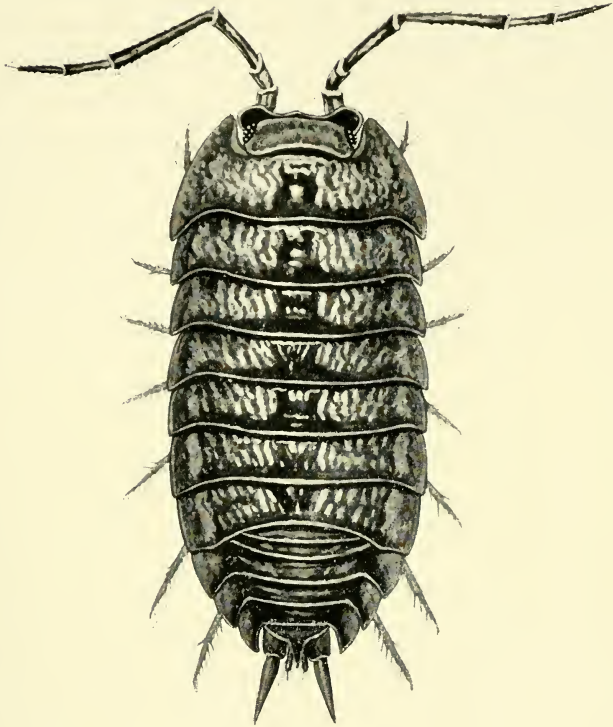




METOPONORTHUS PRUINOSUS Brandt.

*Length, nine millimetres.*





CYLISTICUS CONVEXUS De Geer.

*Length, twelve millimetres.*





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*As Illustrated in the*

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I need not point out to my fellow Members and friends the great difficulty often experienced in obtaining authentic specimens from a limited district. I should highly esteem any aid that County and London Collectors could afford. Localised specimens of Essex Birds, Fish and Mammals, Insects of all orders, Land and Freshwater and Marine Shells, Plants, etc., if in good condition, will be of the greatest assistance, and donors will have the satisfaction of knowing that their specimens will be properly preserved, and will be available for study in the future.

Birds, Fish and Mammals in the flesh may be forwarded direct to the Taxidermists, Messrs. Sherrin Bros., 38, Fielding Road, Chiswick, London, W. A post card should precede the specimens. Carriage may be charged forward.

WILLIAM COLE,

*Hon. Secretary and Curator.*

ESSEX MUSEUM OF NAT. HIST.,  
ROMFORD ROAD,  
STRATFORD, ESSEX.

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OF THE

ESSEX FIELD CLUB,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

Honorary Secretary and Curator.

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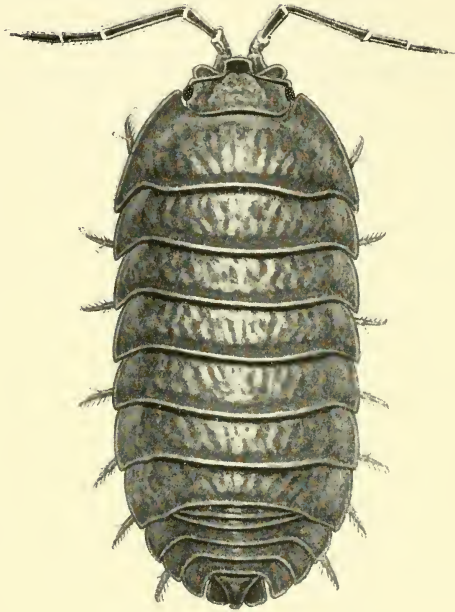
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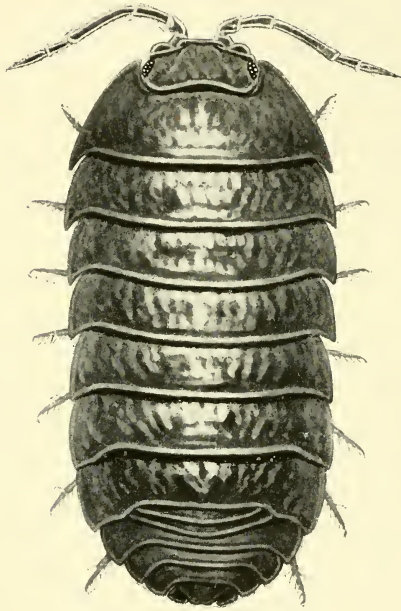
*January, 1906.*



ARMADILLIDIUM NASATUM Budde-Lund.

*Length, fifteen millimetres.*



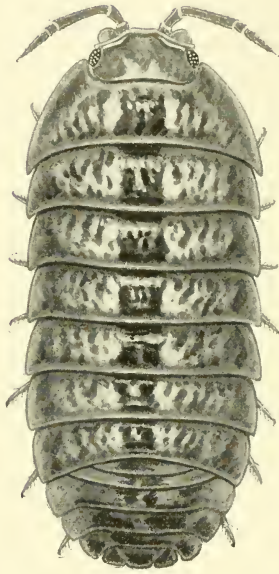


ARMADILLIDIUM VULGARE Latreille.

*Length, fifteen millimetres.*



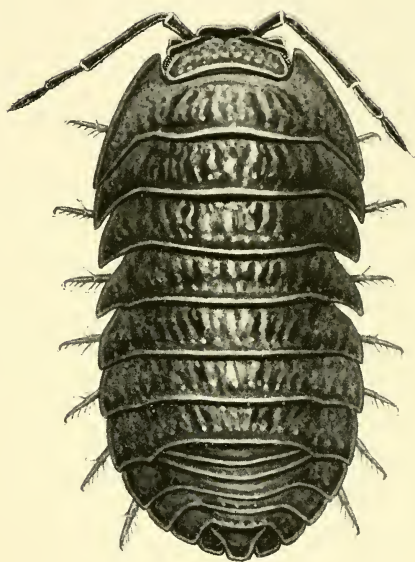




ARMADILLIDIUM PULCHELLUM Zencker.

*Length, five millimetres.*





ARMADILLIDIUM DEPRESSUM Brandt.

*Length, fifteen millimetres.*



Some specimens found by Mr. Webb in 1899 at Eton were submitted to Mr. Stebbing, and since then the former has found *Porcellio rathkei* to be pretty generally distributed in West Middlesex, where the species appears to frequent the open fields.

Air-tubes occur in abdominal appendages 1 to 5 and the white appearance of all of these at once serves to distinguish the living animal from *Porcellio scaber* in which the first two pairs of abdominal appendages alone are white.

BRITISH LOCALITIES:—

England: Eton; (Stebbing, 71a); Lane End; (Stebbing, from the Misses Johnston, 71a); Acton; Ealing; Hanwell; Southall; Northolt; Greenford; West Drayton; Mortlake; (W.M.W.); Sunderland; (Brady, 50a).

FOREIGN DISTRIBUTION:—

Europe: France; (25); Bosnia; Servia; (22); Hertzogovania (B.M.); Norway; Northern, Western, and Middle Europe, everywhere; (59); Corfu (B.M.)

Asia: Transcaucasia; (59).

North America: (59).

*Porcellio laevis* Latreille. PLATE XVII.



FIG. 51.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Porcellio laevis*.



FIG. 50.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Porcellio rathkei*.

- 1804 *Porcellio laevis* Latreille (37), p. 46.  
 1827 *Porcellio degeerii* Savigny and Audouin (61), p. 289.  
 1833 *Porcellio cucercus* Brandt (3), p. 177.  
 1833 *Porcellio syriacus* Brandt (3), p. 178.  
 1833 *Porcellio musculus* Brandt (3), p. 180.  
 1833 *Porcellio cinerascens* Brandt (3), p. 178.  
 1833 *Porcellio dubius* Brandt (3), p. 178.  
 1837 *Porcellio poeyi* Guélin (50), p. 6.  
 1844 *Porcellio urbicus* Koch (34), part 36, pl. IV.  
 1847 *Porcellio flavipes* Koch (35), p. 206, pl. VIII., fig. 97.  
 1853 *Cylisticus laevis* Schnitzler (65), p. 25.  
 1857 *Porcellio cubensis* Saussure (60), p. 307.  
 1857 *Porcellio sumichrasti* Saussure (60), p. 307.  
 1857 *Porcellio cotilla* Saussure (60), p. 307.  
 1857 *Porcellio aztecus* Saussure (60), p. 307.  
 1857 *Porcellio mexicanus* Saussure (60), p. 307.

Another smooth species is *Porcellio laevis*. The colour of its body is light grey with irregular white markings. The large size of this species and the very long tail-appendages of the males are features which will help to identify it. The distal joint of the flagellum is slightly the longer and as in the last species (*P. rathkei*) the flagellum is equal in length to the last joint of the peduncle. The chief habitats for this species are among vegetable rubbish near human dwellings.

Only the first two abdominal appendages contain air-tubes.

## BRITISH LOCALITIES:—

England: Maldon; (W.M.W. from R.M.): Ipswich (1892); Hanwell; Wimbledon; (W.M.W.): Kent; (Kinahan 32).

Ireland: Dublin; (Bate and Westwood, 1): Blackrock; Dundrum; Co. Dublin; Galway; (R.F.S.)

## FOREIGN DISTRIBUTION:—

Europe: France; (25); Spain; (15); Sicily; (19); Hertzogovania; (22); Sweden; Denmark; Germany; Belgium; Austria; Italy; Dalmatia; Greece; Turkey; (59); Corfu; (B.M.): Inca, Majorca (23); (B.M.—Pocock and Thomas.)

Asia: Syria; Turkestan; (21).

Africa: Morocco; Algeria; Tunis; Tripoli; Senegal; Egypt; (23).

Atlantic Isles: Bermudas; Azores; Canaries; Cape Vera; Madeira; (24).

America: North America; Mexico; Peru; Brazil; Chili; West Indies; Pacific Islands; (59); Sandwich Isles; (B.M.)

**Porcellio ratzeburgii** Brandt. PLATE XVIII.

1833 *Porcellio ratzeburgii* Brandt, (3), p. 178.

1839 *Porcellio nemorensis* Koch (34), part 28, pl. XIX.

1839 *Porcellio lugubris* Koch (34), part 28, pl. XX.

1853 *Porcellio quercum* Schnitzler (65), p. 24.

1898 *Porcellio ratzeburgii* Sars (59), p. 182, pl. LXXX, fig. 1.

There are granulations on the middle of the segments in *Porcellio ratzeburgii* and the sides of its body are more nearly parallel than in the other species of *Porcellio*; the frontal lobe is, practically speaking, semi-circular and the lateral plates of the thorax flank the head to a considerable extent. As in *Porcellio pictus*, the dark band is in the middle of the back. The distal joint of the flagellum is nearly twice as long as the proximal, and the flagellum is shorter than the last joint of the peduncle. This species was added to the British list by Mr. Webb (74) in 1898.



FIG. 52.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Porcellio ratzeburgii*

*Porcellio ratzeburgii* agrees with *Porcellio rathkei* in having air-tubes in the first five abdominal appendages.

## BRITISH LOCALITIES:—

England: Warley; Brightlingsea; young examples (W.M.W.): Maldon; young examples (W.M.W. from R.M.)

## FOREIGN DISTRIBUTION:—

Europe: Trafoi St. Martini, and Capitello, in the Tyrol; (Norman, 50); East Alps, very common; Val-de-Joux; Massif de la Chartreuse Vaulnaveys (25); Bosnia; (22); Norway; Central Europe; Upper Pfaltz; Bohemia; Saxony; Rhaetia; (59).

Genus—**METOPONORTHUS** Budde-Lund, 1879 (7), p.4

*Porcellionides* Miers, 1876 (44), p. 98.

*Flagellum, with two joints ; abdomen, narrow ; frontal lobe not developed.*

The hinder legs of *Metoponorthus* are proportionately longer than in any other Oniscidæ save *Philoscia*. Both genera have a narrow abdomen, but *Philoscia* has an extra joint to the flagellum, and shows no sign of lateral lobes to the head.

**Metoponorthus pruinus** Brandt. PLATE XIX.

1833 *Porcellio pruinus* Brandt (3), p. 181.

1840 *Porcellio truncatus* Milne-Edwards (46), p. 173.

1840 *Porcellio maculicornis* Koch (34), part 34, pl. XVI.

1853 *Porcellio frontalis* Lereboullet (39), p. 63, pl. I, fig. 17.

1868 *Porcellio pruinus* Bate and Westwood (1), p. 487.

1877 *Porcellio (Porcellioides) flavo-vittatus* Miers (45), p. 669 pl., LXVIII., fig. 4.

1898 *Metoponorthus pruinus* Sars (59), p. 184, pl. LXXX., fig. 2.

Undamaged specimens of *Metoponorthus pruinus* are of a beautiful bluish-grey colour, owing to a "bloom" which is easily brushed off, revealing a dark reddish-brown tint beneath it. The antennæ are long and have white markings upon them.

Air-tubes occur in the first two abdominal appendages.

BRITISH LOCALITIES:—

*England*: Maldon; (W.M.W. from R.M.): Hanwell; Eton Wick; Kew; Ipswich; Stoke-on-Trent; (W.M.W.): Chiselhurst; Oxford; (Bate and Westwood): Berkhamsted; Burnmoor; Durham; (Norman, 49): Exeter; (Parfitt, 53); Torquay; (B.M.—T.R.R.S.)

*Scotland*: Banff; (Thomas Edwards in Norman, 49).

*Ireland*: Dublin; (Kinahan, 32): Foyle District; Donegal; Galway; Clonbrock, Co. Galway; Mornington, Co. Meath; Santry; Gleeson Park; Dundrum, Co. Dublin; Bray; (R.F.S.)

FOREIGN DISTRIBUTION:—

*Europe*: Practically all the Countries of Europe are given in Dollfus' list; (23).

*Asia*: Japan; China; Syria; Ceylon; Sumatra; Celebes; Phillipines; Caucasus; Himalayas; (23): Christmas Island; (B.M.)

*Africa*: Generally distributed; Madagascar; Seychelles; (23).



FIG. 53.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Metoponorthus pruinus*.

*Atlantic Isles*; (23).

*America*: North and South, almost everywhere, to judge from M. Dollfus' list; (23).

*Australia*: New Caledonia; (23).

**Metoponorthus cingendus** Kinahan. PLATE XX.

1857 *Porcellio cingendus* Kinahan (32), p. 279, pl. XIX., figs. 1468-9.  
 1868 *Porcellio cingendus* Bate and Westwood (1), p. 489.  
 1885 *Metoponorthus simplex* Budde-Lund (8), p. 188.

The colour of *Metoponorthus cingendus* is steel blue with red or yellowish spots. It has a raised line across each thoracic segment and its abdomen is narrower than in *Metoponorthus pruinosus*.



FIG. 54.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Metoponorthus cingendus*.

BRITISH LOCALITIES:—

*England*: Salcombe, Devon; (Norman, 49): South Devon; (Stebbing in 49).

*Ireland*: Dublin; (B.M. from Kinahan); Mountain Districts of Dublin, Wicklow, and Cork; Coast of Kerry; Arran Islands; Achill, Co. Mayo; Roundstone, Co. Galway; Mallow, Caef Island; Glandore; Brock Haven, Co. Cork; Killoughrim Forest, Co. Wexford; Kenmare, Co. Kerry; (R.F.S.).

FOREIGN DISTRIBUTION:—

*Europe*: France; (25): Spain; (12).

(2.) Able to roll up into a ball.

*Genus*—**CYLISTICUS** Schnitzler, 1853 (65), p. 24.

*Flagellum*, with two joints; *abdomen* broad; *frontal lobe*, very small.

The characters given immediately above are almost those of *Porcellio*, with which *Cylisticus* might, perhaps, be confounded. The latter has the power, however, of rolling itself into a ball, and the first segment of the thorax is comparatively larger than in any species of *Porcellio*, indeed the side plates of the segment in question entirely flank the head. These features, as well as the straight sides of the body and the arched back, connect *Cylisticus* with *Armadillidium*, from which the former is, however, at once separated by its long pointed tail appendages.



**Cylisticus convexus** De Geer. PLATE XXI.

- 1778 *Oniscus convexus* De Geer (10), p. 553, pl. XXXV., fig. 11.  
 1853 *Porcellio spinifrons* Brandt (3), p. 177.  
 1836 *Porcellio laevis* Koch (34), part 6, pl. I.  
 1853 *Porcellio armadilloides* Lereboullet (39), p. 65, pl. I., fig. 18.  
 1853 *Cylisticus laevis* Schnitzler (65), p. 25.  
 1868 *Porcellio armadilloides* Bate and Westwood (1), p. 485.  
 1898 *Cylisticus convexus* Sars (59), p. 186, p. LXXXI.

There is but a single species of *Cylisticus* found in this country, so that it is not necessary for us to go into much further detail with regard to it. *Cylisticus convexus* has the two joints of the flagellum about equal, and they together in turn closely approximate in length to the last joint of the peduncle. Mr. Stebbing says, in a letter, that British examples do not appear to have the "white tail-piece" seen in Continental ones. It is not noticeable in the preserved specimens which we have seen from Berkhamsted and Leixlip, but it is very evident in the living ones found at Hanwell and Maidstone.

The abdominal appendages 1 to 5 are provided with air-tubes.

## BRITISH LOCALITIES:—

*England*: Maldon; (W.M.W. from R.M.): Hanwell; Bluebell Hill, Maidstone; Eton; (W.M.W.): Berkhamsted; Portland; (Norman, 49).

*Scotland*: Salisbury Crags; Edinburgh; Lanarkshire; Rothesay; (Scott, 68): Killwinning; (John Smith *vide* Robertson, 57): Highgate; (Bate and Westwood, 1).

*Ireland*: Leixlip, Co. Dublin; Tempo, Co. Fermanagh; Goresbridge, Co. Kilkenny; (R.F.S.)

## FOREIGN DISTRIBUTION:—

*Europe*: France; (25): Sweden; Norway; Denmark; Germany; Bohemia; Holland; Belgium; Turkey; Caucasus; (59).

*North America*; (59).



FIG. 55.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Cylisticus convexus*.

## Family—ARMADILLIDIIDÆ.

Tail appendages not projecting when the animal is walking.

Genus—ARMADILLIDIUM Brandt, 1833 (3), p. 184.

Flagellum, with two joints; outer division of the tail appendages expanded and broader at the hinder end.

The members of the genus *Armadillidium* are more likely to be confounded, by the uninitiated, with the "Pill-millipedes" than with other Woodlice. Excepting *Cylisticus* (which has long pointed tail appendages) no other British forms have the power of rolling themselves up into a complete ball. The very arched body is characteristic of *Armadillidium*, and so is the groove into which the basal joints of the antennæ fit when the creatures curl up.

The first two abdominal appendages only are provided with air-tubes.

*Armadillidium nasatum* Budde-Lund,  
1885. PLATE XXII:

1885 *Armadillidium nasatum* Budde-Lund (8), p. 51.

1892 *Armadillidium nasatum* Dolltus (14), p. 10, fig. 12.

1899 *Armadillidium nasatum* Norman (misprinted *Porcellidium*) (49), p. 57, pl. VI., figs. 5-8.



FIG. 56.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Armadillidium nasatum*.

*Armadillidium nasatum* has a narrow but very prominent frontal lobe, which is almost square and curves somewhat upwards and backwards. The joints of the flagellum are approximately equal, and are together of the same length as the last peduncular joint.

The telson is as long as it is broad at the base, and tapers to a roundish point, while its sides are slightly incurved.

The outer divisions of the tail appendages are considerably longer than broad, and are more or less paddle-shaped.

It will be noticed that the slope from thorax to telson is more gentle than in the common species, *Armadillidium vulgare*, and the first thoracic segment is not so greatly developed. Consequently the species which we are considering does not produce a perfect sphere, and the antennæ are not hidden when

it rolls up. It is interesting to compare this species with *Cylisticus convexus*. The surface of the body is smooth, and its colour is a delicate brownish grey with more or less distinct rows of darker markings.

## BRITISH LOCALITIES : -

England : Maldon ; (W.M.W. from R.M.) : Bluebell Hill, Maidstone (W.M.W.) ; Clifton, banks of the Avon ; (W.M.W. from J.T.C. 1900) : Leigh Woods, Clifton ; Tunbridge Wells ; South Devon ; (Stebbing in 49) ; Cheddar Cliffs, Somerset ; (Norman, 49).

## FOREIGN DISTRIBUTION : -

Europe : France ; (28) : Spain ; (12) : Italy ; (23).

**Armadillidium vulgare** Latreille. PLATE XXIII.

1804 *Armadillo vulgaris* Latreille (37), p. 48.

1804 *Armadillo variegatus* Latreille (37).

1853 *Armadillo ater* Schmitzler (65), p. 48.

1816 *Armadillo maculatus* Risso (56), p. 158.

1818 *Armadillo pillularis* Say (62), p. 432.

1825 *Armadillo pustulosus* Dermarest (11), p. 323, pl. XLIX.

1830-4 *Armadillidium commutatum* Brandt and Ratzeburg (4), p. 81, pl. XIII., fig. 123.

1833 *Armadillidium zenckeri* Brandt (3), p. 185.

1839 *Armadillo trivialis* Koch (34), part 28, pl. XIV.

1898 *Armadillidium vulgare* Sars (59), p. 189, pl. LXXXII.

The common pill woodlouse is *Armadillidium vulgare*. Its frontal lobe is not large, though it is broad, while its margin where it joins the head is rounded and slightly recurved. The proximal joint of the flagellum is somewhat the shorter and the two together, as in *Armadillidium nasatum*, are of about the same length as the last joint of the peduncle.

The telson has the form of a triangle with the angles truncated and is about as long as it is broad at the base. The outer divisions of the tail appendages are considerably broader than they are long.

The species can roll itself up into a very perfect sphere, and when it assumes this form its antennæ are hidden beneath the much expanded lateral plates of the first thoracic segment.

The body is smooth, shiny, and strongly arched. Its colour varies very considerably, generally it is of a slaty-grey, but yellow markings are often present to a greater or less extent. In a specimen before us (from Bluebell Hill, Maidstone) the head is of a



FIG. 57.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Armadillidium vulgare*.

uniform dark grey, the sides of the thorax are yellow, while the back is mottled with the same colour. The abdomen, including the telson, is also yellow with the exception only of the tail appendages, which are dark grey.

BRITISH LOCALITIES:—

England : Warley ; (W.M.W) : Maldon ; (W.M.W. from R.M.) : Brightlingsea ; Hanwell ; Mortlake ; Bluebell Hill, Maidstone ; Langley ; Skirmett ; Pamber Forest ; Kingston-on-Soar ; Ipswich ; (W.M.W.) ; Lynmouth ; (W.M.W. from J.T.C.)

Scotland : (Scott, 68.)

Ireland : Ardrahan ; (Norman, 50) : Borris, Co. Carlow ; Glandare, Terneay, Co. Cork ; Courtstown, Co. Wexford ; Cappagh, Co. Waterford ; Castel, Co. Tipperary ; (R.F.S.)

FOREIGN DISTRIBUTION:—

Europe : Throughout ; (23).

Asia : Damascus ; (23).

Africa : Algeria ; (23).

Atlantic Isles : (23).

America : North and South ; (23).

Australia : Melbourne (64 quoting Budde-Lund) ; New Zealand ; (23).

**Armadillidium pulchellum** Zencker. PLATE XXIV.



FIG. 58.—FLAGELLUM AND LAST PEDUNCULAR JOINT OF THE ANTENNA OF *Armadillidium pulchellum*.

- 1799 *Oniscus pulchellus* Zencker (78) (quoted by Koch in Panzer), part 62, pl. XXI.  
 1833 *Armadillidium pulchellum* Brandt (3), p. 188.  
 1861 *Armadillo maculatus* Sill (69), p. 5.  
 1870 *Armadillidium pictum* Plateau (not Brandt) (55), p. 116.  
 1898 *Armadillidium pulchellum* Sars (59), p. 191, pl. LXXXIII., fig. 4.

The smallest British species is *Armadillidium pulchellum*. The frontal lobe projects so as to make the head somewhat triangular. The antennæ are very short and the distal joint of the flagellum is three times the length of the other, while the two together are not as long as the last peduncular joint.

The telson is truncated at the end so that it is by no means as long as it is broad at the base, and the outer divisions of the tail appendages are in similar proportion.

The colour of the body (which is smooth) is dark brown with four important series of light patches running down the back and less marked variegations between them.

## BRITISH LOCALITIES:—

England : Matlock ; (T.R.R.S.) Arnside ; Westmorland (Brady, 50a).

Ireland : Ballymote, (Irish Nat., May, 1901), Sligo ; (Scharff).

## FOREIGN DISTRIBUTION:—

Europe : Vosges ; Switzerland ; Pyrenees ; (23) : Forest de Soignes ; Belgium ; (14).

**Armadillidium depressum** Brandt. PLATE XXV.

1833 *Armadillidium depressum* Brandt (3), p. 82. pl. XII., figs. 4, 5, 6, C, D.  
1892 *Armadillidium depressum* Dollfus (14), p. 17-18.

The frontal lobe in *Armadillidium depressum* is very prominent and much recurved. The antennæ are fairly long and while the two joints of the flagellum are nearly equal they are together not so long as the last peduncular joint.



FIG. 59.—FLAGELLUM  
AND LAST PEDUNCULAR  
JOINT OF THE ANTENNA  
OF *Armadillidium*  
*depressum*.

The telson is slightly longer than it is broad at the base, and its sides are incurved. As in *Armadillidium vulgare* and *Armadillidium pulchellum* the outer divisions of the tail appendages are broader than they are long.

The body is flatter than in the other species and bears tubercles; its colour is a slate-grey with yellowish markings. The first thoracic segment is well developed and the head appears as if almost completely imbedded in it.

## BRITISH LOCALITIES:—

England : Clifton, banks of the Avon ; (W.M.W. from J.T.C., 1900) : Shirehampton, near Bristol ; (Stebbing in 49) : Clifton ; (Dollfus from Miers 14).

## FOREIGN DISTRIBUTION:—

Europe : France ; Italy ; (25) : Asia Minor ; (14, quoting Brandt).

**Distribution of Species.** There are not sufficient records at present to enable us to draw any conclusions as to the general distribution of Woodlice in the British Isles, but it is hoped that more attention will be given to these creatures, and that before long there may be other material available.

**Conclusion.** At the beginning it was mentioned that the present work grew out of an investigation into the fauna of Essex, and in order to show what may be expected when places

are explored in which no collecting has been done, we may briefly indicate the results which we obtained in the county in question.

It was not long before a species new to Britain—to wit, *Porcellio ratzeburgii*—was found (74). This discovery was mentioned by Mr. Stebbing in the *Victoria County History of Essex* (p. 71), and he prophesied that most of the British species then would be met with in the county. We may safely claim to have shown that his prediction was true, for we have been able to record in the preceding pages no less than sixteen other species, as will be seen from the following lists:—

WOODLICE RECORDED FROM ESSEX.

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| 1. <i>Ligia oceanica</i>              | 10. <i>Porcellio pictus</i>        |
| 2. <i>Ligidium hypnorum</i>           | 11. <i>Porcellio dilatatus</i>     |
| 3. <i>Trichoniscus pusillus</i>       | 12. <i>Porcellio laevis</i>        |
| 4. <i>Trichoniscus roseus</i>         | 13. <i>Porcellio ratzeburgii</i>   |
| 5. <i>Haplophthalmus danicus</i>      | 14. <i>Metoponorthus pruinosus</i> |
| 6. <i>Oniscus asellus</i>             | 15. <i>Cylisticus convexus</i>     |
| 7. <i>Philoscia muscorum</i>          | 16. <i>Armadillidium nasatum</i>   |
| 8. <i>Platyarthrus hoffmannseggii</i> | 17. <i>Armadillidium vulgare</i>   |
| 9. <i>Porcellio scaber</i>            |                                    |

Of these *Ligidium hypnorum* calls for special mention, as it had not been found in this country since Mr. Stebbing discovered it in Surrey in 1873. Several of the *Porcellios* and *Cylisticus convexus* have been met with in but few places, and the same may be said of *Armadillidium nasatum*.

Of the British species not as yet found in Essex *Trichoniscus vividus* has at present only been recorded from Ireland; *Philoscia couchii* and *Armadillidium depressum* have not been collected except in the extreme south west of England, while *Metoponorthus cingendus* has hitherto only been noticed in Devonshire and Ireland. The other four species, with the exception of *Porcellio rathkei*, which is well distributed in west Middlesex (and might have been expected to occur in Essex), are still rare. In fact, for *Trichoniscoides albidus* but two British localities are known; for *Haplophthalmus mengii* three (two in England and one in Ireland); while *Armadillidium pulchellum* has only been recorded from two or three places.

In other counties quite as satisfactory results were obtained as in Essex—a systematic search in Buckinghamshire brought to

light at Eton three species which at the time had not been recorded from the British Isles, while in Middlesex, no less than a dozen species were found at Hanwell.

Since part of this contribution was printed our attention has been drawn to some notes by the Rev. Canon Norman and Professor G. S. Brady (50a). These bear out the remarks which have already been made, for among the species found by Professor Brady in the north of England were *Trichoniscoides albidus*, *Haplophthalmus mengii*, *Porcellio rathkei*, and *Armadillidium pulchellum*. In one of Canon Norman's previous papers (50—1903) he claims to have added the second species to the British list, and in the notes in question a similar claim is made with regard to the first and third. It should, however, be pointed out that all three of them were found in Buckinghamshire in 1899 by Mr. Webb, and that they were exhibited at the Nature Study Exhibition held in London in August, 1902. A specimen of *Armadillidium pulchellum* from Matlock was sent to us by the Rev. T. R. R. Stebbing in January, 1904, and was found, we understand, some considerable time previously.

It only remains for us to express our hearty thanks to the numerous friends and correspondents who have given us their ready help. The names of these have been printed in the text, but we would like to mention more particularly Dr. Calman, of the British Museum (Natural History), Monsieur Adrian Dollfus, Mr. Roland Matthams, the Rev. Canon Norman, Dr. Scharff, the Rev. T. R. R. Stebbing, and Miss Willmott.

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Explanation of the initials given in the text:—

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C.S.—Charles Sillem.	T.R.R.S.—The Rev. Thomas R. R. Stebbing.
J.T.C.—John Thomas Carrington.	
J.A.M.—James A. Murie.	W.M.W.—Wilfred Mark Webb.
R.M.—Roland Matthams.	R.W.—R. Welch.
R.F.S.—R. F. Scharff.	

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## THE BOG-MOSSES (SPHAGNACEÆ) OF ESSEX : A CONTRIBUTION TO THE FLORA OF THE COUNTY.

Read by FRED. J. CHITTENDEN, County Technical Laboratories, Chelmsford.

THE present paper is an attempt to collect the scattered records of the occurrence of the Bog-Mosses in Essex, to bring the nomenclature into line with more recently published lists, to define the limits of their distribution at the present day, and to correlate their distribution with the geological formation of the county.

In the *Victoria History of Essex* the following remark occurs respecting the Sphagnaceæ or Bog-mosses: "Comparatively few species of *Sphagna* are recorded, but the list of species of this genus will probably be largely increased by further investigation."

The author, no doubt, had in mind the recent changes in the classification of these organisms, which share with other large and widely spread genera, such as *Rubus*, *Rosa*, and *Hieracium* among land plants, and *Potamogeton*, the *Batrachian Ranunculi* and the *Harpidioid* section of *Hypnum* among aquatics, that difficulty of classification which arises from the presence of only very slight differences and very great likenesses between the forms. This characteristic aggravates the question as to what is a species and causes great differences of opinion among workers in these groups.

In the following list the system of Warnstorf has been followed.<sup>1</sup> This system has been adopted by most Continental and American writers, and in some of the more recent local lists of *Sphagna* in this country.<sup>2</sup> According to Warnstorf's classification 41 species of *Sphagna* occur in this country, while only 12 are recognised in the most recent book on British mosses.<sup>3</sup> This classification is based largely upon the position of the chlorophyllose cells in the branch leaves and the distribution of the pores in the hyaline cells, and is therefore to some extent an artificial one, but the forms so distinguished do, as a rule, according to my experience, correspond with what appears to be a natural grouping of the plants themselves. (But see note under *Sphagna subsecunda* below.)

Several lists have been published. I have been able to find the following:—

- (1) 1845. GREENWOOD, A. "Mosses found near Chelmsford." *Phytologist*, Vol. ii.
- (2) 1872. PARSONS, Dr. A. F. "Mosses of London District." *Science Gossip*, Vol. viii., p. 64.
- (3) 1884. ENGLISH, J. MS. list of Mosses of Epping Forest.
- (4) 1890. BUXTON, E. N. "Mosses." *Epping Forest*, Ed. III., pp. 135, 136.
- (5) 1891. MARQUAND, E. D. "List of Mosses in Mr. E. G. Varenne's Herbarium." *Essex Naturalist*, Vol. vi., pp. 33.
- (6) 1900. HORRELL, E. C. "European Sphagnaceæ." *Journal of Botany*, 1900.
- (7) 1901? DIXON, H. N., MS. list of N. Essex mosses.
- (8) 1903. SHENSTONE, J. C., *Victoria History of Essex*. Article "Botany."

1 HORRELL, E. C., "European Sphagnaceæ," *Journ. of Bot.*, 1900.

2 e.g., INGHAM, W., "Sphagna of Yorkshire and Durham." *Journ. of Bot.*, 1901., p. 145.

3 DIXON, H. N. *Student's Handbook of British Mosses*. Ed. II. (1904).

In addition to these lists there are specimens of bog-mosses collected in Essex, in the following Herbaria :—

- (9) BRITISH MUSEUM OF NATURAL HISTORY.  
 (10) ESSEX FIELD CLUB HERBARIUM.

(Including the collections of Messrs. English and Varenne.)

All of these sources of information have been consulted in drawing up the list, and the records duly incorporated.

The Sphagnaceæ so far as their vegetative structure is concerned, form a highly specialized group, and are particularly well adapted for life in situations where there is an abundant and constant supply of water contained in shallow basins and flowing but slowly, if at all. The majority of the species appear to thrive best in the presence of abundant light. These somewhat peculiar conditions are realised in few places in our county, and only, it would seem, where a porous stratum forming the top of a hill meets a non-porous stratum as one goes down the slope. Except where drainage, either for agricultural purposes or for building, has altered the conditions, they are fulfilled wherever the Bagshot Sands overlie the Boulder Clay or the London Clay, and in some places where Glacial Gravel forms the crown of the hill, the lower portion of which is of Boulder Clay or London Clay.

I have collected *Sphagna* in the following localities where London Clay underlies Bagshot Sands—Warley, Norton Heath, High Beach, Galleywood Common, Mill Green, and Hainhault Forest. In all the other localities where I have found these plants growing, the drift maps show Glacial Gravel (Post-glacial at the Rising Sun, Walthamstow), except at the locality in Thomas' Quarters, Epping Forest, and there the map must be at fault. I have not found any *Sphagna* definitely associated with the Boulder Clay that forms so large a part of the surface of the County—possibly owing to the presence of a fairly large proportion of lime in that formation.

[NOTE.—In the following list the names in brackets refer to the collector of the specimen quoted. I have examined those from localities followed by the sign ! and have collected a specimen in the localities followed by !!]

## SPHAGNA ACUTIFOLIA.

**Sphagnum acutifolium** Warnst.

[Most, if not all, the old records of this species belong to the next.] I have not seen the following : N. Essex (Dixon), near Chelmsford (Greenwood).

*var. purpureum*, Wils.

Near Chelmsford (Greenwood).

**S. subnitens** Russ. and Warnst.

“ Bog near the Bald-faced Stag ” (Forster) ! ; Warley Common (young undeveloped form) ! !

*var. purpurascens* Schlieph.

Epping Forest (English) ! ; Tiptree Heath (Varenne) ! ; Linguard Common ! !

*var. versicolor* Warnst.

Thomas' Quarters, Epping Forest ! ! ; Galleywood Common (Varenne) ! ! ; Linguard Common ! ! ; Woodham Walter Common and Bergholt Heath (Varenne) !

*var. virescens* Warnst.

Thomas' Quarters, Epping Forest ! !

## SPHAGNA SQUARROSA.

**S. squarrosum** Pers.

“ Forest near Snaresbrook ” (Forster) ! ; Galleywood Common (Greenwood)

*var. subsquarrosum* Russ.

Theydon and High Beach (English) ; Galleywood Common ! ! ; Pod's Wood (Varenne)

*var. imbricatum* Schimp.

Near “ Rising Sun,” Walthamstow (Parsons) ! ! ; Galleywood Common

## SPHAGNA CUSPIDATA.

**S. cuspidatum** Ehrh.

N. Essex (Dixon). [In the absence of a specimen it is impossible to tell to which of the segregates this belongs.]

**S. recurvum** *var. mucronatum* Warnst.

Between Theydon and Wake Arms ! ! ; Epping Forest (English) ! ; Woodham Mortimer Common (Varenne) !

**S. molluscum** forma *robusta* Warnst.

Between Theydon and Wake Arms !!; Warley Common !!

## SPHAGNA RIGIDA.

**S. compactum** D.C.

N. Essex (Dixon).

*var. imbricatum* Warnst.

High Beach (Varenne) !; Thomas' Quarters, Epping Forest !!; Tiptree Heath (Varenne) !!

*var. subsquarrosum* Warnst.

Tiptree Heath !!

## SPHAGNA SUBSECUNDA.

[The classification of the species comprising this group rests primarily upon the distribution of the pores on the inner and outer surfaces of the branch leaves, and since almost all possible variations occur, and plants with very varying appearance have a similar distribution of pores, the classification becomes exceedingly difficult. I have regarded all the forms having a conspicuously greater number of pores on the outer surface of the leaf and the stem leaves of medium size as belonging to *S. inundatum*—the type of the group I have failed to find in the county. It is possible that all the forms may have to be regarded as varieties of one and the same species, so closely do they run to one another and so little does the habit seem to be correlated with the anatomical characters in many of them.]

**S. inundatum** Warnst.

“ On the forest by the road from Debden Green to the camp, Ambres' Banks ” (Forster) !; Thomas Quarters, Epping Forest !!; Wake Valley !!; Strawberry Hill, Epping Forest !!; nr. Mt. Pleasant, Epping Forest !!; Great Monk Wood !!; nr. Rising Sun, Walthamstow !! and other parts of Epping Forest near High Beach; N. Weald, Epping Lower Forest !!; Hainault Forest !!; Norton Heath !!; Mill Green Common !!; Warley Common (Varenne) !!; Linguard Common !!; Tiptree Heath (Varenne) !!; Little Baddow Common !!; nr. Chelmsford (Greenwood); Galleywood Common (Varenne) !!

**S. rufescens** Warnst.

Between Theydon and Wake Arms !!

**S. crassicladum** Warnst.

Cuckoo Pits, Chingford !! ; Galleywood Common !!

**S. obesum** Warnst.

High Beach (Varenne) !!

## SPHAGNA CYMBIFOLIA.

**S. cymbifolium**, Warnst.

Epping (Sidebottam 1843) !; Norton Heath (Sidebottam) !; nr. Walthamstow (Forster) !; (*sub-nom.* var. *compactum*) near Chelmsford (Greenwood).

*var. flavo-glaucescens*, Russ.

Theydon (Horrell).

*var. fusco-glaucescens* Russ.

Tiptree Heath !!

*var. glaucescens* Warnst.

Theydon (Horrell); Thomas' Quarters, Epping Forest !!; between Theydon and Wake Arms (English) !!; Loughton !!; Warley Common (Varenne) !!; West Bergholt Heath (Varenne) !!; Pod's Wood (Varenne) !; Mill Green Common !!

*var. rubescens* Warnst.

Between Theydon and Wake Arms !!; Linguard Common !!; Galleywood Common !!; Little Baddow Common !!

**S. [papillosum**, Lindb.

This species has been recorded in error (Horrell, *Journ. Bot.*, 1900); the specimen proves to belong to *S. cymbifolium*.]

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## PRESENTATION TO MR. WILLIAM COLE: A REPORT.

BY MILLER CHRISTY.

[At the request of the Council of the Essex Field Club and myself, the Editor of this journal has been good enough to place at my disposal a few pages in order to publish a report of a matter in which every member of the Club must feel a very special interest, though the Club itself is not officially connected therewith. For this courtesy, I tender thanks on behalf of myself and others concerned.]

THE Foundation of the Essex Field Club, in 1880, was due to the initiative of Mr. William Cole, of Buckhurst Hill, who has acted ever since as its Honorary Secretary. To his energy is due, in the main, the leading position the Club now holds among local scientific societies and the establishment of its two Museums (the Epping Forest Museum, at Chingford, and the Essex Museum of Natural History, at Stratford). He took also a prominent part in the Freeing of Epping Forest.

That a man should continue to act for over a quarter-of-a-century as Honorary Secretary of a society founded by himself is very unusual ; and, for some years past, it has seemed to me that the time was approaching when some movement to recognize formally and publicly Mr. Cole's long-continued and valuable scientific, educational, and other public work (carried on by him at considerable pecuniary sacrifice) would be not only timely but positively called for.

When, therefore, I found myself President of the Club in the twenty-sixth year of its existence, an attempt to initiate some such movement seemed to be a duty laid upon me. On consulting with several Past Presidents, I found that one and all shared my view as to the opportuneness of such a movement. Thus encouraged, I approached others, with a view to forming a Committee to take action ; for it was felt generally that the object aimed at could be attained better by a separate organization than by the Council of the Field Club. Ultimately, an influential Committee of thirty-two persons was formed as follows :—

Professor R. Meldola, F.R.S., Pres.C.S., &c. (*Chairman*),  
David Howard, D.L., F.I.C., F.C.S., &c. (*Hon. Treasurer*).

Miller Christy, F.L.S. (*Hon. Secretary*),

Geo. Avenell

John Avery, F.S.S.

Professor G. S. Boulger, F.L.S.,

F.G.S.

I. Chalkley Gould

J. E. Harting, F.Z.S., &c.

Thomas Vincent Holmes, F.G.S.,

F.A.I.

A. E. Briscoe, B.Sc., &c., <i>Late Principal of the Municipal Technical Institute, West Ham</i>	The Vicomte Horncastle, <i>Chairman Epping Forest Committee of the Corporation of London</i>
Rev. R. Ashington Bullen, <i>Chairman of Council of the Selborne Society</i>	Andrew Johnston, J.P., <i>Chairman Essex County Council</i>
E. North Buxton, D.L., &c., <i>Verderer of Epping Forest</i>	Henry Laver, J.P., F.S.A.
Sir T. Fowell Buxton, Bart., D.L., <i>Verderer of Epping Forest</i>	F. T. Newton, F.R.S., F.G.S., &c.
T. F. V. Buxton, <i>High Sheriff of Essex, J.P., &amp;c.</i>	E. B. Poulton, F.R.S., F.L.S., &c.
J. Byford, jun., <i>Mayor of West Ham</i>	E. A. Read, <i>Verderer of Epping Forest</i>
Frederic Chancellor, J.P.	Thomas W. Reader, F.G.S.
Edward A. Fitch, J.P., C.A., F.L.S., F.E.S.	F. W. Rudler, I.S.O., F.G.S.
Peter Gellatly, D.L., <i>Verderer of Epping Forest, &amp;c.</i>	J. C. Shenstone, F.L.S.
	John Spiller, F.C.S., F.I.C.
	The Countess of Warwick
	Wilfred Mark Webb, F.L.S., <i>Hon. Sec. Selborne Soc.</i>
	William Whitaker, B.A., F.R.S., F.G.S.
	E. J. Wythes, J.P., &c.

This Committee included, it will be seen, all the eight Past-Presidents of the Club, with other gentlemen, some of whom are members of the Club, whilst others are not.

During October last, I sent out, in the name of this Committee, to all members of the Club and to many others likely to appreciate Mr. Cole's work, an appeal asking for subscriptions (not exceeding one guinea) to "The William Cole Recognition Fund," and stating that the Committee (having taken steps to ascertain what would be acceptable to Mr. Cole) proposed—

(1) To present to him, as a slight testimony of appreciation of his work, a purse of at least One Hundred Guineas ;

(2) To entertain him, together with his Brothers and Sisters (all of whom have assisted him very greatly in his work), as Guests at a Complimentary Dinner, at which the purse would be presented ; and, further,

(3) To present also to the Guests at the Dinner a formal inscribed Address of Thanks.

The response to this appeal was most gratifying. No fewer than one hundred and sixty-nine ladies and gentlemen (chiefly, of course, members of the Essex Field Club) sent subscriptions varying in amount from 2s. 6d. to the maximum of £1 1s.<sup>1</sup> The Committee found itself, therefore, in possession of a sum sufficient to enable it to hold the proposed dinner, to present a Purse of one hundred and ten guineas, to pay for the engrossing

<sup>1</sup> Their names will be found appended to the formal Address, which is printed hereafter.

of the formal Address of Thanks, and to meet the various incidental expenses.

The Dinner was held at the Royal Forest Hotel, Chingford, Essex, on the 9th December 1905, and was an unqualified success. It was attended by nearly one hundred subscribers and their friends (each subscriber having the right to bring a guest), including the special Guests of the Evening—Messrs. William Cole, F.L.S., B. G. Cole, and H. A. Cole, Miss Cole, and Miss Jane Cole. The subscribers and guests were formally received on their arrival by Prof. and Mrs. Meldola, Mrs. Howard, and Mr. Miller Christy.

The chair at the dinner was occupied by Prof. R. Meldola, F.R.S. (first President of the Essex Field Club), and among those present were Mr. T. F. V. Buxton, J.P. (High Sheriff of Essex), Mr. David Howard, J.P., D.L., F.I.C., F.C.S., Mr. Miller Christy, F.L.S. (President of the Essex Field Club), Professor G. S. Boulger, F.L.S., F.G.S., Mr. P. Gellatly, D.L., J.P. (Verderer of Epping Forest), Mr. J. E. Harting, F.Z.S., Mr. T. Vincent Holmes, F.G.S., Mr. E. T. Newton, F.R.S., F.G.S., Mr. W. Mark Webb, F.L.S. (Hon. Sec. of the Selborne Society), Mr. John Spiller, F.C.S., Mr. W. Whitaker, F.R.S., Mr. Horace B. Woodward, F.R.S., Dr. J. H. B. Burrage, M.A. (H.M. Inspector of Secondary Schools and Technical Institutes), Miss Mary H. Cole, Mr. Bryan Corcoran, Mr. John Avery, Mr. F. W. Elliott, Mr. and Mrs. J. A. Finzi, Miss K. M. Hall, F.L.S., the Rev. W. C. Howell, M.A., Mr. W. Ping, F.C.S., Mr. G. E. Pritchett, F.S.A., Mr. Frank W. Reader, Mr. Thomas W. Reader, F.G.S., Mr. J. R. Roberts, Mr. and Mrs. Thomas Royle, Miss Royle, Mr. Matthew Rose, Mr. J. C. Shenstone, Mr. G. E. Vaughan, Mr. Joseph Wilson, and Mr. J. M. Wood. Several others who were expected telegraphed at the last moment expressing regret at their inability to be present. These included Mr. A. E. Briscoe, Mr. J. Byford, jun. (late Mayor of West Ham), Mr. H. I. Coburn (Hon. Solicitor to the Club), and Mr. I. Chalkley Gould.

When the time arrived for speeches,

The CHAIRMAN said : Ladies and Gentlemen, we have met together on this occasion in circumstances of peculiar interest. It is a notable thing in the history of any Society to be enabled to celebrate its half-jubilee. The Essex Field Club has completed twenty-five years of active work, but the interest of this gathering centres chiefly in the fact that what the Club has been

enabled to do is practically the outcome of the single-minded devotion of our chief guest this evening, Mr. William Cole, who has been its active executive officer during the whole period of its existence (Applause). We have met, therefore, to do honour to our Founder, our Hon. Secretary, our Editor, and the Curator of our Museums. In all these capacities, he has served us right loyally for a quarter-of-a-century—(applause)—devoting the best part of his life and energy to this work.

I might speak of Mr. Cole in a collective capacity, like the editorial “we,” signifying many; for we all know how the other members of the family have worked with him shoulder to shoulder (Applause).

In case there should be some misapprehension—and I have heard one or two remarks which lead me to believe that there may be some—I wish it to be distinctly understood that this is not a farewell gathering (Applause). It is quite the reverse: it is a renewal of the lease of Mr. Cole’s activity. We are glad to know that he is not going to retire upon his laurels, and I am sure I shall be expressing the innermost wishes of all of you when I wish continued health and activity to Mr. William Cole and the members of his family, to continue the good work which he inaugurated more than twenty-five years ago and has carried on so actively ever since.

If there is one thing that stands out clearly in the history of the Essex Field Club, it is the extraordinary vitality and longevity of the officials connected with it. There is not a single blank in our list of Past-Presidents, and I think there is only one gap in the list of officers who have ever given their services to the Society during the whole period of its existence.

It is undesirable that I, who have been put into this most honourable and, I may say, particularly gratifying position, should detain you long with any personal reminiscences. At the same time, it is difficult for me to travel back in the history of my long friendship with the Cole family without saying that I first met our Secretary, some thirty-five years ago, in the glades of Epping Forest (Applause). From the time that this Club was started down to the present moment, it has been my privilege and my pleasure to promote the objects of the Society in every way within my power (Applause). I have seen the work from the commencement, and I think I have a unique knowledge of the amount of thought and labour which Mr. Cole and his brothers and sisters have put into the affairs of this Society. He started the Club with lofty ideals, and those ideals have been more or less realized. That is something to be proud of. The position which this Club has gained throughout the country is so high that he may well feel pride in contemplating the outcome of his work.

We are proud to see among us to-night many of the oldest members of our Society. We are prouder still to see many guests, whose presence here shows that there is also an outer public which is appreciative of the work the Essex Field Club has been able to carry on, through its Founder and Secretary, during this long period of time (Applause). I should like, with your permission, to read some of the letters which have been sent to myself and to Mr. Miller Christy, in connection with this gathering, by yet other well-wishers who are unable to be present with us.

The Chairman then read the letters following:—

52, NEVERN SQUARE, KENSINGTON, S.W.

*December 3rd, 1905.*

My dear Meldola,

I was delighted to hear of this proposed official recognition of the great debt

we owe to Mr. Cole for the inception of the Club, and for his untiring labours during the past twenty-five years as our Honorary Secretary and Editor of our Journal. All this will receive suitable expression, I feel sure, at the gathering on Saturday next.

The labours of our Honorary Secretary and his colleagues have exerted an influence far beyond the limits of the Essex Field Club itself, which is now justly regarded as the *normal* Field Club, to which other kindred Societies look for guidance in all matters connected with their organization and administration. This fact is one which should not be lost sight of in expressing our gratitude to the Guest of the Evening.

I am, my dear Meldola, sincerely yours,  
HORACE T. BROWN.

THE VICARAGE, PYRFORD, WOKING,  
*November 13th, 1905.*

Dear Sir,

I am very sorry that other engagements for December 9th, and my distance from Chingford, with a bad service of trains, precludes the possibility of my being present on that day at the William Cole Recognition Fund dinner.

I am glad that your labours have been so successful, and trust that you will have a happy and pleasant gathering.

Yours sincerely,  
R. ASHINGTON BULLEN.

KNIGHTON, BUCKHURST HILL,  
*Nov. 30, 1905.*

Dear Mr. Christy,

I find it will not be possible for me to attend the dinner at which the presentation to Mr. Cole is to be made. I shall have friends staying here at the time. I hope the occasion will be worthy of the object, with which I have the greatest sympathy.

Yours very truly,  
E. N. BUXTON.

EDEN HOLME, ATHERTON ROAD, FOREST GATE, E.  
*December 8th, 1905.*

Dear Mr. Christy,

I regret very much indeed that a severe cold and sore throat will prevent me attending the dinner to-morrow at the Royal Forest Hotel, Chingford, in honour of Mr. William Cole, whose great and invaluable services are so much appreciated by the members of the Corporation of West Ham and the great mass of people residing in that district.

The Museum next to the Technical Institute will always remain a monument to his name, and gratitude will be expressed for years to come to the gentleman whose efforts brought such a useful and interesting exhibition in their midst.

I sincerely hope the function will be a great success, and again regretting my inability to be present,

Believe me, yours faithfully,  
JOHN BYFORD, JUN.  
(Ex-Mayor of West Ham).

BELLEFIELD, CHELMSFORD,  
*Nov. 28, 1905.*

My dear Mr. Christy

I should much like to have attended the dinner in honour of Mr. Wm. Cole, who has done so much for the Essex Field Club and has well earned any honour that may be offered him; but, for an old man, it is such a long journey from Chingford to Chelmsford *after* dinner that I think it more prudent to ask to be excused

I remain, yours faithfully,  
FRED. CHANCELLOR.

NASH MILLS, HEMEL HEMPSTEAD, HERTS,

Nov. 13, 1905.

Dear Prof. Meldola,

I much regret that it will not be possible for me to be present at the complimentary dinner to be given to Mr. William Cole on Dec. 9th.

Will you kindly express to him and to those who are assembled to do him honour my high appreciation of his energetic work in the promotion of natural knowledge, offer him my congratulations on the success of his endeavours during the past twenty-five years, and tell him how heartily I join in all the good wishes that will be expressed for his being long spared to continue his useful labours.

Believe me, yours sincerely,  
JOHN EVANS.

CLAREMONT HOUSE, WIMBLEDON COMMON,

November 25, 1905.

My dear Meldola,

I shall not be able to be present at the dinner to Mr. Cole, but I should like to express my sense of the great value of his services to the Essex Field Club.

We are all proud of the work that has been accomplished, directly and indirectly, through its activity. One knows how much an association like ours depends for its effectiveness on the "Permanent Head of the Department. I am sure I shall not be alone in giving expression to the feeling that we owe a great—a very great—deal of our healthy activity to the motive power of the Hon. Secretary,

Yours sincerely,  
J. B. FARMER.

BRICK HOUSE, MALDON.

1st December, 1905.

Dear Mr. Christy,

I fear I shall be unable to attend the complimentary dinner to Mr. William Cole on the 9th inst.

Should I be absent, I trust the Chairman will be able to express my very best wishes for the welfare of the Cole family in remembrance of many happy days spent together in the long ago with them and my colleagues of the Essex Field Club. Long may they and it continue to flourish.

Yours very sincerely,  
EDWARD A. FITCH.

3, ENDSLEIGH STREET, TAVISTOCK SQUARE, W.C.

Nov. 28, 1905.

Dear Mr. Christy,

I find that it will be quite impossible for me to attend, much as I should have wished it, so as to have been able to congratulate Mr. Cole and his family personally for the excellent work they have done.

Yours very truly,  
F. CARRUTHERS GOULD.

WOODFORD GREEN,

Nov. 12th, 1905.

Dear Sir,

We go to Hertfordshire on a visit on the 9th prox., so that I shall be unable to be at the dinner, with the object of which, as you know, I entirely sympathise, and am very glad that your efforts have been so successful.

Yours very truly,  
ANDW. JOHNSTON.

BRITISH MUSEUM (NATURAL HISTORY), CROMWELL ROAD, LONDON, S.W.,  
Nov. 6th.

My dear Meldola,

I am sorry to be unable to attend the dinner at Chingford on Dec. 9th, and the presentation to Mr. William Cole. I am yet very far from having recovered from my severe illness, which laid me up all the summer.

I can, however, join in the expression of appreciation of Mr. Cole's services to the Essex Field Club, and do so most cordially. The Club has done and is doing most valuable service in cultivating the best kind of field work. There is still plenty to be done, new things to be found and new facts discovered about old and well-known plants and animals. A Club such as ours brings a constant supply of young naturalists into contact with the problems which have occupied the older generations, and a generous spirit of comradeship and enthusiasm in the study of Nature is the result of such organization.

With best wishes, I am sincerely yours  
E. RAY LANKESTER.

43, HEAD STREET, COLCHESTER,  
Nov. 29, 1905.

Dear Mr. Christy,

I am sorry I shall be unable to be present on the occasion of the presentation to the Hon. Sec. of the Essex Field Club.

I should have been glad to have taken part in honouring our friend, who has done so much in furthering a love for natural history. It will be long, I suppose, before there will be another opportunity, in any part of the Kingdom, for presenting to any hon. secretary of a Society a testimonial for such an almost life-long persistent effort to interest all classes as has been exhibited by our friend, Mr. Cole.

In thanking him, we must not lose sight of the assistance we have received from other members of his family. I am glad the Society acknowledges this fact, and I trust they may all long live to enjoy the esteem they have so well merited.

I am, yours very truly,  
HENRY LAVER.

LEYTONSTONE,  
Nov. 11, 1905.

Dear Mr. Christy,

I shall be in the West of England at the time of your gathering and shall, therefore, be unable to be present.

. . . The address seems to me to be excellent, and truly expresses the cordial recognition which all the contributors must entertain of the admirable work Mr. Cole and his relatives have done in the cause of Essex Natural History.

Believe me, yours very truly,  
ARTHUR LISTER.

LOUGHTON HALL, LOUGHTON, ESSEX,  
Nov. 28, 1905.

Dear Mr. Christy, . . .

Pray express my regret that I am unable to attend the dinner on the 9th at Chingford.

I wish every success to the gathering, and may Mr. Cole long continue his most useful labours.

Very truly yours,  
(Rev.) J. WHITAKER MAITLAND.

WYKEHAM HOUSE, OXFORD,  
November 7, 1905.

My dear Meldola,

I am extremely sorry that the vast accumulation of work and many things during my recent long journey with the British Association prevents me from being present on an occasion which commands my warmest sympathy.

I heartily congratulate William Cole for all he has done, and the Essex Field Club in the possession of so enthusiastic and successful a helper. We want many more natural history Societies in England with the high standard of the Essex Field Club, but in order to get them we need many more men like William Cole. However, we must hope for the best, and rest content with the knowledge that such well organized and admirable effort is itself productive of good work in others, and sooner or later is certain to lead to the growth of other organizing centres of beneficent knowledge.

Hoping that you will have a most successful evening,

I am, yours sincerely,

E. B. POULTON.

TERLING PLACE, WITHAM, ESSEX,

*Nov. 7th, 1905.*

Dear Prof. Meldola,

I am afraid it is not possible for me to come to the dinner at Chingford on Dec. 9, but I am glad that an opportunity has been found for recognising the services of Mr. Cole as Hon. Sec. to the Club over so many years. Though I have myself been able to take but little part, I have always understood that the activities of the Club, as directed by him, have been of great advantage to the County.

Yours very truly,

RAYLEIGH.

18, ST. GEORGE'S ROAD, KILBURN, N.W.,

*Dec. 8th, 1905.*

My dear Professor,

Could I have had the advantage of being at Chingford, it would have been an unfeigned pleasure to me to have added my feeble tribute of esteem to the volume of appreciation which will, I am sure, go forth in recognition of the long and disinterested services rendered to our Club by Mr. W. Cole, and by his brothers and sisters.

I feel, indeed, that Mr. W. Cole has been the guiding spirit of the Club from its original inception; I know that he remains its organizing head to-day; and I trust that he may be spared to hold this position for many a day to come. I join, therefore, with you in offering to him my warm congratulation on his work in the Past and the Present, while tendering to him my sincere wishes for its continuance in the Future.

I am, Dear Professor Meldola, yours faithfully,

F. W. RÜDLER.

CHELMSFORD,

*Nov. 29, 1905.*

Dear Mr. Christy,

I had been hoping to be able to attend the dinner given to Mr. Cole on the 9th prox., but I am so deeply engaged that I fear I shall be unable to do so.

I have known Mr. Cole ever since I came into Essex, and have so often been indebted to him for valuable assistance that I feel he richly deserves the token of appreciation to be presented to him at the dinner. I sincerely hope that he and his family may long be spared to continue their good works in the interest of the Field Club and the County of Essex.

Yours faithfully,

JOHN C. THRESH.

11, PATERNOSTER BUILDINGS, LONDON, E.C.

*7th Dec., 1905.*

Dear Mr. Christy,

I very much regret to find that it will be quite impossible for me to be present at the complimentary dinner to my old friend, William Cole.



As I am one of the oldest members of the Club and also a member of the first Council, it would have been peculiarly pleasant to have been present and joined in the congratulations and thanks to William Cole for his magnificent and unselfish work for our county.

Yours very truly,  
T. FISHER UNWIN.

BROADSTONE, WIMBORNE,  
Nov. 4th, 1905.

My dear Meldola,

It seems only the other day that you started the "Essex"—or, rather, I think the Epping Forest—Field Club, and now you are celebrating its Jubilee of 25 years.

I heartily congratulate you and Mr. Cole on the great success of your work. I look back upon my few rambles with the Club in its early days with great pleasure, while the "fungus forays" were as delightful as they were instructive. I only regret that distance and other occupations have for so many years debarred me from the pleasure of attending your meetings and excursions.<sup>1</sup>

With my very best wishes for the success of the Club and for the prolongation of its life into the remotest conceivable futurity,

Believe me, yours very sincerely,

ALFRED R. WALLACE.

11, CRANMER ROAD, CAMBRIDGE.

December 6th, 1905.

My dear Meldola,

I am extremely sorry to be unable to be present at the celebration dinner to Mr. Cole, but, as President of the Cambridge Philosophical Society, I must be in the chair at *their* annual dinner.

Had I been with you, I should have hoped to say much better than I can write how heartily I congratulate Mr. Cole on his consummation of a great work; for it is a great work to have founded, and successfully piloted through all these years, a club such as yours.

Field Clubs with real working power such as yours are capable of doing an immense amount of good.

Even your literary side—of course, I mean the periodical publication—expresses a vigour and appreciation of the local scientific topics of interest and importance, which arouses enthusiasm in anyone with a true love of Natural History.

You are, in the truest sense of the words, a "Field Club," and I hope you will continue to be so, prying into local Natural History, and making yourselves felt as a local power.

As for myself, I am very proud to be enrolled in honour on your list.

Believe me, yours sincerely,

H. MARSHALL WARD.

WARWICK HOUSE, ST. JAMES'S, S.W.,

Nov. 25th, 1905.

Dear Professor Meldola,

I regret very much that my engagements do not admit of my being with you on Dec. 9th, and I, therefore, write a few lines for you to communicate to the Meeting.

In the first place let me congratulate you all on the completion of 25 years of active work in our good County of Essex. You know full well how warmly I

<sup>1</sup> In his recently-published *Autobiography* (vol. ii., p. 106) Mr. Wallace says:—"Shortly before I left England (1886) I gave the lecture on "Darwinism" to the Essex Field Club, in order to see how my diagrams of variation struck an intelligent audience, and was fairly satisfied with the result."

sympathise with all work that helps to elevate the general level of public scientific interest, and the Essex Field Club has certainly deserved well of the County for the efficient way in which it has carried out its programme. That the success of the Club is largely due to the single-minded devotion to its interests by the Hon. Secretary, Mr. William Cole, is to be declared publicly on the occasion of the presentation on the 9th.

I will ask you, therefore, at that ceremony to make known to him and to the Members assembled how much I appreciate his past services, and to let him know that he has my good wishes for his future activity, and for the future prosperity of the Club.

Yours sincerely,

FRANCES EVELYN WARWICK.

129, BEAUFORT STREET, CHELSEA, S.W.

Dear Mr. Miller Christy,

I had fully intended to come and to bring Mrs. Woodward, but advancing years and much work still to be done prevent.

My thoughts will be with you at your gathering, and I most cordially add my earnest good wishes for my friend William Cole, his brothers and sisters, and for the success of the Essex Field Club.

. . . . With much regret at not being able to be present and renewed good wishes for the success of your gathering,

Believe me, always, yours very sincerely,

HENRY WOODWARD.

KAYHOUGH, KEW,

November 11, 1905.

Dear Mr. Miller Christy,

I much regret being unable to attend the dinner on the 9th December, having only just recovered from a bad cold.

. . . . The address well expresses the sentiments we all must have towards Mr. Cole. His long and disinterested labours, so well seconded by members of his family in promoting the cause of Natural Science, deserve, as the address says, "formal and public recognition."

Yours sincerely,

CHAS. A. WRIGHT.

The CHAIRMAN (continuing) said: Before I sit down, I think it is my duty to perform one pleasant task, and that is to express my own appreciation of the skilful organizing powers which the President of the Club, Mr. Miller Christy, has displayed in arranging this little function (Applause). It is really to Mr. Christy, more than anybody else, that you are indebted for the success which has attended this movement. As he has acted as hon. secretary of this fund, I think the next thing to be done is to ask him to say a few words.

Mr. MILLER CHRISTY: Mr. Chairman, ladies and gentlemen, Our Chairman has spoken of this function as celebrating an epoch in the history of the Essex Field Club, but I may, perhaps, point out that, although the Essex Field Club is very closely connected with what we are met here to do, the organization which has got up this movement is not officially connected with the Club.

I have had in my mind for some time the idea that something ought to be done to call attention to and to recognize the very remarkable work of our founder and hon. secretary; and, when I found myself President of the Club in the twenty-sixth year of its existence, I felt there was nothing for me to do but to endeavour to set this movement on foot. This is the history of its origin.

You would say it was fiction on my part were I to tell you that the getting up of this Fund had not involved a considerable amount of labour. I admit that it

has. I feel, indeed, in some ways, like a man who has undergone what is vulgarly called "three months' hard"; but whereas, in ordinary circumstances, the man who undergoes that experience has nothing but vain regrets, I have nothing but pleasant recollections. Personally, I have my reward in the very ready response this movement has met with. It seems to have received almost universal approval. Everyone I have approached in the matter has expressed good wishes and has sent a subscription. I think I have never been associated with any movement that went with such a "bang," as you may say, from start to finish. In connection with these matters, it is, as you know, a very common experience to have to whip round very hard, but nothing of the kind has been necessary in this case. How ready the response has been is shown by the fact that no less than 169 ladies and gentlemen have sent subscriptions—(applause)—and that is, I think, a very remarkable total. Further, I should like to express to our Chairman of this evening and also to our honorary treasurer, Mr. David Howard, my personal thanks for the very great assistance they have rendered in this matter.

So much as to the origin and progress of this movement. Turning to other matters, I should like to say that I think one of the most satisfactory features we can congratulate ourselves upon in connection with this movement is the fact that it is not a farewell meeting, as so many such gatherings are. Our hon. secretary is not retiring from his labours, and we all hope that he will not retire for a long time.

I have been associated with Mr. Cole during the whole course of the Field Club's existence, and I know well the labour and the skill and forethought he has given to its work. In expressing my own appreciation of his work and that of his brothers and sisters, I should like to emphasize one remark which was contained in the letter from Professor Ray Lankester which our Chairman read to you. He said, I think, something to the effect that the whole result of what Mr. Cole has done is not yet apparent. It is not so much a matter of what we can *see* has been accomplished in the past as of what will be accomplished in the future by what he has done. That work, by attracting young men to study natural science, and by training them, will, I believe, continue to bear valuable fruit long after we have celebrated this function. In this we have, I think, the chief value of Mr. Cole's work.

MR. T. F. V. BUXTON, J.P., High Sheriff of Essex, said: Professor Meldola, ladies and gentlemen, I feel it an honour to be asked to say a few words in support of what has already been said about Mr. Cole and his work.

It seems to me that there is something peculiarly appropriate in our meeting where we do this evening. This paper that we have before us reminds us that we may look back not only over the twenty-five years of the Club's existence, but just a little further still to a great work which Mr. Cole had a hand in carrying out; I mean the rescue of Epping Forest (Applause). To-night we meet within the borders of that forest, which is now so great a boon to the public.

I am reminded that the Field Club is not connected with the forest alone or with this neighbourhood alone, but that it is an *Essex* Field Club; and I feel that the County as a whole—not only those who live in this part of the county—are indebted to Mr. Cole and his brothers and sisters for the work that they have done in the interests of science and natural history, I think that a specially-valuable branch of that work has to do with the education of children. A good deal has been done and a good deal more is likely to be

done in the way of Nature Study among children, a teaching which will make them more observant and enable them to enjoy the charms of country life. To-night, we meet within a stone's throw of one of those two museums, established by the Essex Field Club, in which children and others are being educated. I am glad to think that in these two museums we have a lasting and tangible memorial which will be a reminder to our children and grandchildren of the work which Mr. Cole and his family have done. I hope that that work will be more recognized by the county as a whole that it has been. It is much to be desired that the number of members of the Club should be increased; and I cannot but think that this meeting, which will be read about and talked about all over the county, will lead to a large increase in the membership. This, I know, is what Mr. Cole himself much desires.

While we congratulate Mr. Cole and while we remember the benefits he has conferred upon the County, I am glad we see no signs of flagging in the work, and we look forward to that work being continued for many years to come. There is something peculiarly charming in meeting with him and his two brothers and two sisters, all of whom have for so many years worked shoulder to shoulder for this good object (Applause). I am sure we all join in giving them our very hearty good wishes for long life and happiness and every blessing for time and for eternity (Applause).

Mr. DAVID HOWARD said: My part in this matter has been a very pleasant one. I must say that, when next I have to do with such a matter, I hope I may have such a man of business as our President to take the lead and do all the work. Nothing was left to me but to receive the money. On that matter, may I say, there was one disadvantage: the letters came in so fast that I found it perfectly impossible to write out all the receipts myself, and I have a horrible suspicion that my clerk is not quite an accurate reader of handwriting. Therefore, if some of you have had weird perversions of your names, please forgive, for it was owing to the number of letters that came at once (Laughter).

One thing that made it extremely pleasant to act as Treasurer has been the extreme readiness of the response. I have had a good deal of experience and I think I can read between the lines of the letters that came with subscriptions. In the case of some public subscriptions, one is conscious of something very emphatic between the lines, such as "Oh, bother this thing!" But you cannot read that between the lines of the letters I have received. There has been nothing in them but extreme cordiality. The only expressions of disapproval I received related to the fact that the limit was fixed at a guinea. On the other hand, the expressions of approval which accompanied some of the smaller subscriptions made one feel that some of these smaller subscriptions really meant as much as, or more than, some of those which reached the maximum allowed. At all events, it is perfectly true, as the President has said, there was no "flogging." The sum raised has been limited only by our own action in limiting the maximum subscription; but I think it is sufficient, at any rate, to show the hearty appreciation we all feel of the work of our honorary secretary and his coadjutors, his brothers and sisters,

I hope it will be quite understood that this is not the sort of presentation which one occasionally hears of—that sort which is sometimes caused by a retirement and is sometimes intended to cause a retirement. There is nothing of that sort in any of our minds, that is quite certain (Applause).

As to the work that has been done in connection with the Field Club an

in similar directions by Mr. Cole and his brothers and sisters, I feel in the difficulty which was wickedly expressed in the old Latin proverb—*Perant male qui ante nos nostra dixissent*. I heartily echo all that has been said on the subject.

Epping Forest is a very old memory of mine. My earliest ideas of anything scientific—it is long over fifty years ago—were connected with my being taught botany by my father in Epping Forest. I think I can now show the exact place where I first found sundew. I cannot find it there now, because, unfortunately, that particular pond is dried up. But that is one of my earliest remembrances, and it has given me a very strong belief in the value of natural history to the young in eliciting their sense of wonder and enquiry.

In conclusion, I wish to express my entire concurrence with this most important movement and the extreme pleasure it has given me to have any part in it (Applause).

Mr. T. VINCENT HOLMES, F.G.S., said: I have noticed that some local scientific societies which, for a time, did very good work have lasted only sixteen or eighteen years. They lasted only so long as their originators were working in full vigour with them; but, when they disappeared, their places were not taken by others having the same interest in the society, and the society gradually vanished. We are doubly fortunate in that Mr. Cole and his brothers and sisters, who have served us from the beginning, are still with us at the end of a quarter-of-a-century of existence. I trust we may continue to have their services for another quarter of a century.

Professor BOULGER said: Unlike some of those who have addressed you, my acquaintance with the forest began simultaneously with my acquaintance with Mr. Cole. It so happened that, when I was most associated with the work of the Field Club, we had a somewhat stormy period, during which Mr. Cole and I fought side by side in a very sharp contest which followed the rescue of Epping Forest.

I am glad this is not a meeting of the Club, but that it is a special gathering for the personal congratulation of Mr. Cole and his brothers and sisters. A great many of us first made our acquaintance with Mr. Cole through the Club, and that acquaintance has ripened into friendship. One may have official relations with many men in connection with many societies, but they do not necessarily result in personal friendship. With Mr. Cole, however, I think all those who have been actively associated with him in the work of the Club have come to look upon him as a personal friend. We all congratulate him upon the result of his long work, and we hope that that work may long continue (Applause).

Mr. P. GELLATLY, J.P., Verderer of Epping Forest, said: I come here to-night simply as a neighbour of our good friend and not to represent anybody; but, having been called upon unexpectedly to say something as a Verderer of Epping Forest, I should like to associate Mr. Cole with our work.

Since Epping Forest was dedicated by the Queen for the benefit of the people, the Epping Forest Committee (of whom the Verderers form a part) have taken the deepest interest in carrying out the duties devolving upon them and have improved the glorious open space committed to their charge.

When they had made the important restorations to Queen's Elizabeth Lodge, which they were bound to preserve as an historic building, and had restored it to something like its ancient character, Mr. Cole saw his opportunity of utilizing the spacious rooms as a Natural History Museum especially connected with the

Forest. He worked with consummate knowledge in bringing about the arrangements for establishing a beautiful collection of objects and so arranged the specimens as to make them most valuable, not only for pleasure, but also for the teaching of those who visit the Forest.

I may say on behalf of the Verderers that they are delighted to testify to the great work accomplished by Mr. Cole.

Knowing (as I do) the Corporation of the City of London and its Epping Forest Committee, I am sure they will cordially join with me in expressing their admiration for the important work so admirably carried out by Mr. Cole, and would thank him for the educational advantages bestowed on this neighbourhood and the County, if not the country at large.

MR. W. WHITAKER, F.R.S., said when he saw the proposal that a dinner should be given to Mr. Cole, his brothers, and his sisters, it seemed to him a very nice idea. Mr. Cole did not want it all for himself—(laughter)—but he wanted his relations and friends to join him. He (Mr. Whitaker) had been a lonely man : that was to say he never had brothers or sisters and never understood what use brothers and sisters were, but he began to understand it now. He wished he had had brothers and sisters : he should have got them to do his work for him (Laughter).

The Essex Field Club was a natural history society which had the whole of a large county to itself. That meant that it had a wide range for its work, but it also meant that it had great responsibility. That Club had to encourage the scientific work of a large county, and it had done it well so far, largely through the steady work of their good friend Mr. Cole. That it would continue to work, he did not doubt. He looked forward to a long life of the Club with Mr. Cole as secretary, and to a still longer life when most of them had gone, as they must all go.

MR. HORACE B. WOODWARD eulogised the work of Mr. Cole, and said that the publications of the Essex Field Club were the most interesting and the best-edited published by any of the Field Clubs. He sympathised heartily with this acknowledgment of the great services that Mr. Cole had rendered.

MR. JOHN SPILLER, speaking as one of the original members of the Club, heartily endorsed all that had been said with regard to their indebtedness to their founder, Mr. Cole, and the members of the family who had so heartily supported him in the endeavour to spread the knowledge of science amongst those who had, in that glorious county, so many opportunities of studying nature at first hand.

MR. WILFRED MARK WEBB, Hon. Sec. of the Selborne Society, said his Society very cordially accepted Mr. Christy's invitation to take part in honouring Mr. Cole. He pointed out the fact that Mr. Cole had given hundreds of people great pleasure by his work in the county.

The CHAIRMAN: On your behalf, ladies and gentlemen, I have now pleasure in handing Mr. William Cole the following address:—

To MR. WILLIAM COLE, F.L.S., &c.,

*Hon. Sec. Essex Field Club,*

BUCKHURST HILL, ESSEX.

We, whose names are appended, desire to express to you our very warm appreciation of the scientific, educational and other public work in which you have been engaged for many years.

The foundation of the Essex Field Club, in 1880, was due to your initiative. Since then, for a quarter of a century, you have acted continuously as its Honorary Secretary and have edited the whole of its publications—a combination of services which we imagine to be unique. To your labours during this long period are due, in the main, the leading position the Club now holds among Local Scientific Societies, and also the establishment of its two Museums (the Epping Forest Museum, at Chingford, and the Essex Museum of Natural History, at Stratford), of both of which you are now Curator.

In the Rescue of Epping Forest, you took an active part, and you have watched jealously over its interests ever since.

We feel strongly that these long-continued and disinterested labours in promoting locally the Cause of Natural Science deserve formal and public recognition; and the present time (in the twenty-fifth year of the Society which you founded and have served so assiduously) seems peculiarly fitting for the purpose.

We ask you, therefore, to accept our grateful thanks, together with the accompanying Purse of One Hundred and Ten Guineas. The latter is, of course, no more than a slight token of our appreciation of your labours, any adequate remuneration being obviously impossible.

Among those who have subscribed (169 in number, the subscription being limited to one guinea) are the High Sheriff of Essex; the Chairman of the Essex County Council; the Mayors of West Ham and of Chelmsford; the Chairman of the Epping Forest Committee of the Corporation of London; all the four Verderers of Epping Forest; the President and many Fellows of the Royal Society; many Fellows of other Learned Societies; the President, the eight Past-Presidents, and numerous Members of the Essex Field Club; and others who have been associated with you in your work, or have admired it.

Whilst thus thanking you in particular, we desire also to thank your brothers, Messrs. B. G. and H. A. Cole, and your sisters, Miss Cole and Miss Jane Cole, all of whom have helped you throughout, as we know, most untiringly.

We trust that you and they may long continue the work you have carried on so well, and for such a lengthened period.

Adams, H. J., F.E.S.

Avenell, George

Avery, John, C.A., F.S.S.

Baddeley, W. H.

Barnes, H. J.

Bartleet, H. S.

Benham, C. E.

Biggs, Miss M. M.

Bird, James

Boake, Arthur, F.C.S.

Boake, E. J., B.A.

Boswell, R. Bruce, M.A.

Boulger, Prof. G. S., F.L.S., F.G.S.

Bowles, E. Augustus, M.A., F.L.S., F.E.S.

Brand, F. J.

Briscoe, A. E., B.Sc.

Brown, Horace T., LL.D., F.R.S., F.C.S., F.G.S.

Brown, W. H.

Bryan, Colonel, C.E.

Bullen, Rev. R. Ashington, B.A., F.L.S.

Buxton, Edward North, J.P., D.L., etc.

(*Verderer, Epping Forest*)

Buxton, Mrs. E. North

Buxton, Gerald, J.P.

Buxton, Sir T. Fowell, Bart., K.C.M.G., D.L.,

etc. (*Verderer, Epping Forest*)

Buxton, Lady Victoria [Essex]

Buxton, T. F. Victor, J.P. (*High Sheriff of*

*Byford, J., junr. (Mayor of West Ham)*

Cansdale, W. D., F.E.S.

Chancellor, F., J.P. (*Mayor of Chelmsford*)

Christy Miller, F.L.S. (*President, Essex Field Club*)

Clapham, Mrs. E.

Clark, J. A., F.E.S.

Clark, Percy, B.A.

Clarke, F. C.

Coburn, H. I.

Colchester, The Bishop of

Coles, Mrs. Harriet

Colsell, Robert

Corcoran, Bryan

Dalton, W. H., F.G.S., F.C.S.

Dawson, Charles J.

Dent, Francis

Dewick, Rev. E. S., F.S.A., F.G.S.

Duffield, F. H.

Dymond, T. S., F.C.S., F.I.C.

Edwards, J. Passmore

Edwards, Stanley, F.L.S., F.Z.S., F.E.S.

Elliott, F. W.

Evans, Sir John, K.C.B., D.C.L., LL.D., F.R.S., etc.

- Farmer, Prof. J. B., M.A., F.R.S.  
 Finzi, J. A.  
 Finzi, Mrs. J. A.  
 Fitch, E. A., F.L.S., F.E.S.  
 Forbes, W. P.  
 Fountain, F. [Forest]  
 Gellatly, P., J.P., D.L. (*Verdeier, Epping*)  
 George, William  
 Gould, F. Carruthers  
 Gould, I. Chalkley  
 Green, F. W.  
 Hall, Miss K. M., F.L.S.  
 Hall, Samuel, F.C.S.  
 Hanbury, Frederick J., F.L.S.  
 Harrison, A.  
 Harrison, A. W.  
 Harting, J. E., F.L.S.; F.Z.S.  
 Hawkins, C. E. W.  
 Hildyard, F. W., F.L.S.  
 Hilleary, F. E., LL.D.  
 Holmes, Prof. E. M., F.L.S.  
 Holmes, T. Vincent, F.G.S.  
 Hope, G. P., J.P., etc.  
 Horncastle, The Vicomte (*Chairman, Epping Forest Committee*)  
 Howard, David, J.P., D.L., F.I.C., F.C.S.  
 Howard, D. Lloyd  
 Howell, Rev. W. C., M.A.  
 Hulton, The Rev. Canon, M.A.  
 Hunt, Rev. A. L.  
 Hunt, Reuber  
 Hurnard, S. F., J.P.  
 Hutton, Rev. A. B., M.A.  
 Jennings Cecil F. J.  
 Johnson, Samuel H.  
 Johnson, Mrs. Samuel H.  
 Johnston, Andrew, J.P., D.L. (*Chairman, Essex County Council*)  
 Jones, Robert, M.D.  
 Kenworthy, Rev. J. W.  
 Knight, J. W., F.G.S.  
 Lach-Szyrna, Rev. W. S., M.A.  
 Landon, Colonel Frank, V.D.  
 Laver, Henry, F.L.S., F.S.A.  
 Linder, Ernest, B.Sc.  
 Lister, Arthur, J.P., F.R.S., F.L.S.  
 Lodge, Robert  
 Macandrew, W., J.P.  
 Maitland, Rev. J. Whittaker, M.A.  
 Mann, Mrs.  
 McConnell, Prof. Primrose, B.Sc.  
 McIntyre, F.  
 McLachlan, Hugh  
 Meldola, Prof. R., F.R.S., F.E.S., etc  
 (*President Chemical Society*)  
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*Signed on behalf of the Subscribers*

R. MELDOLA,                      DAVID HOWARD,                      MILLER CHRISTY,  
*Chairman of Committee.      Hon. Treasurer.                      Hon. Secretary.*

Mr. DAVID HOWARD. Mr. Cole, on behalf of the subscribers, I have great pleasure in presenting you with a purse of One Hundred and Ten Guineas. With a little more time, the amount would have grown yet further. As I have said



before, if you only knew how pleasantly cordial were the letters which came with the subscriptions, you would realize even more how your services and those of your brothers and sisters have been appreciated.

Mr. WILLIAM COLE, in reply, said : Professor Meldola, Mr. David Howard, Mr. Miller Christy, Ladies, and Gentlemen—perhaps, I might say old friends to all of you. On behalf of my sisters and brothers, as well as on my own behalf, I thank you most heartily for the kindness which has prompted you to present us with this beautiful testimonial in appreciation of our services to the Club and our attempt to cultivate a taste for natural history in the county of Essex.

I feel it difficult to express my feelings of gratitude to so many ladies and gentlemen, well known in Essex and eminent in the scientific world, for the very flattering way in which they have spoken of my share in the work of the Field Club during the last 26 years. I do feel proud and delighted that such a gathering as this has been held, and thankful for the gracious expressions of esteem in the letters which Professor Meldola has read. I know that my brothers and sisters are equally grateful to you, and they desire me to thank you in their names. This Address will always be a pleasant memorial of the many friendships which we have formed during the progress of the Club, and of the interesting investigations in which we have taken part. Some of these investigations have added, I cannot help thinking, to the knowledge we possessed of the natural history and archæology of Essex, and I hope that, in the future, the Club will engage in many more enquiries of the kind. I thank you also most sincerely for this very tangible expression of your goodwill and for your presence on this memorable evening, and I gratefully accept the flattering memorial and accompanying purse. I must add my full appreciation of the services of Mr. Miller Christy in having promoted this most successful gathering. I know something of secretarial duties, and I am sure that both he and Mr. David Howard must have given up a great deal of their valuable time to the friendly work they so kindly took in hand.

In accepting this present and memorial, you must not think that I arrogate to myself the sole credit of promoting the interests of the Club. I have on my right hand Professor Meldola, the first President—(applause)—and I have the best means of knowing what intense interest he took in its inception. I well remember the talks which led to the formation of the Club, and we all recall the small assembly of supporters held at his rooms in John Street, Bedford Row, at which the draft of his excellent “ Inaugural Address ” was read and discussed. Whenever people apply to me for advice as to the formation of a Field Club or similar society, I always refer them to Professor Meldola’s “ Address,” as being, perhaps, the best paper ever written on what should be the work of a society such as ours. Not only did Professor Meldola follow up this remarkable programme with a series of admirable addresses, but, at our meetings during the whole 26 years’ existence of the Club, he has always, when present, led the discussion on subjects brought forward in a way that has elevated the debate and given it a truly scientific character. All members of the Club owe a very great debt of gratitude to Professor Meldola for what he has done for the Society (Applause).

We have always had a very excellent Council. I think that very few societies of the nature of the Essex Field Club ever had a Council which has met in such large numbers and whose members took such an intense personal interest

in the proceedings. We have here to-night two of our past presidents, Professor Boulger, who did such admirable service in the fight over some questions affecting Epping Forest, and Mr. T. V. Holmes, whose work on the Dene-holes you all remember. Mr. Holmes and I spent six weeks underground at Grays, investigating these pits, and his report in our Journal sums up all that is really known concerning them. Then there is Mr. Henry J. Barnes, our first Treasurer, who did much valuable service. That reminds me that the Club was much favoured in having, at one time, a lady Treasurer. Mr. Royle, who was Treasurer, had to go abroad on scientific work, and Mrs. Royle very kindly took his place.

With respect to our work, will you allow me to mention my brother, Mr. B. G. Cole, who has acted as assistant hon. secretary during the whole life of the Club. His has been a very quiet work; it does not loom largely in the *Transactions* of the club; but it has been, nevertheless, of great importance to its welfare.

Concerning the Museums, I should like to acknowledge our indebtedness, first, to the Corporation of London and its Epping Forest Committee for their kindness in granting the use of the old Tudor Lodge at Chingford as a home for our Forest Museum, and, secondly, to the Corporation of West Ham for their public spirit in agreeing to our application for the establishment of a County Museum at West Ham. Whatever may be said of local corporations, there is one thing which most of them strongly favour, and that is, education. When Mr. Howard and others first met the Corporation of West Ham to discuss our proposal, we were received in a most cordial way. We are still being treated most appreciatively, and the progress of the museum in West Ham is mainly due to the friendly manner in which the efforts of the Field Club have been met by the Corporation. I have every reason to believe that the Corporation will continue to cordially support the Museum, and that it will become in time a treasure-house for specimens illustrating the natural history of Essex and a valuable aid in imparting instructions to young people and to schools in the district.

With regard to our little museum in the Forest, it is not in any way complete, and I should certainly like to see the scheme carried out as it should be. When the initial work has been accomplished, I venture to hope that the City Corporation will see their way to set it on a permanent and sound foundation similar to the arrangements by which the Essex Museum has been taken over by the Corporation of West Ham. But that is, of course, a matter for the future.

We have had to-night a great deal of retrospective talk. I prefer not to regard our work as completed, but that rather we should take for our motto Tennyson's lines—"That which we have done but earnest of the things that we shall do," and seek in the coming years even better lines of progress.

For instance, there is the proposal that the Club should organize a station for local biological research. This is one of my pet projects. I believe it will be brought before you a concrete form in the near future.

I have alluded to the exploration work we should like to do. There is an immense field for it in Essex, both in archæology and natural history. For instance, the question of the origin and use of Dene-holes should be settled definitely. I believe it is settled to Mr. Holmes' satisfaction and to my own, but others are not quite so sure, and more work should certainly be done. Then there is the origin and meaning of our Essex "Red-Hills." These puzzling

remains should be taken in hand quickly, because they are fast disappearing from various causes.

We have started a Photographic Survey of Essex in an admirable way under Mr. Victor Taylor's superintendence, and I think we have every hope that in a few years that will become an important branch of our work.

There is another little "fad" of mine which I hope to realize during the next few years. I propose to make an attempt to register the *voices* of eminent men in the county and of those who have presided over the meetings of the Club. Then we have the vanishing speech of the natives of Essex. School Boards are invading the remotest places in our County and destroying all its peculiar idioms, and I am afraid that the dialect songs of Essex will utterly disappear in the course of a few years. I should like to secure some record of these old harvest home songs and native carols on permanent phonographic cylinders or discs before it is too late. I am told that in the Saffron Walden district there is a real witch—or, rather, a woman who believes in witchcraft. Essex was always famed for witchcraft; and it would be well to register some native "incantations" while there is yet a chance!

In conclusion, the English language is, I think, deficient in expressions of gratitude, and I cannot perhaps do more than say again, "I thank you." (Applause.)

On the motion of Mr. Whitaker, a vote of thanks was passed to Professor Meldola for presiding; and the guests then separated.

[Thanks are due to Mr. Edwin C. Davis, Chief Reporter of the *Stratford Express*, who undertook, single-handed and for a merely nominal fee, the very arduous task of reporting the foregoing speeches, and did it most admirably.]

---

## NOTES—ORIGINAL AND SELECTED.

### MAMMALIA.

**Whale at Mersea in 1299.**—Mr. Miller Christy sends the following extract from *The Wardrobe Accounts of King Edward I.* (Society of Antiquaries, 1787), page 76 :—

*Custus circa balenam per vicecom' Essex.*—Johanni de la Lee, vicecom' Essex' et Hertford', pro denar' per ipsum solutis diversis hominibus custodientibus quandam balenam captam in insula de Merseye; uno dolio vacuo empto pro eadem balena infra ponenda; sale empto pro eadem salienda; cariagio ejusdem de predicta insula usque Staunford ad curiam; una cum expens' unius hominis equitio conducentis eadem balena<sup>1</sup> ibidem mense Maii . . . . . £0 14 8

1? Eadem balena—sc. eadem balona.

We are indebted to the kindness of Mr. W. C. Waller, M.A., F.S.A., for a translation of the Latin :—

Charges in respect of a whale per the Sheriff of Essex.—To John de la Lee, Sheriff of Essex and Herts, for moneys paid by him to divers persons in charge of a certain whale caught off the island of Merseye [Mersea] ; for one empty cask bought to put the whale in ; for salt bought to salt the same ; for the carriage of the same from the island aforesaid to Staunford<sup>2</sup> to the court ; together with the expenses of one man with a team conducting the said whale there in the month of May ..... £<sup>o</sup> 14 8

### INSECTS.

**Plusia moneta at Buckhurst Hill.**—I had the pleasure of netting two specimens of this moth in our garden last summer—one on the 7th of July and the other on the 11th of the same month. I saw another a few evenings later, but did not catch it. The moths were hovering over the flowers of the Rose-bay, *Epilobium angustifolium*, of which we have a great store in the garden. This adds another to the three or four records of this moth in Essex. It was first recognised as British in 1890.—B. G. COLE, Buckhurst Hill.

**Prodenia littoralis, Boisd., a New British Moth.**—At the meeting of the Club on January 27th, 1906, Prof. R. Meldola, F.R.S., exhibited, on behalf of Major Robertson, a specimen of this scarce European moth, which had appeared in his breeding cage in July last. All the Major's larvæ in this cage had been collected in the Bournemouth district, Hampshire. *Prodenia littoralis* has a wide distribution in S.E. Europe, Asia, India, &c., and it is to be hoped that this handsome Noctua, like *Plusia moneta*, has "come to stay." The coming summer may bring further news of it as an immigrant in Britain.—B.G.C.

<sup>2</sup> ? Staunford--sc. Stanford-le-Hope, near the Thames, and about 30 miles from Mersea. It is not apparent what court is meant: Morant sheds no light on it.—W.C.W.

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## The Year-Book and Calendar of the Essex Field Club for 1905=6.

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The Council are issuing annually a new publication, to be entitled *The Year-book and Calendar*, of which the first volume, containing four plates, has been sent out to Members. Additional copies may be had from the Hon. Librarian, price 1s., and to Members 9d., post free. It will be published yearly hereafter on the 20th April—that is, shortly after the close of the Club's official year.

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[APRIL, 1906.

*The*  
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BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary and Curator.*

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*The Authors alone are responsible for the statements and opinions contained in their respective papers.*

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PUBLISHED BY THE CLUB, AT THE ESSEX MUSEUM OF  
NATURAL HISTORY, STRATFORD, ESSEX.

Entered Stationers' Hall.]

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Editorial communications to W. COLE, "Springfield," Buckhurst Hill, Essex.  
and Advertisements to MESSRS. BENHAM and Co., Printers, Colchester.

# The Fauna and Flora of Essex,

*As Illustrated in the*

ESSEX MUSEUM OF NATURAL HISTORY.

---

I have great pleasure in announcing that the Essex Museum of Natural History has now been furnished with four blocks of handsome Cabinets intended to contain a County series of Insects, Mollusca, and Crustacea. Several new Wall-cases have been made so as to suitably accommodate the Collection of British Mammalia, which has lately received numerous additions, including models (the work of Sherrin Bros.) of the Essex Cetacea. We have also constructed eight Herbaria Cabinets, to house the series of specimens of Flowering Plants, Mosses, Algæ Lichens, &c. More space can now be allotted to the collection illustrating the works of Early Man, and this is also being rearranged. Work on these collections will now be taken in hand, and it is hoped that they will prove helpful to students, and will lead to a greater interest being taken in the Essex Fauna and Flora. To aid in this work we are acquiring some of the best Faunistic books on British Natural History, which will be available for consultation in the Museum itself.

I need not point out to my fellow Members and friends the great difficulty often experienced in obtaining authentic specimens from a limited district. I should highly esteem any aid that County and London Collectors could afford. Localised specimens of Essex Birds, Fish and Mammals, Insects of all orders, Land and Freshwater and Marine Shells, Plants, etc., if in good condition, will be of the greatest assistance, and donors will have the satisfaction of knowing that their specimens will be properly preserved, and will be available for study in the future.

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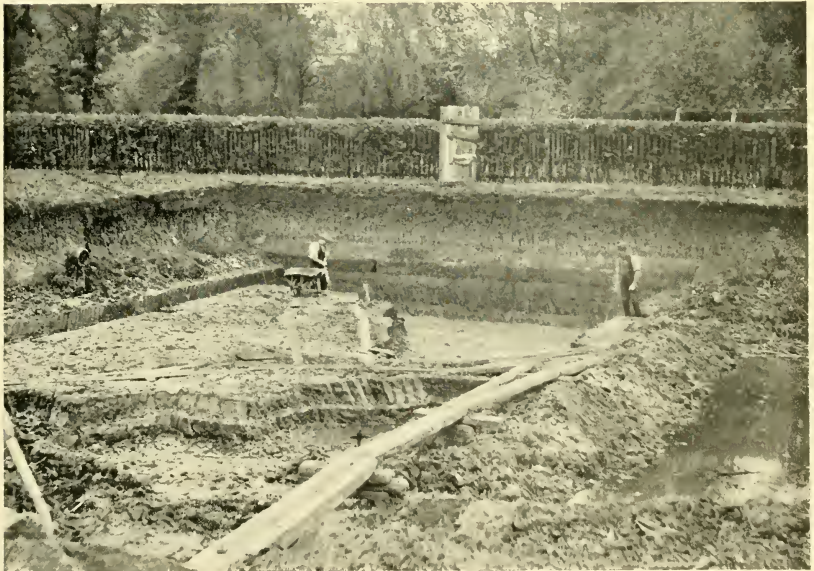
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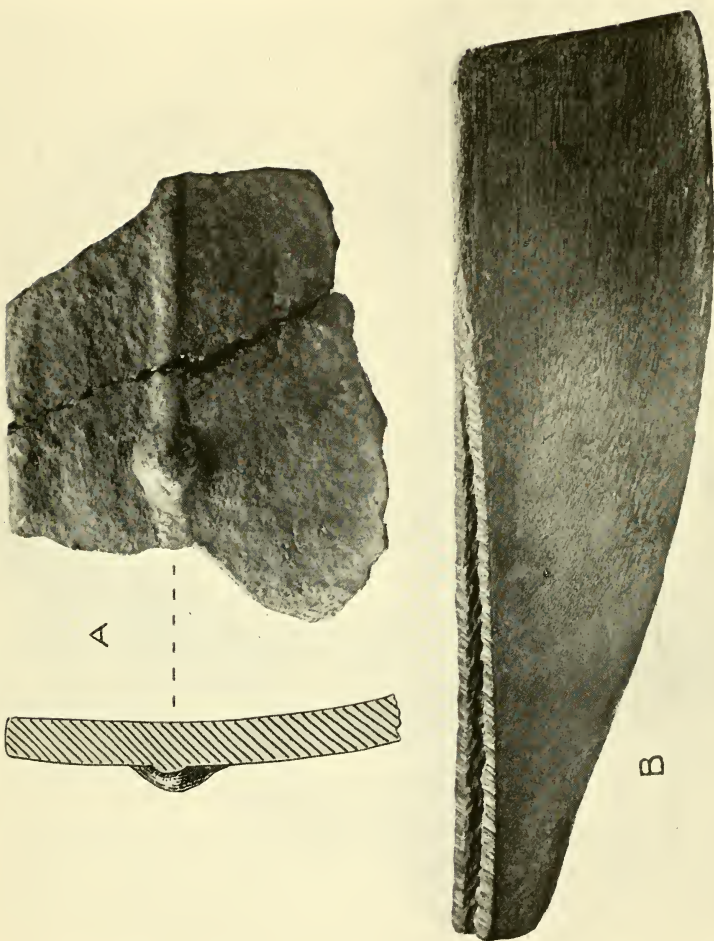
*January, 1906.*





Figs. 1 and 2.—SKITT'S HILL, BRAINTREE.  
General Views of Excavations.—For explanations, see text.





OBJECTS FROM SKITT'S HILL, BRAINTREE, ESSEX.  
A. Fragment of Hand-made Pottery, one-half natural size.  
B. Portion of Sawn Rib-bone, two-thirds natural size.



## FURTHER NOTES ON THE PILE-DWELLING SITE AT SKITT'S HILL, BRAINTREE, ESSEX.

A REPORT ON THE EXCAVATION OF A PORTION  
OF THE RELIC-BED, OCTOBER, 1900.

(*With Plates XXVI. and XXVII. and numerous Illustrations*)

By F. W. READER.

[*Read November 26th, 1904.*]

IN the report of Mr. Kenworthy's discoveries at Skitt's Hill<sup>1</sup> it was mentioned that there was a portion of the relic-bed uncovered, which was shortly to be excavated. The hope was expressed that the Essex Field Club would endeavour to obtain permission to excavate this portion, in order to be able to examine it more closely than was possible when it was merely being dug to obtain the material for brick-making. Unfortunately the time and resources of the Club were so absorbed in the preparation of the Museum at West Ham that it was found to be impossible to do anything in the matter at that time.

During the month of October, 1900, the brick-makers again commenced digging, and on my hearing from Mr. Kenworthy that a favourable opportunity had arrived for seeing the section, I at once went to Braintree and watched the operations continuously for three days, when all the exposed bed at this level was dug out.

During the time I was able to make several sketches and photographs of the sections and had the opportunity of examining the deposit with some thoroughness.

This observation proved to be in no way conclusive as regards its being a pile-dwelling site, but revealed some points which may be of use to those who in the future find opportunities to interest themselves in the locality.

The most important result of my visit was to obtain a more accurate section of the bed of the stream than that published in the former report.

In the section previously published, the river bottom is represented at about 10 feet from the surface. The brick-makers dig to this depth, after which the digging is abandoned, not because the bottom is reached, but in consequence of the cutting becoming waterlogged.

The accompanying view (Fig. 1, Pl. xxvi.) is taken looking to the S.E., down the course that has been excavated, and shows the ridges that are left between successive years' work, the excavated spaces between being filled with water. The partition on which the man is standing is that which divides the portion of the bed under consideration from that previously excavated. This view also helps one to realise the appearance of the original river before its bed became silted up. The present stream, only

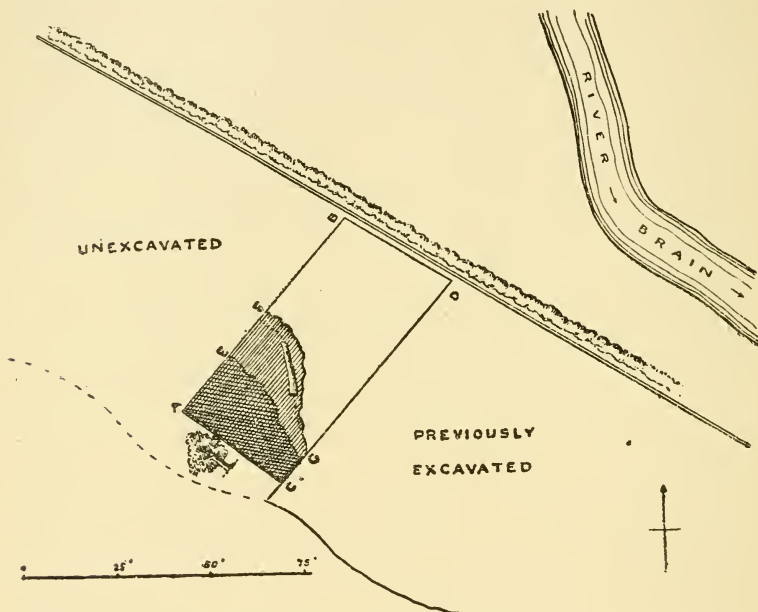


FIG. 3.—PLAN OF THE PORTION OF THE RELIC-BED, SKITT'S HILL, excavated Oct., 1900.

a few feet wide, runs between the willows seen in the mid-distance, and from the position of the spectator is some 70 feet to the left.

On ascertaining that the bottom of the clay had not been reached at the depth of 10 feet, I obtained permission to have a hole dug below this level to find the old river base. This revealed a very different state of things from what had been supposed, the bottom being found at a depth of 17 feet from the surface, or seven feet below the bottom of the relic-bed. As the hole was dug

somewhat on the side of the stream, the deposit would probably be a little shallower than at the centre. This depth of the alluvium agrees with that given by Mr. W. H. Dalton, F.G.S., in the *Geological Survey Memoir*,<sup>1</sup> where he states that the section showed in 1872 "sixteen to eighteen feet of fine grey and buff loam resting on a thin bed of sandy gravel, in a broad shallow hollow of the London Clay."

A general view of the excavation is given in Fig. 2., Pl. xxvi. This is taken from the point C on plan, Fig. 3, and shows at the far end the section on the line B—D, which is parallel with the hedge, and is the part furthest from the edge of the original stream on which the spectator is standing.

The lower part of this section, which has come darker on the photograph, consists of washed clay, containing no organic remains. The overlying light portion is alluvial brick-earth, above which is the darker surface soil. The man with the wheelbarrow is standing on the top level of the relic-bed, but in this portion of the filling the characteristic black earth containing wood extends from the bank on which the spectator is standing only to about the spot marked by the drain-pipe on the left of the picture. From this point it runs obliquely towards the spectator, F—G on plan, Fig. 3.

The hole, Fig. 5, was dug at the spot marked with the × in Fig. 2, Plate xxvi. A.F.G.C. The upper portion of the Relic-bed, consisting of a sandy clay about one foot in thickness, and fairly well conforms to the first spit of the bed. It should be explained that the workmen dig the deposit in spits of a foot deep, a method of great service in keeping the relics distinct in their proper levels.

A.E.G.C. Part of the lower portion of the relic-bed, composed of very black earth and sand, largely mixed with fragments of wood, twigs, and leaves. Beyond the darkly shaded portion this level of the relic-bed becomes almost pure white sand containing little organic matter. This extends only to within about five feet of the extent of the upper portion of the bed, shown by the dotted line and along, which lies a log 15 feet long. See Section, Fig. 5. The thickness of this layer was from one to two feet.

F.B.D.G. Fine washed clay.

It will be seen that the mixed earth of the relic-bed extends from the side of the stream only about 17 feet on the line C—G, running obliquely into the bed of the stream to a distance of about 50 feet on the line A—F. The thickness of this deposit was greater by about one foot at C—G than at A—F.

All the rest of the filling at this level, the unshaded portion on the plan F.B.D.G., was the normal clay filling of the stream.

*For general section and explanation see Fig. 4 on page 140.*

This diagram (Fig. 5) shows the portion of the relic-bed level which differs from the general filling of the stream in being principally composed of sand, and contains quantities of wood,

<sup>1</sup> Sheet 47, N.W. Essex and N.E. Herts, p. 66.

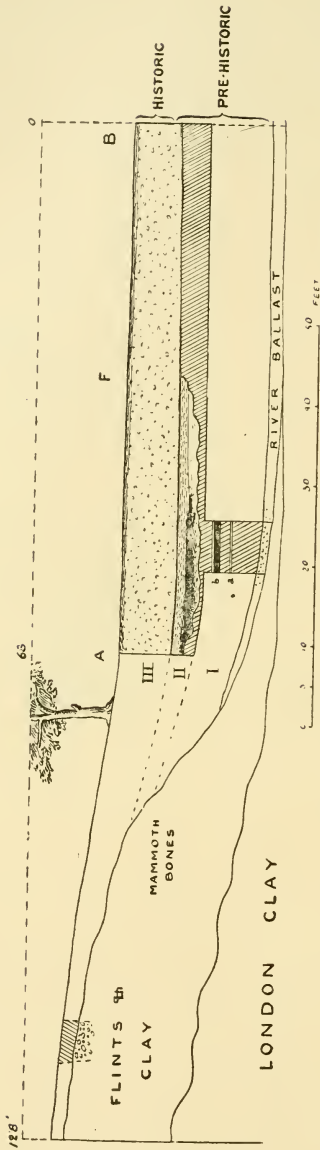


FIG. 4.—GENERAL SECTION AT EXCAVATIONS AT SKITT'S HILL, BRAINTREE.

- I. Washed clay, with seams of gravel and black earth.
- II. Sand and silt containing quantities of wood, &c.; this forms the relic-bed which extends from A—F and rests in clay similar to I.
- III. Brick-earth, rain-wash, containing
 

1	Modern objects
2	Medieval "
3	Roman "



etc. Below is projected the additional filling found by the hole that was dug below the level of the brick-making excavation.

1.—Sandy clay mixed with wood. This layer fairly well conforms to the first spit, 12 inches deep; it represents the upper portion of the relic-bed, where in former diggings the greater proportion of relics of human agency were found.

Nine burnt flints and three flint-flakes occurred.

2 and 2A.—The lower portion of the relic-bed, which was very irregular and consisted for the most part of sand, one to two feet deep. At the end nearest the bank of the stream (A) the soil was very black, containing a quantity of vegetable remains, but this only continued for a distance of about 17 feet, when it merged into white sand; (2A) which extended for another 12 feet, but this stopped about five feet short of the end of the layer above it.

In the white sand very little wood or other organic matter occurred. Three

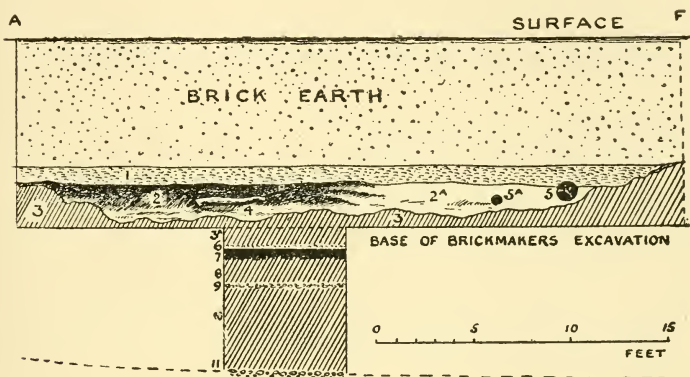


FIG. 5.—ENLARGED PORTION OF RELIC-BED ON LINE A—F.

burnt flints, three rib-bones, and seven vertebræ, (?) red-deer. A quantity of hazel nuts were found in the black soil.

3.—Fine, grey, washed clay, which ran irregularly, rising almost to the top of spit II. at A and to the top of spit I. at F, forming a basin in which the relic-bed rested.

No wood or other objects occurred in the clay.

3A.—Fine grey, washed clay, the continuation of the deposit underlying the relic-bed and extending below the base of the brickmaker's excavation to the depth of one foot.

No organic remains.

4.—Log lying horizontally, four feet six inches long.

5.—Large log, 15 feet long, lying along the edge of the relic-bed, see plan, Fig. 3.

5A.—Small log lying transversely.

6.—A layer of small pebbles and white sand, one inch thick.

7.—Very black peaty deposit, containing quantities of leaves, eight inches thick, hazel nuts, acorns, and plentiful remains of insects.

This layer had very much the appearance of the bottom of a forest pond, mixed with animal excrement, and was probably the edge of a very sluggish stream where animals came to drink.

Some of the soil containing the insects has been kindly examined by Mr. G. C. Champion, F.E.S.; he reports, however, that the remains are too fragmentary for identification.

8.—Fine washed clay, one foot deep, similar to 3 and 6.

9.—Pebbles and sand, two inches deep.

10.—Washed clay, four feet six inches, similar to 3, 6, and 9.

11.—River ballast, base of old river at a total depth of about 17 feet from the present surface.

By probing this ballast was found to run up towards the bank somewhat sharply.

## RELICS.

ANIMAL REMAINS.—The only bones which occurred were fragments of ribs and vertebræ, apparently of red deer.

THE WOOD.—Though not so plentiful as in former parts of the diggings, a great quantity of wood came from the portion shaded darkest on the plan (Fig. 3). A large log, 15 feet long, was found lying along the line of the sandy deposit F—G on plan, 5 on the section (Fig. 5).

Two large pieces of timber are shown in the section (Fig. 5). One lying horizontally (4); another shown end-wise (5). Numerous smaller pieces occurred, but not in any position to suggest that they had been placed as stakes.

Masses of twigs, leaves, and fragments of wood occurred in the portions shaded darkest on the plan and sections. All the logs were denuded of roots and branches.

A number of fragments have been examined by Mr. George Ellis, who has identified the greater quantity as oak, with a few pieces of elm and willow.

THE POTTERY.—Nearly all the pottery has come from the brick-earth overlying the relic-bed, and is of the Romano-British period.

The workmen, some of whom have been working here for upwards of fifteen years, told me that the lowest level at which pottery has been found is quite on the top of the relic bed, but it has rarely been found at this level.

Some fragments of coarse pottery, but of uncertain age, were mentioned in the former account as coming from the relic-bed.<sup>3</sup>

From the present portion we have an interesting fragment of definite character found at a depth of 6 feet 6 inches, which is

the surface of the relic-bed. This is black hand-made pottery of the bronze or early iron ages. (A, Plate XXVII.)

In the brick earth above were several fragments of Romano-British pottery, from depths of 2 feet to 4 feet 6 inches. These have been recorded by Mr. Kenworthy as they have occurred from time to time during the removal of the brick-earth, and sent by him to the museum to be added to the other objects from this site. They are mostly of the grey ware with the base of a large pot, nine inches wide, of black ware, red inside.

#### GENERAL REMARKS.

It would seem that this portion of the relic-bed was an unfavourable place from which to obtain evidence relating to the pile-structures. From the small portion of this level that was occupied by the black earth characteristic of this bed and the scarcity of the relics as compared with the portions previously excavated, it would appear to represent a break in the artificial construction, if such it be.

There was nothing in the position of the logs to warrant the supposition that they had been placed to secure the bed. The large log lying along the edge of the deposit might be considered to indicate its having been so placed to protect the bed on this edge. (See *Plan*, Fig. 3, and *Section*, Fig. 5.)

On the other hand it might be argued that the black deposit had accumulated there owing to the log having fallen in that position. The logs being stripped of their branches might equally be the result of rolling in the stream as that of human agency, and in fact logs are usually so found in alluvial deposits.

During the whole history of this river since it began to fill up the old bed, it seems to have been an extremely sluggish stream, depositing very fine clay from the base up to a height of 10-11 feet, over which, largely by the action of rain wash, the brick-earth has accumulated. It is interesting to notice that this change in the deposit from clay to brick-earth appears to have taken place about the period of the Roman occupation.

The only breaks in this slow regular deposition are seen first at *a* (I., Fig. 4), where a layer of pebbles and sand occurs. This is a thin layer only two inches deep, but shows some short and temporary change, during which the carrying powers of the

stream were greatly increased, after which the normal conditions are resumed, and a further 12 inches of fine clay is deposited.

Again at b (I., Fig. 4) comes a seam of very black earth, eight to ten inches deep, largely composed of organic matter, which shows that the stream had assumed lacustrine conditions, either through a lowering of the level of the land or the passage of the stream having become obstructed. This state of things must have lasted for a considerable period for such a depth of leaf mould to accumulate, even allowing for the probable greater luxuriance of the vegetable growth of that time.

This period of quiescence was followed sharply by one of activity, which suggests the bursting of a dam, for the top of the black earth was covered with a thin layer of sand and pebbles to the thickness of an inch. Overlying this, the fine clay is again regularly laid, followed eventually by the brick-earth and surface soil.

The uppermost deposit of clay is broken at the side of the stream by the irregular and mixed deposit, considered to be the artificially constructed platform of the pile-dwelling community. This contains stones and other objects which seem to be beyond the carrying power of the normal stream at the time, judging by the portion of the deposit at the same level, but nearer the centre (see section, Fig. IV.) unless we are to regard this irregular deposit as a buried channel, the result of excessive flood, cut in the regularly laid clay. The probability of this view is increased by the sandy nature of the lower portion of this deposit.

Although the examination here recorded has not given definite evidence of the pile-structures, it serves to throw some light on the age to which the relic-bed belongs by the addition of the underlying deposits to the section.

The relic-bed having previously been supposed to rest directly on the base of the old river, it was concluded that it represented the entire accumulation since the silting up of the stream bed. Owing to this it was further held to have been occupied by man as a dwelling site from Neolithic times down through the bronze and early iron ages.<sup>4</sup>

From this misconception of the actual facts Mr. Kenworthy was led to say:—

“I think that the silting up has been much more rapid since the occupation by the Romans, owing probably to the destruction of the forest and its under-

<sup>4</sup> ESSEX NATURALIST, Vol. xi., p. 116.

growth, the land cultivation and the baring of the virgin soil. Bearing this consideration in mind, we may say that the pre-historic accumulation was perhaps ten times slower than the Roman, and that of recent times much more rapid than the Roman and Mediæval.”<sup>5</sup>

With the section as now revealed, this view must be considerably modified. Instead of the relic-bed resting directly on the river-ballast, we have beneath it an alluvial accumulation of 7-8 feet, or a total depth from the surface of 17-18 feet. Mr. Kenworthy has given us the depth of 4 feet 6 inches from the surface as the lower horizon at which Roman objects occur; we now have 13 feet of deposition below this representing pre-historic accumulation.

As the silting-up of our present river-system is generally considered to be coeval with the commencement of the Neolithic period, the assignment of the Skitt's Hill pile-structures to this era was, perhaps, incontrovertible so long as their foundations were said to rest close on the river base, and Mr. Kenworthy might well suppose that the silting-up of the river was so much slower in pre-historic times, if after continuous occupation through the long period of the Neolithic and Bronze ages only about three feet of filling had been accumulated, while above was about 6 feet 6 inches, representing the comparatively brief period of historic times.

The brick-earth provides very little reliable evidence as to period, owing to its being the result of rain-wash. It may consequently contain objects derived from higher levels, which would not occur in any regular order of superposition. Romano-British pottery extends more or less throughout this deposit. Although some of the pottery may be of the class now recognised as late-Celtic, it is impossible to decide this from the fragments that have come to hand. Many of the forms of late-Celtic pottery survived into the Romano-British period, and are commonly found in association with the more purely Roman shapes. It is only when late-Celtic pottery is found quite distinct from Roman relics, that it can be taken as any indication of an earlier age.

In the absence of positive evidence, therefore, I have thought it better to omit any portion of the rain-wash as being late-Celtic, and simply to divide the whole filling of the stream broadly into historic (including Romano-British) and pre-historic.

<sup>5</sup> *Ibid.*, p. 99.

Below the brick-earth comes the upper surface of the relic-bed, which is also the level at which the alluvial clay terminates in the general filling of the stream's bed.

It seems certain that no Roman pottery has ever been found at this depth, and that we may safely place this deposit as prehistoric. It is here that all the remains have occurred which have been thought to indicate the existence of pile structures.

It was pointed out in a note to the former account<sup>6</sup> that the occurrence of stone implements and flint flakes is not necessarily an indication of the Stone-age.<sup>7</sup> Stone implements have frequently been found in association with later remains, while flakes occur in great numbers in the Romano-British villages, exceeding the proportion found in the settlements of the Bronze Age. Large numbers of flint flakes also frequently accompany the interments of the Anglo-Saxons. The great abundance of flint-flakes in Roman times was referred to by General Pitt-Rivers in his address to the Archæological Institute, 1897.<sup>8</sup> He indicates difficulty of accounting for these, and suggests the use of the tribulum and their uses for other agricultural purposes.

Although no object of metal has yet been produced from the relic-bed at Skitt's Hill, it has also been pointed out that this cannot be regarded as evidence of the Neolithic age of the deposit in the face of the abundant evidence of the use of metal tools on the antler and bone objects.

Another example of this indication is here presented (Fig. B., Plate XXVII). This piece of rib-bone bears unmistakable marks, produced undoubtedly by a good metal saw, while its peat-stained condition shows clearly that it came from the relic-bed. This object was discovered in the previous excavation, but was by an oversight omitted from the former report.

In the filling under the relic-bed we now have the the deposition that may be attributed to the earlier divisions of the present geological period, viz., the Neolithic and the Bronze ages, while the relic-bed may with more reason be considered to represent the early Iron age, the period to which most of the relics that have been produced from it seem to belong.

If, then, this fresh evidence serves to remove any grounds for supposing the Skitt's Hill pile-dwelling site to be of Neolithic

<sup>6</sup> ESSEX NATURALIST, Vol. xi., p. 119

<sup>7</sup> *Ancient Stone Implements*, Sir John Evans, p. 282.

<sup>8</sup> *Cranborne Chase*, Vol. IV., p. 17.

age, it at least adds to the interest of Mr. Kenworthy's discoveries, and contributes to the probability of his conclusions being correct by bringing the site in point of time more into line with similar discoveries elsewhere in this country, which, as Dr. Munro has pointed out, are mostly of later date than those of the Continent. Apart from this particular consideration, regarding which so little fresh evidence has been adduced, the filling of the stream presents features sufficiently interesting to warrant their record.

[The Club is indebted to Mr. Reader's kindness for the blocks illustrating his paper.—ED.]

## SELENITE.

BY W. H. DALTON, F.G.S., F.C.S.

IN his paper on Sulphate of Lime in Essex Soils and Sub-soils, published in the *ESSEX NATURALIST* (*ante*, pp. 62-4), Mr. Dymond advances a novel view to account for the crystals of selenite in the London Clay, viz., that the sulphate of lime is supplied by the surface soil. He furnishes statistics to show that the rainfall of 13 years would, apart from impoverishment by the removal of crops, wash out all the sulphate in the soil, and argues, incontestably, that continuous replacement must be in process. But for this he suggests that the lime is supplied by the farmer, the sulphuric acid by the rainfall. The alternative source which he propounds for the acid, fermentative action in the soil, is an alternative more apparent than real, in that fermentation, or any process, biological or chemical, can affect only the matter coming within its sphere of action; it may modify the compounds present, but cannot create such as are absent, and I may remark that one such process is to separate, not to unite, sulphuric acid and lime. The source of the sulphur, then, is the point at issue; geologists generally say it is iron-pyrites; Mr. Dymond, rainwater.

That the water in house-tanks contains sulphates is undeniable, but are not these derived wholly from the soot of coal-smoke, the bulk of which is precipitated on the roofs collecting the rainwater? What amount of sulphates would be found in rainwater collected at a distance from such sources of sulphur as coal-fires, brick-kilns, and sea-spray. And why are not the waters off the chalky boulder-clay

charged with sulphate of lime far more heavily instead of much less so, than the London-Clay waters, seeing the ample natural supply of the calcareous element. The boulder-clay land is improved by lime-dressing, where the surface-soil has been impoverished by the removal of its calcareous matter, but if any sulphurous rainwater can percolate into the mass of the boulder-clay (which Mr. Dymond holds to be permeable), there should be far more abundant crystals of selenite formed there than in the almost limeless London Clay; but none such are to be found.

That the London Clay requires lime-dressing is *prima facie* evidence of the normal acidity of the clay when the finely-divided pyrites (to which the blue colour is due) has been oxidised by atmospheric action into iron sulphate and free sulphuric acid, which in the absence or deficiency of lime or alkali has to remain unneutralised.

I would therefore answer Mr. Dymond's closing query in the full negative; it is not conceivable that the selenite in the London or any older clay derives either its lime or its sulphur from external sources; it owes a part only of its oxygen to the air, and its water of crystallisation to the rain; the important constituents are native to the deposit. If I mistake not, selenite nowhere occurs in superficial deposits, nor in unweathered and absolutely impervious clays. The action of water charged with oxygen is essential to the disruption of the pyrites, but it seems necessary for the production of crystals that the supply of the ingredients be slow, and under conditions which as yet we have not been able to determine.

A totally different problem is presented by the sulphate of baryta, constituting the crystalline lining of some septaria. In what condition was this almost insoluble mineral or its constituents, at the time of the contraction of the nodule, and the infilling of the radiating and concentric fissures resulting? The recently-detected occurrence, in a Lias septarium, of zinc-blende is a kindred puzzle.

#### NOTE BY MR. DYMOND.

While I must defer to Mr. Dalton's opinion that selenite nowhere occurs in superficial deposits of the London Clay, I do not think the arguments he adduces against my suggestion "that a part of the sulphate of lime that hardens the water



. . . may be due to the interaction of sulphuric acid and lime in the surface soil" are very convincing.

If the boulder-clay is pervious to rainwater (which I assumed on agricultural grounds, and because the clay of the chalky deposits is granular and not colloidal), any sulphate of lime would be dissolved away, and no accumulations would be expected. I think Mr. Dalton is mistaken in supposing that rainwater owes the whole of its sulphuric acid to the combustion of carbonaceous fuels, though it undoubtedly owes most. Nor can I agree that a London Clay soil requires lime-dressing mainly because of the production of sulphuric acid from pyrites; the de-calcified Boulder-clay requires lime-dressing just as much.

The subject, which is one of great practical importance is more fully discussed in the May number of the *Journal of Agricultural Science* (1905, page 217).

T. S. DYMOND.

## A WHALE AT MERSEY IN 1299.

By J. E. HARTING, F.L.S., F.Z.S.

THE extract from the *Wardrobe Accounts of King Edward I.* quoted by Mr. Miller Christy in the last number of the *ESSEX NATURALIST* (*ante* p. 135), having reference to the occurrence of a supposed whale at Mersea in 1299, is of much interest and suggests a little criticism. For two reasons it appears to me doubtful whether the Latin word *balena* (or *balæna*) is in this case rightly applied to a whale. The entry in the accounts referred to includes a charge for supplying an empty cask for the purpose of transporting the creature to Stanford, from which we are to infer either that the animal, if a whale, was a very young one, or that the cask was a very large one. Again the name *balæna* (*γάλαινα*), as I shall presently show, was formerly sometimes applied to the porpoise. It will be of interest to look at some of the earliest applications of the word, which, almost needless to say, are to be found under the head of "Fishes."

In the *Colloquy of Archbishop Alfric*, of the 10th century, composed with the object of teaching the Anglo-Saxon scholars Latin (Mus. Brit. Bibl. Cotton *Tiberius*, A. iii.) there is an amusing dialogue with a fisherman in which the A.S. *hwal* is rendered in Latin *cetus* and *balæna*, both these words

occurring sometimes in the same sentence. For example, the fisherman who describes himself as accustomed to fish from a boat with nets as well as with a hook (*hamus*, A.S. *angil*) after enumerating the different kinds of fishes taken by him in fresh-water, is asked why he does not fish in the sea. He replies that he does so sometimes, but that it necessitates having a larger boat. To the enquiry whether he cares to catch a whale (*cetum*) he answers, "No, because it is too dangerous. He is safer on the river in his own little boat than going off with a fleet of larger vessels whaling." "*Quia periculosa res est capere cetum. Tutius est mihi ire ad amnem cum nave mea, quam ire cum multis navibus in venationem balæne*"; adding that it is preferable to catch a fish that he can kill, than to pursue one that might kill him or sink him, and his companions too. This fisherman was wise in his generation.

Apart from its bearing on the present question, the dialogue quoted is of interest as showing that the Anglo-Saxons were not unacquainted with the whale-trade, of which fact, moreover, there is other evidence.

If we turn to the supplement to *Archbishop Alfric's Vocabulary*—the oldest document of the kind in the English language—printed in Wright's *Vocabularies*, vol. i., 1857, we find under "Nomina Piscium" *hwæl*, balena, vel cete, vel cetus, vel pistrix.<sup>1</sup> While in another Anglo-Saxon Vocabulary of the 11th century, printed in the same volume, only "cetus" (whence the modern *cetacean*) is given, as if the more preferable word.

In a semi-Saxon Vocabulary of the 12th century, however, this word is glossed *mære-swin* (Germ. *meer-schwein*, Fr. *marsoûin*), that is sea-hog, or porpoise (deriv. *porc-pisce*), though in the Supplement to *Abp. Alfric's Vocabulary*, above mentioned, the *mære-swin* is identified with the Dolphin.

In a Pictorial Vocabulary of the 15th century, stated by Wright to be preserved in a MS. in possession of Lord Londesborough, we find *Hæc balena*, anglice "a porpeyse."

From these examples, then, it will be seen that both before and after the date of the entry in the Wardrobe Accounts of Edw. I. the word "balena" was used with so uncertain a signification as to render it very doubtful whether the animal captured on the Essex coast in 1299 was of a species to which

<sup>1</sup> *Pistrix* used for any sea monster, whale, shark, or saw-fish, the last named being that to which the modern form *pristis* is exclusively applied.

that term would be applied by zoologists at the present day, while the statement that an empty cask (*dolium vacuum*) was provided for its removal from Mersey Island to Stanford renders it more probable that the creature was, not a whale, but a porpoise, more especially as the capture took place in the month of May.

Two slight misprints in the Latin extract may be corrected, namely, *cum expens' unius hominis equitio* should read *hominis equitis*, and in the footnote *eadem balena* instead of *balona*. Mr. Waller criticising the expression *usque Staunford ad curiam*, says it is not apparent what court is meant. Probably we are to understand that in the month of May, 1299, the King and his court happened to be sojourning at Stanford, and so thither the so-called "whale" was carried as "a royal fish" to the Sovereign.

A discussion of this point would carry us too far from the subject, but it may be stated that from the *Quo Warranto* Rolls, temp. Edw. I., it appears that a stranded whale belonged as "a royal fish" to the king, but might be claimed as a "wreck of the sea" by any subject able to prove that he and his ancestors had been "immemorially in seizin of all manner of wreck of the sea, to wit royal fish, wrecked ship, and of all other things which would be called wreck of the sea." Whether at the present day in a claim against the Crown for a stranded whale a plea would be of any avail which averred that "a whale is not a fish," would be a question for the lawyers to settle; it would at all events give rise to an amusing conflict of opinion between the law-officers of the Crown and the zoological experts who might be called as witnesses on behalf of the claimant.

An earlier instance of the occurrence off the Essex coast of a cetacean of some kind is mentioned by Mathew Paris in his *Chronica Majora*, wherein we read of a whale which, coming up the Thames in the year 1240, could scarcely pass between the piers of the bridges, and was driven up the river as far as Mortlake. "Ad manerium autem regis quod Mortelac dicitur, insequentibus multis navigatoribus cum unibus et balistis et arcubus perveniens, ibidem jaculorum ictibus vix est peremptus." This may have been a small Rorqual, but from its ability to pass the bridges is more likely to have been a Porpoise. An Essex specimen of Rudolph's Rorqual (*Balænoptera borealis*) was captured

at the mouth of the river Crouch in November, 1883 (*Zool.* 1884, p. 27). It was claimed by Sir Henry Mildmay as lord of the manor, and on legal proceedings being taken to settle the question of ownership, a verdict was found in his favour. In October, 1887, another specimen of Rudolphi's Rorqual was taken in the Thames off Tilbury, an account of which was given by Mr. Walter Crouch, with an illustration, in the *ESSEX NATURALIST*, 1888, pp. 41-46.

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## THE CORRESPONDING SOCIETIES' COMMITTEE OF THE BRITISH ASSOCIATION,

LONDON, 1905.

REPORT OF THE CLUB'S DELEGATE:

F. W. RUDLER, I.S.O., F.G.S., *Vice-President E.F.C., Secretary of the Conference of Delegates.*

[*Read November 25th, 1905.*]

IT is usual for the Delegates from the Local Societies to meet in Conference during the Session of the British Association, at its place of meeting. But as the Association met this year in South Africa, it could hardly be expected that the Delegates would assemble there; and it was consequently suggested by Mr. Whitaker, F.R.S., the Chairman of the Corresponding Societies' Committee, that a Conference should be subsequently held in London—a suggestion which met with the approval of the Council of the Association. Accordingly a Conference was held on Monday and Tuesday, October 30 and 31, at the Rooms of the Linnean Society. It was satisfactory to find that it was attended by nearly thirty delegates, representing places as distant as Belfast, Perth, Glasgow, and Paisley. The Conference was presided over by Dr. A. Smith Woodward, F.R.S., and was in every way a most successful meeting.

The Chairman, in opening the Conference, delivered an address, in which he dealt sympathetically on the value of the work done by many of our local societies, but deplored the tendency in certain quarters to allow the picnic element and other sources of popular attraction to assert undue influence. With regard to the evening meetings, he referred, not without approval, to the practice of making a special feature of "exhibits," and threw out the suggestion that papers on the unsolved problems of science might be found extremely useful

to students. "We are distinctly in need of a series of books to treat of ignorance rather than knowledge." The Chairman was not disposed to hide the fact that the local societies had not followed to any great extent the organised lines of research which had been suggested from time to time at the annual Conferences; but he found a partial explanation of this neglect in the spirit of individualism, so characteristically British, which penetrates even to our scientific societies. "We cannot endure the feeling that we are merely units in the working of an organised machine; we all wish for freedom to follow our own inclinations."

Dr. William Martin, of the Temple, introduced a discussion on "The Law of Treasure Trove, especially in relation to local scientific societies." He held that in the interest of archaeology the law, so far from being abolished, as some have suggested, should rather be extended. Meanwhile, he suggested that printed notices should be sent to every post office, where they should be publicly displayed, in order that it might be generally known that any finders of valuable antiquities would be reasonably, or even liberally, rewarded.

Mr. W. Morris Colles, the Director of the Authors' Syndicate, and Mr. Harold Hardy, of the Temple, explained to the delegates the present Law of Copyright as it affected the proceedings of scientific societies. It appears that if a paper be read at a society, where the audience consists only of its members and a limited number of invited persons, the author is entitled to its copyright, but if read before a meeting to which the general public are admitted the author can only protect his copyright by certain legal methods of a cumbrous character. With regard to lectures orally delivered, in which the lecturer has at present little or no protection, Mr. Hardy suggested that the law relating to lectures should be made analogous to that which rules in the case of plays. In the discussion by the delegates, the general opinion seemed to be that scientific societies had no wish to restrict the re-publication of any of their papers, since this, if duly acknowledged, was rather a compliment to the Society, and decidedly assisted in the dissemination of scientific knowledge.

At the second meeting Professor G. S. Boulger initiated a most interesting discussion on the Preservation of our Native

Plants. As many plants are in serious danger of extermination by trade-collectors, students of botany, and others, it seems necessary to appeal to legislation for their protection; but it was suggested that before this could be secured, a leaflet might be distributed among teachers, and, perhaps, a "Reader" published, explaining the danger to which certain rare plants are subjected, and pleading for the conservation of objects of natural beauty and scientific interest. The subject was warmly taken up by the delegates, and their local influence at field-meetings and in nature-study classes will probably be of much service.

It is the usual practice at the annual Conference of Delegates to receive reports from the Committees of the several sections of the Association, with reference to any local work which might be usefully undertaken by the Societies. In consequence, however, of the meeting having been held this year in South Africa, the sections were not sitting during the London meeting. For this reason no detailed reports or suggestions were received, but a few of the secretaries of the sections had sent short letters, one of which ought to be of some interest to our Club. Dr. H. W. Marett Tims, of Cambridge, who acted as Secretary of the Section of Zoology in South Africa, wrote explaining that he had not been able to communicate with the Sectional Committee, but on his own responsibility suggested the following subjects as worthy of local consideration, namely:—

1. A systematic study of the fresh-water Plankton of East Anglia.
2. A study of the Rotifera of East Anglia.

This suggestion your delegate undertook to bring to the notice of the Essex Field Club, and if some local naturalists can be induced to follow it up, the Conference may be indirectly the means of adding something to our knowledge of East Anglian zoology.

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## THE ESSEX FIELD CLUB.—REPORTS OF MEETINGS.

### VISIT TO SAFFRON WALDEN DISTRICT, ASHDON, WIMBISH, WENDENS AMBO, &c.

EASTER MONDAY, APRIL 24TH, 1905.

*Conductors*: The President (Mr. Miller Christy, F.L.S.), Rev. C. E. Barnes, and Mr. Guy Maynard, *Curator of the Saffron Walden Museum*.

The object of this Meeting was mainly to renew our acquaintance with the interesting plant, the true Bardfield Oxlip (*Primula elatior*, Jacq.), by visiting several woods in the charming district in which it is a native. Mr. Christy is the authority on the distribution and variation in this country of the Oxlip, and very full information will be found in his papers on the subject in vol. iii. of the *Transactions of the Essex Field Club* and in the *Journal of the Linnean Society* vol. xxxiii.).

We had also the benefit of the presence of Mr. W. Bateson, F.R.S., and Mr. E. R. Punnett, M.A., the well-known students of variation and "Mendelism" in plants and animals.

The company assembled at 10 o'clock at Saffron Walden, and a public breakfast was served at the "Rose and Crown" Hotel, the President in the chair. By the kindness of Mr. Maynard each guest was furnished with a specimen of the Oxlip, the objective of the meeting.

Afterwards the very interesting museum was visited, under the direction of the Curator. Some account of the museum will be found in the report of a former visit to Saffron Walden in *ESSEX NATURALIST* (vol. iii., pp. 290-1).

The company was then conveyed in brakes to the several woods, where the "Primulas" were in profusion. And here Mr. Christy and Mr. Bateson gave a running demonstration and dissertation on *Primula elatior*, certainly one of the most local and interesting of Essex plants.

In the afternoon the drive was continued to the pleasant village of Wendens Ambo, where the Rector (the Rev. C. E. Barnes) met the party at the Church. The architecture was commented upon by Mr. Hugh McLachlan, F.R.I.B.A., and Mr. Barnes showed the ancient Registers, which he had recently bound up and restored.

The Rector and Mrs. Barnes most hospitably entertained the party at tea at the Rectory.

After tea a short Ordinary Meeting (the 238th) was held, Mr. Miller Christy President, in the chair.

**New Members.**—Mr. Jonathan Seabrooke, *The Elms, Grays*, and Mr. Joseph Wilson, *Hillside, Avon Road, Walthamstow*, were elected Members.

The President, in the name of the Club, warmly thanked the Rector and Mrs. Barnes for their great kindness and hospitality, and referred to the fact that it was on Easter Monday 25 years ago that the first Field Meeting of the Club took place, the meeting-place being Ongar (see *Proceedings E.F.C.*, vol. I., pp. viii.-x.)

Mr. W. Cole seconded the vote of thanks, and said that he was particularly grateful to Mr. and Mrs. Barnes, inasmuch as such aid as that they had afforded very materially lightened the difficulties in arranging meetings on such days as Bank Holidays.

The Rector replied in a very humorous speech, and alluded with much feeling to the friendships which had begun at the first field-meeting, and which had been maintained for a quarter of a century.

The company left by the 5.42 train from Audley End, and the ease with which the several journeys homewards were made was a demonstration of the possibilities of holding enjoyable meetings on Bank Holidays.

[It came as a great shock to all who were present, and indeed to all old members of the Club, to hear of Mr. Barnes' death shortly afterwards.

He was evidently very weak at the meeting, but with his usual spirit and good nature exerted himself to welcome the Club, and the visit to the Rectory will long remain a pleasant, if sad, remembrance with many of us.]

### SPRING RAMBLE IN EPPING FOREST, AND 239th ORDINARY MEETING.

*Saturday, June 3rd, 1905.*

On this afternoon one of the usual spring rambles took place in Epping Forest. The party assembled at Theydon Bois Station at 3.30 p.m. The route was over Piercing Hill to the spot formerly known as Blackheath. Here is a plantation, principally of Larch, Scotch-pine, and Spanish chestnut, planted more than 20 years ago by the late Major McKenzie, the then Superintendent of the Forest. Mr. S. A. Skane (assistant in the Herbarium Royal Botanic Gardens, Kew), kindly acted as Botanical Conductor, and made some remarks on the trees here. Prof. Primrose McConnell also spoke on the growth of these trees, and on the prospects of Forestry in Essex. The ramble was then continued through Epping Thicks, and so on to Ambresbury Banks, botanical observation occupying attention, and Mr. Skane gave many lecturettes on the plants gathered. Near Ambresbury Banks another detachment of members coming from Chingford joined the party.

Tea was taken at the "Wake Arms," and afterwards an Ordinary Meeting (the 239th) was held, Prof. R. Meldola, F.R.S., Vice-President, in the chair.

Mr. George Chambers, 29, *Buxton Road, Chingford*, was elected a member.

The Chairman congratulated the members on the very pleasant afternoon's ramble, and at his request Mr. Skane gave an interesting and discursive address, touching on many botanical problems suggested by the plants gathered. He had had brought from Kew some specimens presenting special features, and explained their peculiarities.

Prof. Meldola, during some remarks, exhibited two moths taken that afternoon, *Euclidia mi* and *Venilia maculata*.

The homeward ramble was through Monk's Woods to Loughton, Mr. Skane's botanical expositions being continued on the way. The weather was delightful, and rendered the simple forest walk very enjoyable.

WHITSUN MONDAY, JUNE 12TH, 1905.

An excellent meeting had been planned for this day—to meet at Chelmsford, explore the Danbury district, and to visit Mr. and Mrs. Briscoe at Little Baddow. After the issue of the circular the weather broke and continued exceedingly stormy and unsettled, right up to the day of meeting, Very few names having been sent in, at the last moment the President and Secretaries decided with great reluctance to abandon the meeting.



## PICTORIAL RECORDS OF ESSEX: SCHEME INAUGURATED.

SATURDAY, JULY 8TH, 1905.

On the invitation of the Earl and Countess of Warwick, members of the Club and many friends, in all about seventy, assembled on this day at Easton Lodge, Dunmow, the Essex seat of the family, for the purpose of inaugurating the "Photographic and Pictorial Survey of Essex." This Association was founded, as a Permanent Committee of the Essex Field Club, on the 17th December 1904, for "the purpose of gathering a permanent collection of photographs, engravings, sketches, and pictures of objects of interest, as well as maps, plans and other documents, selected with a view of giving a comprehensive pictorial history of the County of Essex, and the neighbouring rivers and sea." The general scope of the scheme upon which the Survey is working was set out by Mr. A. E. Briscoe in a paper published in the *ESSEX NATURALIST* (Vol. xiii., pp. 1-5), and since reprinted. To this, and to the official Prospectus, the reader is referred.

Such recognition and encouragement was quite characteristic of Lady Warwick, through whose kindness the privilege of a meeting in Easton Park was due. The bulk of the party made Bishop Stortford the starting point in the brakes, but some left the train at Takeley, where the brakes called.

The weather was gloriously fine, and the drive to Easton Lodge was much enjoyed. In the Park, the visitors had, in addition to the lovely scenery, much wild life to interest them. Hundreds of rabbits skurried to safe quarters round the base of great trees, which formed a noble avenue, and, later, large herds of deer, many possessing fine antlers, herds of cattle, and numerous sheep of special breeds were to be seen. Arriving in front of the mansion, the Countess, accompanied by her son, Lord Brooke, met the party, and gave them a cordial welcome, subsequently escorting them through the house to the lovely and extensive gardens on the north side. The Italian Garden, with its delightful lily pond, was much admired, and after roaming round a large lake, which lilies and bulrushes shared with many varieties of water fowl, the visitors returned by way of the rose garden, which was most beautiful of all.

Lady Warwick presided at the luncheon, with Lord Brooke in the vice-chair, and at the conclusion of the repast Mr. David Howard, J.P., D.L., proposed the health of the hostess, and expressed the thanks of the visitors individually and collectively for the kindness extended to them. Lady Warwick, in replying, said that she had been requested by Lord Warwick to express his regret at not being able to be with them, but he was at Brest, on a yachting cruise. She was sure the photographic project would be a very useful addition to the work of the Essex Field Club, whose members she was always pleased to welcome at Easton Lodge.

A meeting was subsequently held in a commodious double tent, amongst trees at the back of the house, furnished most comfortably and having something of an Eastern aspect. Mr. Howard again presided, and said that any of them who had studied history knew how we suffered because records had not been kept, and he often longed in vain for information on various points. The Club would undoubtedly earn the thanks of posterity if it kept pictorial records of passing events and places of interest in Essex.

Mr. Miller Christy, the President of the Club, said that the Council of the Photographic Survey was, strictly speaking, a Committee of the Field Club,

Their aim was, in brief, to write the history of the county in pictures. The scheme had been anticipated in several other English counties, notably in Warwickshire, where it had been at work for some years. In Surrey, too, a start had been made. There were in the county thousands of amateur photographers, there being 50 organised societies, and it was hoped to enlist their sympathies in the work. The financial question was not a serious one, a comparatively small sum being required for the purposes of the Survey. The minimum subscription would be half-a-crown, but many would, no doubt, subscribe more. Besides collecting current photographs, they hoped to become the custodians of many prints and engravings that already existed which threw any light on the social life and customs of the people of the county. He produced a sample collection of photographs such as it was proposed to collect, which had been contributed by the Woodford Photographic Society. The photographs were mostly half plates, and accompanying them were schedules of information as to place, time, and photographer, etc. In conclusion, Mr. Christy said he hoped people who had prints or pictures which they were willing to hand over to the Council, would communicate with the hon. secretary, Mr. Victor Taylor, at the Essex Museum of Natural History, where the photographs, etc., were to be stored under the care of Mr. W. Cole, the Curator of the Survey.

Mr. Albert E. Briscoe, B.Sc., Principal of the Municipal Technical Institute, West Ham, then explained the project, and he was followed by Professor Meldola, F.R.S., President of the Royal Photographic Society, who gave further reasons why the scheme should be supported, and by Mr. F. W. Rudler, F.G.S., who thought the new project was calculated to exercise a great influence throughout the county, and the collection, interesting as it would be from the beginning, would in time become invaluable.

The Chairman brought the discussion to a close by describing the step they had taken as an act of common-sense, which had been defined as the highest kind of science.

Some remarks on the progress of the Survey will be found in the Annual Report of the Council, printed in the YEAR BOOK of the Club for the current year.

The company, on the invitation of Lady Warwick, then paid a visit to Bigods Hall, formerly the county seat of Lord Fitzgerald, and now a Secondary and Agricultural School, founded by the Countess, and there they were entertained to tea by the Principal, Mr. T. Hacking, and Mrs. Hacking. Subsequently Mr. Hacking gave an explanation of the methods of the School, and described the curriculum, taking the visitors on a tour of inspection. The school, which is on the most modern lines, proved very interesting, and the work done there is evidently very thorough, embracing poultry-keeping, fruit culture, bee-keeping, and manual instruction, manurial experiments, and meteorological observations, etc.<sup>1</sup>

In the evening the main portion of the Company drove back to Bishops Stortford, for the return trains.

[The above is compiled from the excellent reports in the *East Anglian Daily Times* and the *Essex County Standard*.—ED.]

<sup>1</sup> See reports of previous visits to the School in former volumes of ESSEX NATURALIST.

ANNUAL INSPECTION OF HAINHAULT FOREST AND  
24th ORDINARY MEETING.

SATURDAY, JULY 22ND, 1905.

On this afternoon the fourth annual meeting of inspection of the newly-recovered lands of Hainhault Forest was held, the object being to watch the gradual upgrowth of the projected woodlands. Mr. E. N. Buxton was announced as leader, but was unfortunately prevented from attending by the illness of a near relative. Mr. Francis Dent very kindly undertook to fill his place, and Mr. Alfred Buxton was also present.

The party was a large one, and much interest was manifested in the work or reclamation. The party walked up from the Grange Hill station to Chigwell Row, crossing the Recreation Grounds and entering the woods at the part known as "Ethelstone's Forest." Then a ramble was taken through the older woodlands, viewing the new or newly cleared rides, and improvements made in removing the old and diseased undergrowth, etc. At the gate near Cabin Plain the recovered lands were entered, and Mr. Dent gave a series of peripatetic demonstrations on the work now being carried out in laying down grass so as to obtain a good surface for future planting. The first part of the area visited showed a capital growth of gorse and heather; the seedlings, however, had only thriven where protected by scrub from the cattle put on by commoners in the exercise of their rights. On the way up to Cabin Hill, on the Lambourn side, several old enclosures were met with. These had been illegally cleared in the old days, and were now restored to the forest. Up to this point, on the top of the hill, all that had been done was the removal of some of the inferior pollards, and the opening up of some glades. From this spot there is a good view over the Dog Kennel Hill, where the problem of converting arable into forest land is being dealt with.

Tea was taken in the great barn at Foxborough Farm, and afterwards an ORDINARY MEETING (the 24th) was held, the President, Mr. Miller Christy, F.L.S., in the chair.

**New Members.**—Mr. Guy Maynard, Curator of the Saffron Walden Museum (on behalf of the Committee of the Museum), and Mr. F. T. Sturdy, "*Surinam*," *Holly Bush Hill*, *Snaresbrook*, were elected.

The President expressed the regret of the Club at the absence of Mr. Buxton and its cause, and said that the experiments in re-afforesting now being carried out would have a wide and permanent interest.

Mr. Dent then gave an interesting and valuable detailed account of the methods and results of the work on the open lands, and of the difficulties and successes experienced. The great difficulty was the establishment of good turf, with the character of the virgin turf of Epping. At first he was in favour of inoculation, but it was found that the expense of labour and cartage was a bar to that method. Mr. Buxton had resolved that this should be more or less open down-land, with patches of gorse and thorns. Experts had been consulted with respect to the production of a forest turf; few of them grasped the problem, and recommended grasses better adapted for agricultural purposes. Some turf had been brought from Epping, and this consisted principally of bent, fine-leaved grasses and sheep's fescue. It was decided that native grasses should be sown. Some of the land had been treated with basic slag, with good results. Quitch and slender foxtail would probably disappear here, as they had done in Epping

Forest. It would be a good many years before a uniform turf was produced, for cattle grazed unevenly. The seedlings in the experimental plots had not done well, perhaps from the great growth of weeds, or from a want of humus in the soil. Mr. Dent spoke in terms of warm commendation of the manner in which the tenant of the farm had carried out Mr. Buxton's instruction. He also gave some interesting details about the fauna of the new ground. A litter of fox cubs had been found, and there was reason to hope that badgers might come over from Epping. There had been an extraordinary number of partridges at Lambourn and Hainault; linnets were abundant, and the goldfinch had become a regular breeder in the district—indeed, he knew of five nests this season within half a mile of his house. He had seen a pair of kestrels and a pair of sparrow-hawks, and nightingales were plentiful.

The President, in proposing a vote of thanks to Mr. Dent for his services that afternoon, and for the paper he had read, discussed some of the points raised by this valuable series of experiments. He thought that Mr. Dent's remarks should be published in the *ESSEX NATURALIST*, as they would prove of value in future years as a record of the reclamation.

**Attempted Partition of the County.**—He also alluded to the attempt which had been made to sever part of Essex from them, and to include the parishes in Hertfordshire. The Club, in common with the Essex Archæological Society and other bodies, had made a vigorous protest, and had written to the local members of Parliament on the subject. He was glad to say that the opposition had proved successful, and the order of the Local Government Board had not been confirmed by Parliament.

Professor Meldola, F.R.S., cordially seconded the vote of thanks, and fully supported the idea that Mr. Dent's notes should be published. He suggested that supplements might afterwards be issued, recording the progress of the experiments from year to year.

After the meeting Mr. Dent gave some further demonstrations in the field, and the members walked down to the station for the return trains.

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## ANNUAL FUNGUS FORAY.

SATURDAY, OCTOBER 14TH, 1905.

This meeting was held at the "King's Oak" Hotel, High Beach, Epping Forest, under the arrangements common to the Foray for many years past. A room was reserved at the Inn, wherein the specimens collected were determined and classified.

The first collecting party started from Chingford Station in the morning at 11.30. Great regret was expressed at the absence of Dr. Cooke, who was unable to undertake the fatigue of a long day in the Forest.

Mr. George Masee, F.L.S. (*President of the British Mycological Society*), kindly undertook to act as principal Botanical Conductor, and we were favoured with the company of a considerable number of well-known Botanists, including Mr. A. Lister, F.R.S., and Miss Lister, Dr. D. H. Scott, F.R.S., *Secretary to the Linnean Society*, Mr. E. M. Holmes, F.L.S., Professor Silvanus Thompson, F.R.S., Mr. W. M. Webb, F.L.S., and many others.

The afternoon party assembled at Theydon Bois, and rambled through the woods to High Beach, collecting by the way.

Mr. Massee named and arranged the specimens. Fungi were less plentiful in individuals than on some previous occasions, but the *species* noted were somewhat numerous, 265 in number, and included several new to the Forest list, and some very rarely met with. Mr. Massee reported that "perhaps the beautiful specimens of *Hydnum imbricatum* L. and *Polyporus rufescens* Berk. were of the greatest interest. Both are rare everywhere in England, and the latter is very seldom met with outside the forest. Among the Agarics the genus *Tricholoma* was represented by no fewer than ten species, perhaps a record number for the Forest. Of these *Tricholoma oreinum*, Fr., *T. boreale*, Fr., and *T. subpulverulentum*, Pers., are new Forest records, I believe."

"Among Micro-Fungi determined afterwards were *Helicomyces roseus*, Link, and *Tetrasporia aristata*, B. and Br.; these are also new to the Forest."

Demonstrations on the many fine specimens in the room were freely given during the afternoon by the many skilled botanists present.

Tea was taken about 5.30, and on returning to the exhibition room, Mr. Massee gave an Address on some recent researches on "Diseases of Fruits," mainly those caused by various minute funguses. He demonstrated the very interesting life-histories of several of these fungi, and discoursed of the best methods to be adopted in resisting their attacks. The address was illustrated by a set of very beautiful original colour drawings from Mr. Massee's own pencil.

The President, Mr. Miller Christy, F.L.S., proposed a vote of thanks to Mr. Massee for his great services during the day, and for the exposition he had just given of a subject of the greatest value to gardeners and farmers in the county.

The company separated about eight o'clock, after a most interesting and successful meeting. The forest had never looked better at any previous "Foray," and the excellent outcome of the forestal operations in former years was apparent in the vigour and luxuriance of the trees and undergrowth.

## THE 241st ORDINARY MEETING.

*Saturday, October 28th, 1905.*

The first meeting of the winter session was held on this evening in the Physical Lecture Theatre of the Municipal Technical Institute, Stratford (by kind permission of the Education Committee, and the Principal, Mr. Hogg), at 6.30 p.m. The President, Mr. Miller Christy, F.L.S., occupied the chair.

**New Members.**—Mr. A. F. Hogg, M.A. (*Principal of the Technical Institute*) and Dr. T. Battersby Jobson, were elected members.

**Rocks and Minerals Presented.**—Mr. W. H. Dalton, F.G.S., F.C.S., exhibited and presented a collection of specimens of Rocks and Minerals intended to fill vacancies in the type collection so instructively arranged by Mr. Reader in the gallery of the Museum. The series comprised about 40 specimens, and Mr. Dalton gave a brief description of them. He has since sent in a detailed account of the specimens for preservation in the Register of the Museum. Mr. Thomas W. Reader also made some remarks on the collection. A vote of thanks was passed to Mr. Dalton for his kind donation.

**Etching by Landseer Exhibited.**—Mr. Miller Christy, F.L.S., exhibited an etching of "a French Hog, the property of Mr. Bacon, of the 'Black Boy' Inn, Chelmsford, published August 1st, 1818, by W. H. Simpson." The

picture is inscribed as having been painted by Edwin Landseer and etched by Thomas Landseer. These were the late Sir Edwin Landseer and his brother, when boys, then living at Beeleigh Abbey, Maldon. The print is very rare, and Mr. Christy knew of one other copy only, which is in the British Museum.

**Old Boundary Stones of Waltham Forest.**—Professor Meldola, F.R.S., exhibited a series of recent photographs of the old boundary stones of the Forest of Waltham which had been placed in his hands by Mr. Campion, of Walthamstow. Professor Meldola alluded to his paper on these stones, published some years ago in the *ESSEX NATURALIST*, and reiterated the opinion then expressed that such interesting relics should be preserved, either by the Forest authorities or the Essex County Council.—It was agreed that this matter should be brought forward at a subsequent meeting.

**Denudation of the Coast at Cromer.**—Mr. John Spiller, F.I.C., exhibited four photographs of Cromer and the beach (looking south) showing the headland or promontory near Overstrand, where the great landslip occurred in May and August, 1904, when an estimated total of 150,000 tons of earth fell into the sea. The views were taken about 20 years ago by Mr. Marley.

**Queen Elizabeth's Lodge in 1794.**—Mr. John Avery presented to the Club, for the Epping Forest Museum, an old print of Queen Elizabeth's Lodge, Chingford. This print is presumed to be dated 1794, and presents an aspect of the old Tudor building, differing from any print in the possession of the Club.

**Norsey Wood, near Billericay.**—Dr. Salter, F.G.S., presented, through Mr. T. W. Reader, some specimens of ancient pottery from Norsey Wood, near Billericay, Essex. Mr. J. Chalkley Gould made some remarks on the wood. The remains there are very interesting from an antiquarian point of view, and showed evidences of occupation by British, Roman, Saxon, and later peoples. The site would well repay careful scientific examination.

Mr. W. Cole said that the interesting nature of the remains in Norsey Wood had been repeatedly pointed out to him by the late Colonel Branfill. The Colonel had contributed some remarks on the subject to the Essex Archæological Society (*Trans. E. Arch. Soc.* Vol. V., N.S., pp. 226—36).

**Presentations to the Library.**—The Hon. Librarian (Mr. T. W. Reader) announced some important contributions to the Library, including a subscription copy, in white vellum, of Godman's *Mediæval Architecture in Essex*, presented by Mr. Andrew Johnston, J.P., and complete sets of the *Journal of the Anthropological Institute* (new series) 1899 to date, and of *Man*, presented by Mr. T. V. Holmes, F.G.S.

**Vote of Thanks to Mr. A. E. Briscoe**—On the motion of the President, supported by Prof. Meldola, F.R.S., and Mr. Walter Crouch, F.Z.S., a cordial vote of thanks was accorded to Mr. A. E. Briscoe, B.Sc., A.R.C.Sc., etc., the late Principal of the Municipal Technical Institute, for his uniform kindness and sympathy in connection with the work of the Museum, and for his valuable services in the cause of education and the progress of Natural Science in the district.

Votes of thanks were also passed to the exhibitors and donors of books and specimens.

**Paper Read**—Mr. I. Chalkley Gould then read a paper entitled "Straw Plaiting: A lost Essex industry."—During the reading of the paper Mr. Gould

gave demonstrations of the methods employed in preparing the straw, and exhibited the little bone cutters used in splitting the straws, and the wooden "mills" for flattening the strips before plaiting. Mr. Gould said that he was largely indebted to Mr. Miller Christy for statistical details of the rise and decay of this interesting rural industry, and Mr. Christy also spoke, supplementing the author's remarks with much local information.

A discussion took place, in which Prof. Meldola and Mr. Corcoran joined.

A vote of thanks was passed to Mr. Gould for the paper, which will be printed in the *ESSEX NATURALIST*.

**British Science Guild.**—Prof. Meldola called attention to the meeting to be held on Monday next at the Mansion House, under the chairmanship of the Lord Mayor, for the establishment of what bids fair to be a very important body—the British Science Guild—and commended this departure to the members and to all interested in science and education in the county.

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### THE 242ND ORDINARY MEETING.

*Saturday, November 25th, 1905.*

This meeting was held in the Technical Institute, Stratford, at half-past six, Mr. Miller Christy, F L.S., President, in the chair.

**New Member.**—Mr. George Ellis, of 59, *Woodlands Road, Ilford*, was elected a member.

**British Science Guild.**—The President alluded to the circular setting out the aims of the British Science Guild, which has been sent out to all members. The Guild had been successfully inaugurated at a meeting held in the Mansion House on October 30th. The President, in commending the Guild to the support of all wishful for the progress and diffusion of science in Britain, said that he was informed by Professor Meldola that the Essex Field Club was the first local society which had taken an active interest in the Guild by circulating the prospectuses in the way indicated.

**Straw-Plaiting Mill.**—A straw-plaiting mill from Essex was exhibited which had been presented to the Club by Mr. Bryan Corcoran. Subsequently to the making of the mill it had been fitted with a hopper, so as to be used as a mill for crushing hemp-seed for feeding birds.

**Rare Essex Birds.**—Mr. Miller Christy presented a specimen of the Little Auk (*Mergulus alle*) shot at Lindsell Hall, near Dunmow, about 1871, and a Golden Oriole (? female or young) shot at the same place on May 22nd, 1883. Both these birds are recorded in Christy's *Birds of Essex*.

**Mammals recently acquired for the Museum.**—The Secretary exhibited some remarkable animals recently purchased for the Mammalian collection. These included a wild Albino Rabbit, cream-coloured and puce-coloured varieties of the common Mole, the Pigmy Shrew (*Sorex minutus*), and a specimen of the new British Vole, *Microtus orcadensis*, from the Orkney Islands.

**Original Drawings for Godman's Norman Architecture of Essex.**—Mr. Avery exhibited the original drawings made for this work which he had

recently acquired, and he and Mr. Christy made some remarks on the same.

Thanks were accorded to the donors and exhibitors.

**Papers read.**—Mr. F. W. Rudler read his report as Club's Delegate at the meetings of the Corresponding Societies Committee of the British Association held in London on October 30th and 31st last.

A discussion ensued on some points in Mr. Rudler's report, particularly as to the preservation of wild flowers, started by Prof. Meldola, and in which the President, Mr. Wilson, Mr. W. Cole, and others part.

A cordial vote of thanks was passed to Mr. Rudler for representing the Club as Delegate at the Conference and for his report (*ante* pp. 152—54).

**Lecture.**—Mr. F. Martin-Duncan then delivered a lecture entitled "In Demeter's Garden; or the Romance of Plant-life." The lecture was fully illustrated by lantern-slides from the lecturer's own photographs.

A discussion was carried on by the President, Prof. Meldola, Mr. Barnard, and Mr. F. W. Elliott. The Lecturer described the methods employed in taking the instantaneous photographs he had shown.

A vote of thanks was passed to Mr. Duncan, and the meeting ended.

### THE 243rd ORDINARY MEETING.

*Saturday, January 27th, 1906.*

The third meeting of the Winter Session was held as usual, the President in the chair.

**New Member.**—Mr. Ellis Edwards, of *Graham House, Cephias Street, Mile End, E.*, was elected a member.

**Photographs taken at Meetings of the Club.**—Prof. Meldola presented some photographs taken in former years in connection with the Club's meetings and explorations. He added, as a little personal matter, that one picture recorded the first meeting of himself and the Hon. Secretary in Epping Forest, many years before the foundation of the Club,

**Flint Implements and Fossils from Clacton.**—The Secretary exhibited a small collection of flint implements and fossil bones, collected and presented to the Club by Master Randall, a pupil of Clacton College. These bones had been identified by Mr. E. T. Newton, F.R.S. The Secretary mentioned that Mr. Newton had very kindly examined the whole of the Pleistocene and other fossil bones in the Museum. The Club was much indebted to him for this service.

**Honey Buzzard from Kelvedon.**—The Secretary also exhibited a Honey Buzzard from Kelvedon, Essex, which had been purchased from Mr. Ambrose. Also several very interesting examples of Mimicry and Protective Resemblance which had been recently acquired for the Museum.

Professor Meldola, Mr. W. H. Dalton, F.G.S., Mr. E. T. Newton, F.R.S., Mr. F. W. Reader, and the President, spoke anent the various exhibits, and thanks were passed to the donors.

**Lecture.**—Professor Meldola having taken the chair, Mr. Christy delivered a lecture on "Methods of Fire-making, Ancient and Modern." The lecturer treated of the fire-drill, fire-saw, fire-plough, flint-and-steel, "instantaneous lights," the modern friction-match, &c.,



A very large number of specimens were shown by Mr. E. Bidwell, who possesses the finest collection, probably, of objects illustrating the history of fire-making appliances in existence. The lecturer also exhibited some specimens, and others were shown by the Secretary, brought from the Club's Museum. The lecture was also further illustrated by a series of slides shown by the electric lantern.

The Lecturer was much applauded by the large meeting, and afterwards a discussion on special points was carried on by Professor Meldola, Mr. W. H. Dalton, Mr. Walter Crouch, Mr. T. W. Reader, Mr. W. M. Webb, Mr. Bidwell, Mr. F. W. Rudler, Mr. Christy, and others. And a very cordial vote of thanks to the President for his lecture was passed by acclamation.

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### THE 244th ORDINARY MEETING.

SATURDAY, FEBRUARY 24TH, 1906.

The fourth meeting of the Winter Session was held in the Technical Institute as usual, at 6.30 o'clock, the President, Mr. Miller Christy, F.L.S., in the chair.

**New Members.**—Mr. Frederick W. Evens, 27, *Stanley Gardens, Hampstead, N.W.*; Mr. Percy G. Thompson, *Derwent House, High Road, Loughton*; and Mr. S. Hazzledene Warren, F.G.S., *Sherwood, Loughton*, were elected.

**Dipteron Injurious to Daffodils.**—Mr. Chittenden exhibited specimens of the fly, *Merodon equestris*, and made some remarks upon the same, which will be embodied in a "Note." Mr. W. Cole pointed out the remarkable "bee-like" appearance of the fly, as suggesting a case of mimicry.

**Flint Implements from Braintree and Mammalian Bones from Clacton.**—The Rev. J. W. Kenworthy sent for exhibition a small collection of flint implements from Braintree, including three which he was inclined to think were earlier than the usual Thames and Ouse well-formed implements. Also a small lot of Mammalian bones from the submerged forest at Clacton.

Mr. Whitaker, F.R.S., pointed out that the beds at Clacton were quite distinct from those known to Geologists as "Forest Beds," (See *Geol. Mag.*, Vol. v., p. 214, and *Geol. and Arch. of Walton Naze and Clacton*, by H. Stopes, F.G.S., and W. H. Dalton, F.G.S.).

**Hairy-armed Bat in Essex.**—Mr. Cole exhibited a specimen of *Vesperugo leisleri*, which had been detected amongst skins of bats, presented by Mr. Reginald Christy. See "Notes."

**Skomer Vole.**—Mr. Cole also exhibited a skin of this vole (*Microtus orcadensis*), which had been given to him by the describer, Mr. J. G. Millais, F.Z.S.

The President made some remarks upon the exhibits, and referred to the doubtful position of the Skomer Vole as a distinct species.

Mr. W. M. Webb, F.L.S., however, said that he had had an opportunity of observing the Skomer Vole in captivity, and from its general appearance and habits he was disposed to consider it entitled to rank as a species.

On the motion of the President cordial votes of thanks were accorded to the exhibitors.

**Papers Read.**—Mr. F. J. Chittenden read a paper on “The Mosses of Essex: a Contribution to the Flora of the County.” Mr. Chittenden had undertaken to examine the collections of Mosses in the possession of the Club, and to collate them with other records from the County, and the present paper was the result of his labours. He had also very kindly promised to arrange the collections of mosses in the Museum, and he exhibited some sheets for the herbarium already completed.

The President warmly thanked Mr. Chittenden in the name of the Club for an excellent piece of work.

Remarks on the paper (which will appear in the *ESSEX NATURALIST*) were made by Mr. Paulson, Mr. Barnard, and Mr. J. Wilson, and Mr. Chittenden replied.

Mr. T. V. Holmes, F.G.S., then read a paper entitled “Mysterious Subsidence at Mucking, Essex, and Miscellaneous Denehole Notes, 1906.”

Mr. W. Whitaker, F.R.S., made some remarks on points in the paper, and a hearty vote of thanks was passed to Mr. Holmes.

## THE 26th ANNUAL MEETING AND SPECIAL MEETING.

SATURDAY, APRIL 7TH, 1906.

These meetings were held at the Municipal Technical Institute, Stratford, at 4.30 p.m., Mr. Miller Christy, F.L.S., President, in the chair.

**Minutes.**—The minutes of the 25th Annual Meeting, held on April 8th, 1905, and printed in the *ESSEX NATURALIST*, vol. xiv., pp. 68-9, were read and confirmed.

**Annual Report of Council.**—This is printed in the *YEAR BOOK* for 1906-7, at pp. 17-18.

**Financial Statement.**—Mr. Howard, the Hon. Treasurer, presented the Annual Statement, which is also printed in the *YEAR BOOK*, p. 19.

On the motion of Prof. Meldola, seconded by Mr. Spiller and Mr. Walter Crouch, the report and statement were adopted.

**Tea Fund.**—The Secretary presented the account of the Tea Fund for the Session 1905-6.

**Members of Council and Officers Elected.**—At the meeting on February 24th last, the following Members retired from the Council:—Messrs. Shenstone, Spiller, Varley, McLachlan, Elliott, and Dr. Mason; and the following were nominated as new Members of the Council:—Messrs. Bryan Corcoran, Hugh McLachlan, A.R.I.B.A., D. J. Scourfield, F.R.M.S., J. C. Shenstone F.L.S., John Spiller, F.I.C., F.C.S., and F. H. Varley, F.R.A.S. As officers for 1906, the following were nominated:—*President*, Mr. Miller Christy, F.L.S.; *Treasurer*, Mr. David Howard, J.P., F.C.S., Pres. I.C.; *Hon. Secretaries*, Mr. W. Cole and Mr. B. G. Cole; *Librarian*, Mr. Thomas W. Reader, F.G.S.; *Auditors*, Mr. Walter Crouch, F.Z.S., and Mr. J. D. Cooper. No other Members having been proposed, the above-named stood elected as Members of the Council and Officers for 1906, and were so declared by the Chairman.

The President intimated that he would reserve his Address until the evening meeting.

## SPECIAL MEETING.

The meeting was then declared a Special one (in accordance with the intimation sent to members by circular) for the consideration of the following ALTERATION IN THE RULES, proposed by the Council :—

In Rule X, after the words, "*January in each year,*" insert the following :—

" Provided, nevertheless, that any two or more members of the same family, who reside in the same house, and are willing to receive between them only one copy of the Club's Publications, may become Ordinary Members of the Club, and shall enjoy all the privileges of Membership (except that they shall receive between them only one copy of the Club's Publications, as above) in return for the usual Entrance Fee in respect of each Member (in the case of new Members), and a joint Annual Subscription of One Guinea for the first two Members and Six Shillings annually for each additional Member."

The President explained the reasons which had led the Council to recommend this alteration, and proposed it on behalf of the Council. The motion was seconded by Professor Meldola, F.R.S., and Mr. Howard, and carried unanimously.

**Thanks to the President, the Council, and Officers.**—Prof. Meldola proposed that the cordial thanks of the Club should be accorded to Mr. Christy for his services as President during the year. He said that all members of the Club who attended any of the meetings would heartily concur in his appreciation of the care the President had given to its affairs, and the business ability he had exercised as its head.

Mr. W. M. Webb seconded the motion most heartily, and proposed that the vote should include all the officers and members of the Council who had devoted so much care and attention to the affairs of the Club.

Prof. Meldola agreed to this, and the vote was carried by acclamation.

The President returned thanks on his own behalf and on behalf of his colleagues on the Council and the Officers.

The meeting then adjourned until the evening.

## THE 245th ORDINARY MEETING.

SATURDAY, APRIL 7TH, 1906.

This meeting was held at the Technical Institute, Stratford, at half-past six, Mr. Miller Christy, F.L.S., President, in the chair.

**New Members.**—Mr. Herbert O. Jacobs, 133, *Osborne Road, Forest Gate*, and Mr. Herbert E. Rains, 5, *Sackville Gardens, Ilford*, were elected members.

**Black Rat in Essex.**—Mr. W. Cole exhibited two specimens of *Mus rattus* which had been sent to him by Mr. Pettitt, the taxidermist, from "a locality in Essex." The records of the capture of this species in the county were very few, with the exception of specimens from the docks on the Thames, where sometimes Black-Rats, which were presumably escapes from foreign-going ships, were caught.

Mr. Christy remarked that the specimens exhibited seemed to his eyes hardly typical, and he suggested that they might be hybrids between the true *M. rattus* and the Brown Rat (*Mus decumanus*).

**De Winton's Mouse at Lexden.**—Mr. Cole also exhibited two specimens of the Yellow-necked Mouse (*Mus sylvaticus-wintoni*) from Lexden, near Colchester.

**Essex Birds.**—Mr. Cole also exhibited (1) the Red-throated Diver (*Colymbus septentrionalis*); (2) the Black-headed Gull (*Larus ridibundus*); and (3) the Guillemot (*Lomvia troile*), all from the estuary of the Thames, off Southend. These were all presented in the flesh to the Museum by Mr. Sherrin, of Southend.

**Deep Boring at Ilford Gas Company's Works.**—Mr. Walter Crouch, F.Z.S., detailed some observations made at this boring. The notes were of a preliminary nature, but Mr. Crouch promised more definite information later.

A discussion took place in which the President, Mr. T. V. Holmes, F.G.S., Professor Meldola, F.R.S., Mr. John Spiller, F.I.C., Mr. E. T. Newton, F.R.S., Mr. Reader and others took part, and Mr. Crouch replied.

**Large Bone of a Whale at Mountnessing, Essex.**—Mr. Christy exhibited, by the aid of the lantern, a photograph of a large bone which had for many years reclined beside the font in Mountnessing Church. He had submitted the photograph and a description of the bone to Mr. E. T. Newton, F.R.S., who was present. It had been put down in the Guide-books as an Elephant's or Mammoth's bone, but Mr. Newton was of opinion that it had belonged to a Whale—probably the rib of a Sperm Whale (*Physeter*) or to a Rorqual (*Balaenoptera*), perhaps brought as an offering from some whaling ship in the Thames.<sup>1</sup>

**Bone "Needle."**—Mr. H. Mothersole exhibited a curious object resembling a bone "needle," which had been found in an excavation at Chelmsford. Mr. F. W. Reader made some remarks on this specimen, but these are reserved until a figure and further details can be given.

**Remarks by the President, and Paper on Salt-making in Essex.**—Before reading his paper the President made a few general observations on the work of the Club. He considered that they continued fully to justify their existence as a county society; the work done, and progress made during the past year had been very considerable. The Essex Museum of Natural History was developing rapidly, and he particularly called attention to the growing collection of British Mammals, which when completed, would be a very remarkable feature, and one indeed almost unique among the local museums of this country. Under Mr. T. W. Reader's skilful and persevering efforts our library is being rapidly put into order, and promises to become of considerable importance as a collection of books relating to our special subjects.

The papers and lectures have been as numerous as usual, and although some of them have been of a general nature, there is no fear of the supply of original papers relating to the natural history and archæology of Essex falling short.

One very important matter which is now engaging the attention of friends of the Club is the necessity of gaining new members. To our great regret many old and esteemed members have died within the last few years, and it is a prime necessity that their vacant places should be filled up by persons taking an equally warm interest in the Society. It is to be hoped that the recently-established YEAR BOOK, although a somewhat costly item, will aid in attracting members,

<sup>1</sup> In the *Strand Magazine* for May, 1906, is a photograph of a similar rib, still to be seen in St. Mary's Redcliffe Church, Bristol. Legend has it that this is a rib of the celebrated Dun Cow, which supplied all the parish with her milk in the days long ago.

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*Zoologist, May 15th, 1906.*

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[JULY, 1906.

*The*

# Essex Naturalist:

BEING THE

JOURNAL

OF THE

ESSEX FIELD CLUB.

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary and Curator.*

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*The Authors alone are responsible for the statements and opinions contained in their respective papers.*

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and Advertisements to Messrs. BENHAM and Co., Printers, Colchester.

# The Photographic and Pictorial Survey and Record of Essex.

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Members and others are referred to the YEAR-BOOK for particulars of this organization, which is a permanent Committee of the Essex Field Club.

The assistance of all interested in Essex is solicited for this work, which is not only very interesting in itself, but as years go on will become of considerable historical and scientific importance.

The *Hon. Secretary*, Mr. Victor Taylor, *Hurstleigh, Buckhurst Hill, Essex*, will gladly correspond on the matter, and will give full information on the objects and work of the Survey.

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## The Fauna and Flora of Essex,

*As Illustrated in the*

ESSEX MUSEUM OF NATURAL HISTORY.

---

I need not point out to my fellow Members and friends the great difficulty often experienced in obtaining authentic specimens from a limited district. I should highly esteem any aid that County and London Collectors could afford. Localised specimens of Essex Birds, Fish and Mammals, Insects of all orders, Land and Freshwater and Marine Shells, Plants, etc., if in good condition, will be of the greatest assistance, and donors will have the satisfaction of knowing that their specimens will be properly preserved, and will be available for study in the future.

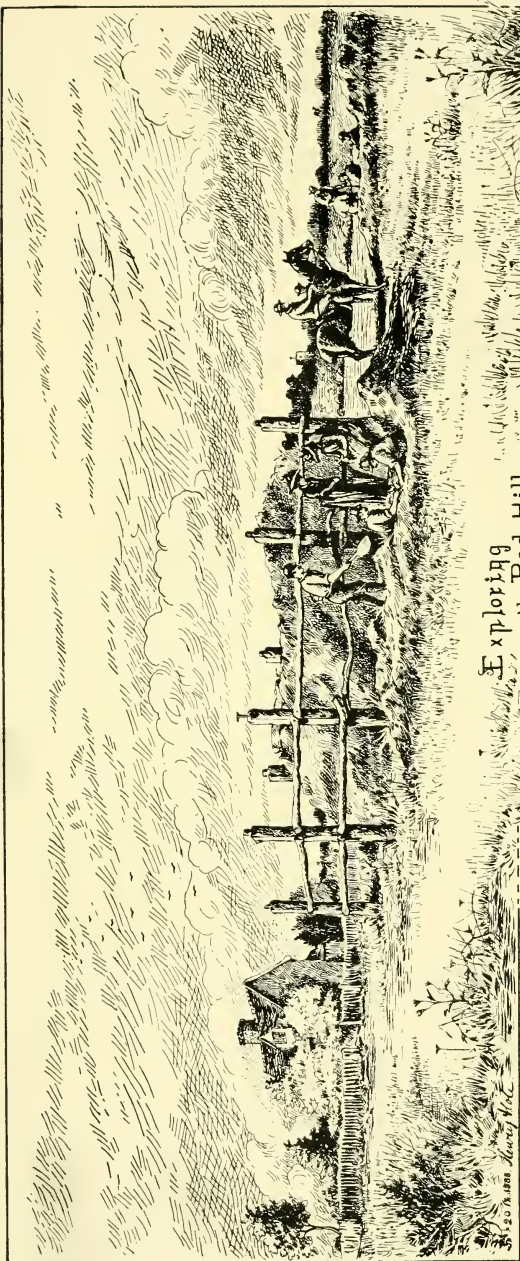
Birds, Fish and Mammals in the flesh may be forwarded direct to the Taxidermists, Messrs. Sherrin Bros., 38, Fielding Road, Chiswick, London, W. A post card should precede the specimens. Carriage may be charged forward.

WILLIAM COLE,

*Hon. Secretary and Curator.*

ESSEX MUSEUM OF NAT. HIST.,  
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STRATFORD, ESSEX.





Exploring  
the Red  
Burgham, Essex.

1888. Henry Mac





RED HILL ON BOWER HALL FARM, EAST MERSEA. NATURAL SECTION CAUSED BY EROSION  
OF THE PYEFLEET.

Drawn by H. A. Cole, August, 1896.



and, as previously announced, it is now intended to make an organised effort to increase our membership roll. As a small matter, the President suggested that new members should be formally introduced at the first meeting attended, so that the officers and their fellow members might welcome them into the ranks.

Mr. Christy also considered that occasional Ordinary Meetings held in various parts of the county would tend to make the Club better known and appreciated.

The President then read his paper on "Salt-making in Essex, Ancient and Modern." The paper was illustrated by lantern-slides, and by specimens of the crystals and finished product made at the Maldon Salt Works, the only "Salt-pan" now remaining in the county.

A discussion was carried on by Prof. Meldola, F.R.S., Mr. J. Spiller, F.C.S., Mr. F. W. Rudler, F.G.S., and the President.

**Vote of thanks to the President.**—At the suggestion of Prof. Meldola, seconded by Mr. Spiller, a very cordial vote of thanks was passed to Mr. Christy for his services as President during the past year, and also for the very interesting paper read that evening.

Mr. Christy acknowledged the vote of thanks.

**"Neolithic Man in Epping Forest,"**—A paper under this title, by Messrs. F. W. and H. Campion, was read for the authors by the Hon. Secretary.

Considerable discussion took place anent the evidence brought forward in the paper, and on the specimens exhibited in illustration thereof. The President suggested to the authors the desirability of their demonstrating on the spot the sites and specimens upon which the paper was founded. But Messrs. Campion appeared to be unwilling to do this.

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## EXPLORATION OF SOME "RED-HILLS" IN ESSEX, WITH REMARKS UPON THE OBJECTS FOUND.

By WILLIAM COLE, F.L.S., F.E.S.

(With Plates xxviii. and xxix. and other Illustrations)

[Read at Spains Hall, July 28th, 1906.]

I HAVE been recently occupied in examining and re-arranging in the Museum the specimens from the Red-hills, obtained during several years' attention paid by myself and my brothers to the subject, and it seems well to place on permanent record the results of our work and observations so far obtained, small though they may be. The main facts were given in spoken communications to the Club, at a meeting held in Colchester, March 30th, 1889 (*ESSEX NATURALIST*, iii., pp. 163-4), and again at a meeting held at Virley on April 13th, 1903 (*E.N.*, xiii., 243), but the full details of these communications have not been hitherto published.

My practical experiences of Red-hills yielding any special results are mainly confined to one at Burnham and several in Mersea.

The exploration at Burnham was made as long ago as 1888, and was rendered possible by the great courtesy and hospitality of our late member, Mr. John Rogers, and of our Vice-President, Mr. E. A. Fitch, F.L.S.

This particular Red-hill is at Little West Wick, Burnham Marshes (called "Lower Westwick" on the one-inch Geological Survey Map).<sup>1</sup> It is situate immediately to the S.E. of the cottage, shown in H. A. Cole's drawing ("Exploring the Red Hill, Burnham, Essex," *Plate xxviii.*), which probably stands on part, and the posts of an old ox-house were still standing about the centre of the hill. The hill is two miles east of Burnham Church, and two miles south-east of Southminster Church,  $5\frac{1}{2}$  miles west of the sea-wall, and  $1\frac{1}{4}$  miles north of the wall on the River Crouch. The distance from the sea and river is noteworthy.

The cuttings were made on the 20th and 21st of September, 1888. The working party consisted of Mr. Fitch, Mr. H. C. Snell, Messrs. W., B. G., and H. A. Cole, while Mr. Rogers kindly allowed us the assistance of David Barber, one of his men,

<sup>1</sup> Sheet (Essex) lxiii south-east of the 1897 six-inch Survey, and No. 245 Sheet 63-15 of the 25-inch Ordnance Survey.

and another. Barber had known the Red-hills about 28 years. He told us that it was then about half an acre in extent, and that hundreds of loads of soil had been taken away. He also said that in making the foundations for the shed "a number of coins were found, one silver, and quantities of pot, some of them whole, and pieces of bone." A carpenter named Baker, of Southminster, found the silver coin. Of course, I give these particulars wholly on hearsay.

Judging from what we saw, and were told, the red-hill had been much interfered with, and very great quantities of the burnt rubble taken away. It was consequently very shallow, and only one of our cuttings afforded anything like a good section. We made four trenches :—

No. 1 was 16ft. long and 2ft. 8in. wide. We dug down to the apparently undisturbed clay (? London Clay) first finding a thin layer of sand at a depth of about 2ft. 6in. The reddish burnt rubble appeared to be very uniform throughout.

No. 2 trench was 20ft. long and 2ft. 6in. wide. The surface soil was thick, about 2oin., and much may have been cast over the "hill." Then came 3in. of burnt red clay and sand; 1in. charcoal; 2in. burnt clay; another layer of charcoal, very thin; then 2in. burnt clay, and finally about 1oin. sand over the clay bottom.

In No. 3 we went down about 2oin. finding red-earth below, but we could not get a section to the bottom because a burrow had been cut through the part years ago, apparently as a shelter for hares.

Our last trench (No. 4) was 1cft. long, 2ft. 6in. wide, and about 18in. down to the undisturbed clay. The soil here, after the superficial surface layer, was of the red burnt-earth kind, which apparently had been sifted; it was quite fine in grain, and contained little or no pottery.

It will be gathered from the above that the "red-earth" formed by far the greater part of the "hill." This substance was quite like the burnt clay now-a-days prepared for making paths and roads during suburban building operations. Interspersed with this burnt rubble, in all the cuttings excepting No. 4, were vast numbers of fragments, mostly quite small, of a very coarse and thick pottery, presumably made from the same kind of clay (see specimen drawn at A, Fig. 1).

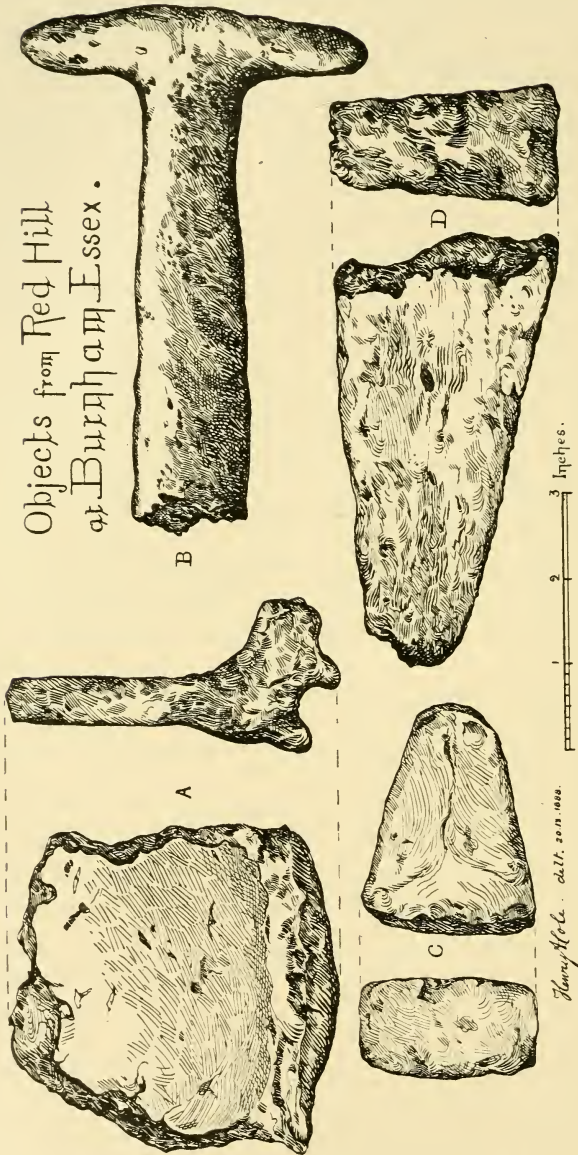


Fig. 1.—SPECIMENS OF RUDE POTTERY, &C., FROM RED HILL, ON LITTLE WEST WICK FARM,  
BURNHAM MARSHES, ESSEX; EXPLORED SEPTEMBER, 1888,

For explanation: see text.



These thick pieces are apparently portions of large vessels, some at least cylindrical in form, and as much as twenty inches in diameter, with the ware an inch or an inch and a-half in substance.<sup>2</sup> The larger fragments found were very soft and fragile whilst moist, and readily broke up on attempted removal from the matrix. There is an appearance on some pieces of careful smoothing of the clay on the inner side, but we saw no indications of glazing on the Burnham specimens.

These coarse pot-shards constituted in some places quite one-fourth of the whole mass of rubble excavated.

We often found portions of curious objects, which we termed "T-pieces"; they were largely fragmentary, but one of the most perfect found at Burnham is shown at B, Fig. 1. The "shaft" had apparently been much longer, but had been broken off.

Wedge-shaped bricks of the same kind of clay also occurred not uncommonly; two are figured at C and D, Fig. 1.

A small number of fragments of a harder and better kind of pottery were picked out of the mass of *debris*; it is of the kind commonly called Romano-British. Specimens from the Bower Hall Farm, Red Hill, East Mersea, are pictured in Fig. 3, *post*. They formed a very small percentage of the rude pottery fragments. Some of it is apparently wheel-turned.

Two small fragments of Samian ware occurred at Burnham; we found no trace of it in any other Red-hill. At the time we considered them accidental, and fancied that they might have been carried down from the surface by the burrowing of rabbits, or by rain-wash.

Our next experiences of Red-hills explored in any careful way, were during our summer vacations in Mersea. One very considerable "hill" was found on Bower Hall Farm, East Mersea. This mound is situate on the saltings bordering the Pyefleet Channel, outside the sea-wall (it is marked on the 6in. Ordnance Map, "Sheet 47, N.W. East Mersea," very near the B.M., 13-5.). The Red-hill is partly cut through by the Pyefleet, so causing a natural section, which exhibits the characteristic features of such remains excellently—the usual pottery is seen sticking out from the exposed burnt earth. *Plate xxix.*

<sup>2</sup> I am much indebted to Mr. Henry Whitehead, the Assistant in the Museum, for making measurements and arranging the specimens for exhibition.

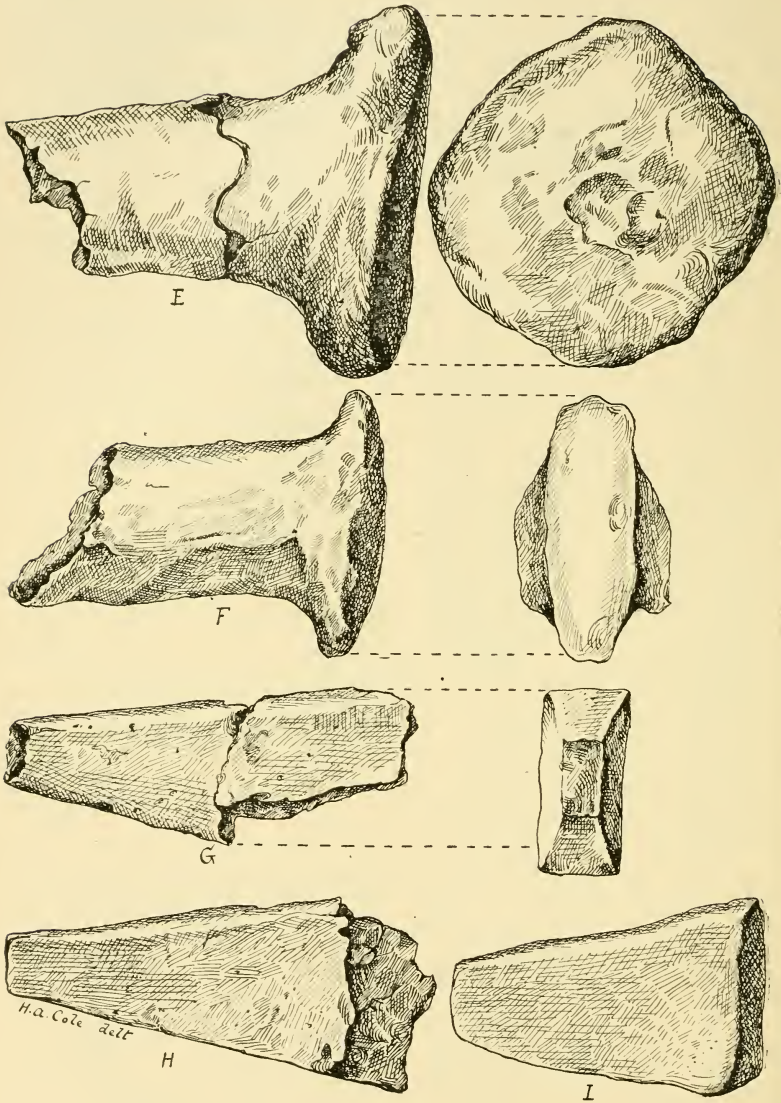


Fig. 2.—OBJECTS FOUND IN RED-HILLS AT BOWER HALL FARM, EAST MERSEA (E F G), ONE (H) AT PELDON (MR. STOPES), AND MODERN WEDGE OF CLAY (I) FROM DOULTON'S POTTERY WORKS.  
(One-half natural size.)

is from a drawing made from the point of view of a boat in the channel at low water, by H. A. Cole, in August, 1896.

The excavations were made (by the kind permission of Mrs. Harvey, the owner) on two days in August, 1892, and the working party comprised my brothers, B. G. and H. A. Cole, Mr. Charles Wilson, and myself. We were assisted in the digging by Mr. David King, the well-known postman of the island. A very long cut, 2ft. 6in. wide, was made, extending in a westerly direction from the extreme outer margin of the "hill" to the centre. As far as we could judge we went down to the solid clay, below the alluvium, as at Burnham. After removal of the purely surface soil, the whole heap was found to consist of burnt rubble with the usual large intermixture of the rude

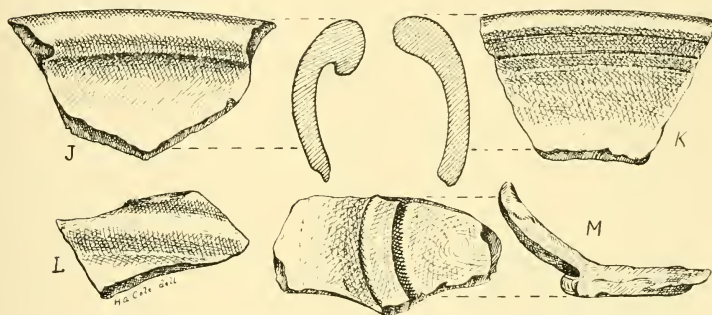


FIG. 3.—POTTERY FRAGMENTS (ROMANO-BRITISH) FROM RED-HILL ON BOWER HALL FARM, EAST MERSEA.

thick pottery. There was no evidence of stratification; the soil worked evenly and homogeneously from top to bottom. We were at once struck with similarity between the objects found here and at Burnham. There were the "T-pieces," the wedges (F. and G., Fig. 2), and the very small proportion of hard ware (shown at Fig. 3, J. to M.) which appears to be like the other examples, Romano-British. At Fig. 2, the objects F. and G. are from this Red-hill. The object E is like the "T-pieces" in material and shaft, but it has a circular boss or foot, as shown. This piece was found by Mr. G. E. Vaughan several years after the date of our exploration, at the natural section formed by the Pyefleet, at low water, washed out of the clay, with

it we collected an abundance of fragments of the rough pottery, and a few pieces of hard ware.

On reviewing the results of the work at Bower Hall Farm we were again impressed by the very large proportion of the rough coarse ware, sometimes occurring in quite large pieces, which, owing to their soft nature and saturation with moisture, were very fragile. The "T-pieces" and wedges were comparatively rare, as was also the Romano-British pot-shards—in fact, we kept all that were found. No Samian ware was observed, nor have we found worked flints in any of our cuttings.

During the same year we dug into a Red-hill situate on the "Grassy-Marsh" (inside the sea

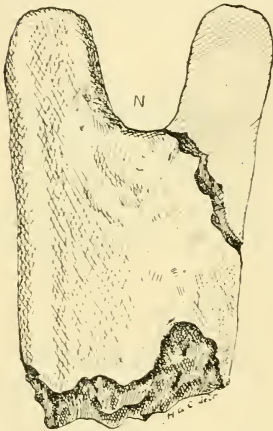


FIG 4.—DOUBLE PRONG-SHAPED PIECE OF POTTERY, FROM A RED-HILL AT IVY HOUSE FARM, EAST MERSEA (restored).

wall) on Ivy House Farm, East Mersea, by kind permission of Mr. Cant, the tenant. This is on the piece of marsh near East Mersea Stone (6in. Ordnance Sheet 47, N.E.), less than a quarter of a mile from the water. The "hill" was roughly oval, about 450 feet in circumference. The working party was the same, with the kind assistance of Mr. R. Wood, the foreman of the farm. The results of the work were almost identical with our experiences at Bower Hall Farm. The same kind of burnt earth, the rough pottery, T- and wedge-shaped pieces, but the pottery was more fragmentary and decayed. Here,

as in other hills, were found roughly shaped masses of burnt clay, which could hardly be called pottery; one piece kept from the "Grassy Marsh" hill is quite  $2\frac{1}{2}$  inches thick. One notable find was a piece of clay similar to the shaft of a "T-piece," but which had apparently been made with a double prong at the end (see the restoration at Fig. 4). This object is commented upon below. It may be noted that two of the pieces of thick rough pottery from this spot have a yellow glaze; we have found no other examples of this. (See *post.*)

We also cut into the remains of a Red-hill at Fen Farm (on the same map) inside the sea-wall, facing Mersea flats. Red earth and rough pottery were found, but little else. It appeared to have been very much disturbed, and Mr. Griggs, the farmer, said that many hundreds of loads of the burnt earth from it had been spread over the fields. And we examined (but only superficially) the site of a very extensive "hill" on Reeves Hall Farm. This had been ploughed over, making the soil of the field quite ruddy; fragments of the characteristic pottery could be found scattered over the whole field.

In 1903 our attention was called by Mr. George Cross to a Red-hill, or rather ridge, on his farm, Lee Wick, St. Osyth. His orchard covers part of it, and it runs N. and S. for a long way into the fields, which are reddened with the burnt clay. A deep trench dug at one side of the orchard gave section of the red earth, with the familiar kinds of rough pottery, T-pieces and wedges. Only two or three pieces of Romano-British pottery were found.

We know of a great many Red-hills in the Mersea, Peldon, and adjoining districts, but I have noticed those only which we have carefully examined.

The original description of our Essex Red-hills, from which all later accounts have been compiled, is that by the late Henry Stopes, F.G.S., in the *ESSEX NATURALIST* for 1887 (Vol. i., pp. 96-105) under the title of "The Salting Mounds of Essex." In this paper, Mr. Stopes gives details of the only practical exploration (at Peldon) of Red-hills previous to our investigations described above. It is quite unnecessary to enter here into any general account of the Red-hills, inasmuch as Mr. Stopes has done this admirably, and all enquirers are referred to his paper. Mr. Stopes' descriptions are quite in agreement with our own observations, and he found many of the same kind of objects, although he makes no mention of the "T-shaped" pieces of clay.<sup>3</sup> He concluded, as we did, that the "hills" went down to the undisturbed clay (? London Clay), and he noticed the apparently uniform character of the burnt earth. In the paper (at p. 103) is a map showing the distribution of the then

<sup>3</sup> Some of Mr. Stopes' specimens are in the Essex Museum, having formed part of Mr Dalton's geological collections.

known mounds in the Wigborough and Mersea districts, prepared by Mr. W. H. Dalton, F.G.S. The sites are plotted on the 1-inch map, and are consequently only approximations to the true positions.

In the remarks that follow, I make no pretension to putting forth a complete and permanent theory of the origin and use of the Red-hills. I simply wish to make a few suggestions, which may be taken as "working hypotheses" in guiding the investigations of future explorers.

In any discussion of the subject the following data should be kept in mind:—

I. The distribution of the Red-hills on the saltings and marshes, above high-water mark, and generally fairly close to existing salt creeks and estuaries. None are found inland.

II. The great number of "hills" at present known. It is probable that Mr. Dalton, Dr. Laver, and myself could plot down 200 on the Essex map.

III. The large size of many of them. They vary in extent from half-an-acre to about 25 acres, and as the burnt earth is often several feet thick, the total quantity must be prodigious. One near Peldon, covering 10 acres, Mr. Stopes estimated to contain some 100,000 tons of red-earth.

IV. The apparent homogeneity of the burnt earth, and the close correspondence of structure and contents of one "hill" with another.

V. The numerical proportions of the fragments of pottery. The vast number of shards were of the coarse, thick pottery, often so plentiful as to form quite one-fourth of the whole mass of burnt stuff. The paucity of the wedges and T-shaped pieces, and the comparatively small number of fragments of the finer ware.

Whilst working at the hills, the conclusion irresistibly forced itself upon us that we had there the *debris* of some primitive kind of pottery-making industry, and I put forward that hypothesis when relating the results of the Burnham exploration at the meeting of the Club at Colchester in March, 1889 (*ESSEX NAT.*, iii., 163-4), and again at the meeting at Virley on April 13th, 1903 (*ESSEX NAT.*, Vol. xiii., pp. 244-5). On consultation with an old potter employed at the Potteries in Honey Lane, Waltham Abbey, he pointed out the similarity of the fragments of coarse pottery to the ware of the great seggars used to protect pots during firing. He also recognised the T-pieces as suggesting the rudely moulded rods or "spacers" of clay used to keep the pots expanded whilst being baked. The little "bricks" are like the wedges still used in potteries to keep the vessels upright

and distinct from each other; one of two modern specimens from Doulton's factory, kindly presented by Mr. F. W. Reader, is figured (Fig. 2 1). I then looked upon the Romano-British pottery, of which the fragments might be "wasters," as the objective of the works, and Mr. I. Chalkley Gould alluded to this opinion in his chapter on the Red-hills in the *Victoria History*.

If this hypothesis were the true one, we ought to find remains of kilns near the Red-hills. Mr. Reader hints "these would probably be seen as circular depressions, being shallow pits with

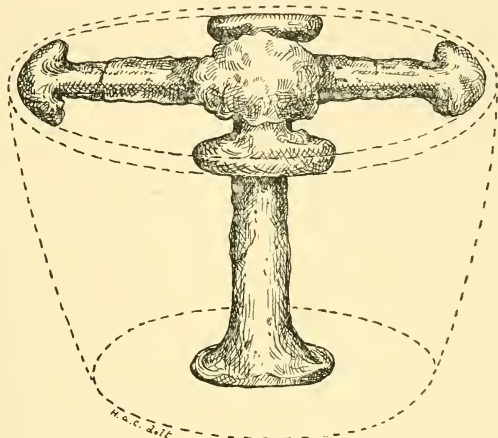


FIG 5.—SUGGESTION AS TO THE USE OF THE "T-PIECES."

a neck or opening for the furnace." I am not aware that anything of the kind has yet been noticed.

But although no one who has worked at them can reasonably doubt that the Red-hills indicate pottery-making, later thought over the problem has suggested a further supposition, which appears to be well worthy of consideration, inasmuch as it accounts fairly well for all the known facts.

The paucity of the remains of the harder pottery hardly seems to accord with the quantity of "wasters" which we should expect to find in such extensive manufactories. Is it possible that these are simply portions of broken domestic utensils used by the workers, and that the large, coarse vessels were really the object of the pottery-making? Such rough pots or pans

would be made in a very primitive manner. In Janvier's *Practical Keramics* it is stated that in England a kiln is "generally a low, vaulted chamber, with a cone-shaped stack. In very rough pottery baking there is no regular kiln at all, the pots themselves being piled up on a sort of floor, and arranged to let the flames play over and through them." It is possible that rude kilns might have been made by piling up the pans surrounded by faggots, and covering in the whole with clay, in the fashion of charcoal-burning, but with a kind of flue at top to allow of the requisite high temperature being attained. To prevent the pots collapsing it is suggested that the T-pieces, the upright with the foot (Fig. 2, E), and the double prong (Fig. 4) were joined with a lump of clay in the middle, as shown in Fig. 5. We took this idea from the explanations of our old friend the potter at Waltham Abbey (see above), who was well acquainted with the primitive methods employed in his young days; but this suggestion is a purely tentative one, and may be confuted by the results of further explorations. When the firing was finished, the demolition of these primitive kilns would set free great quantities of more or less perfectly burnt "red-earth."

If these vessels were really the objective of the pottery-making, to what use were the pots or pans—some of them nearly two feet in diameter—put by the workers at the Red-hills?

One recalls the late Rev. J. C. Atkinson's paper, "Some further notes on the Salting Mounds of Essex,"<sup>4</sup> in which he suggests that the Red-hills were ancient *Salinæ* or salt-pans. He gives a very considerable amount of indirect evidence in favour of this supposition, and the paper is well worthy of careful study in connection with the problem. Our President, Mr. Miller Christy, F.L.S., in his paper on "The History of Salt-making in Essex," read before the Club on April 7th, 1906, but not yet published, pointed out how numerous were these "salt-cotes" on the shores of our Essex estuaries and inlets in the time of the Domesday Survey.<sup>5</sup> The sites of the salt-pans plotted on the map exhibited by Mr. Christy were roughly coincident with many of the existing Red-hills, and the seeker for a *raison d'être*

<sup>4</sup> *Archæological Journal*, Vol. xxxvii. (1880), p. 196.

<sup>5</sup> See also Mr. Horace Round's Essay on the Survey in the *Victoria History*. He says that "the distribution of the salt-pans was in Essex extremely local, being virtually restricted to the Hundreds of Tendring, Winstree, and Thurstable in the N.E. of the county."



of the latter is naturally tempted to suspect some affinity between the two. In this connection the description of the Scottish antiquary, Mr. George Neilson, in his *Annals of the Solway*, of the ancient methods of manufacture at the *salinæ* is informing, and no apology is necessary for quoting it :—

“ In its salt-works the Solway possessed an industry of great importance and high antiquity. At intervals all along both its Scottish and English shores there were *salinæ* or salt-works. These were all situated at places where a loose and porous clayey sand, called ‘sleech,’ formed natural salt beds presenting a surface capable of retaining a very heavy solution of salt after being covered by the tide. The heat of the summer sun disclosed the salty particles, glittering on the sleech like hoar frost. From time to time in due season the ‘salters,’ as the makers of salt were called, first collected the surface sleech on the salt bed by a kind of sledge-drag or scraper, called a ‘hap,’ drawn by a horse, carted it to the merse or grassy beach, and laid it in heaps beside the place where, after some time, it was to be filtered. Neither the apparatus nor process of filtration was complex. A hole dug in the merse formed a ‘kinch’ or pit ; its bottom and sides were puddled with clay to make it water-tight : on the bottom, above the clay, peats were laid ; the peats in turn were covered with a layer of sods, sleech was put on the sods, till the kinch was nearly filled to the brim, and finally as much salt-water was added as the kinch would hold. Filtering through the sleech and the sods the brine at length, when strong enough to float an egg, was allowed to escape by a tube or spout into a wooden reservoir, out of which it was lifted and carried in pails to the salt pans. These were broad, shallow, metal pans, beneath which great fires of peat were lit. After about six hours’ boiling the process was complete ; the liquid of the brine was wholly evaporated, and the pans full of the finished article. The name of Saltcotes was given to the little cluster of buildings which contained the pans, the ‘girnels’ or stores in which the salt was kept, and the dwellings of the salters. Such was the system pursued on the Solway in the end of last (the eighteenth) century, and there is small reason to doubt that substantially the same primitive and laborious mode of manufacture prevailed from early times.” Our author noted “holes in the grassy foreshore, from two to three feet deep, a dozen or thereby wide, and six or eight across ; the bottom is black, and either dry or half-filled with dark and stagnant water. These are the ‘kinches’ or pits once used in the salt manufacture. . . . No unfit memorial of a dead industry.”

With, perhaps, a few modifications rendered necessary by peculiarities of the Essex estuarine shores, the above description of the Solway salters’ methods of work might be taken to body forth the primitive industrial scenes at our local *salinæ*.

On the supposition that we have in the Red-hills the remains of salt-works dating from very early times, when metal vessels were not available, it is no very wild speculation to suggest that the large, coarse vessels, the fragments of which are so numerous, were the pans in which the brine was boiled down to the crystallising point in the old manufacture of salt.

There would be abundant economic reasons for making the pans on the spot out of the clay around. The pans, being very rude and fragile, would be frequently broken, and would thus provide the store of fragments which puzzle us to-day. The mode of baking the pans and the great fires that would be necessary in evaporating the brine would be a sufficient source of the vast quantities of burnt *debris* accumulated during the long years of the industry. Considerable quantities of salt must have been required in early days for curing fish and meat, and later, perhaps, in the making of the great ewe-milk cheeses, for which Essex was long so famed; while, as the output of these primitive *salinæ* could not have been great, a considerable number of them would be called for to satisfy the country-side, and possibly every settlement had its own salt-pans.<sup>6</sup>

In estimating the period of these remains some latitude must be allowed. As Mr. Stopes remarks, "the character of the associated pottery, the absence of any trace of metal, and the downward extension of the calcined masses to the London Clay argue a high antiquity, higher than that of the surrounding alluvium, four or five feet in depth, perhaps higher than the change in the course of the river to which I have referred already." The hill at Burnham is now a considerable distance (about  $1\frac{1}{4}$  miles) from the river Crouch, whilst the one at Bower Hall, East Mersea, has been cut through by the Pyefleet, and must consequently have been accumulated previous to the erosion of the present channel. The absence also of any allusion in old authors and of local traditions respecting the red-hills favours the throwing their origin back to a remote age. Mr. Frank W. Reader has kindly examined the hard pottery obtained during our explorations, and reports thus:—

"The pottery specimens from the Red-hills at Burnham and Bower Hall Farm, E. Mersea, are clearly fragments such as are commonly found on Romano-British sites, and including two pieces of Red Samian of a rather soft quality.<sup>7</sup>

<sup>6</sup> It may be conjectured that the appearance of *glaze* on the two pieces of rough pot from the "Grassy Marsh" Red hill at E. Mersea (*ante* p. 176) was caused by the fusion of salt on the ware by intense heat.

<sup>7</sup> The two pieces of Samian came from the hill at Burnham, and as before hinted (*ante*, p. 173) were probably accidental and may have come from the surface. At any rate, we have not found any Samian elsewhere.

"One of the two pieces from Peldon appears to belong to the class of ware known as late-Celtic.<sup>8</sup>

"As there was an overlapping of the late-Celtic and Roman period, and the forms of the fictile vessels of both these sources of culture appear to have been made simultaneously, it is common to find the two in association. The occurrence of late-Celtic types, therefore, does not necessarily indicate an earlier period. I have already drawn attention to this elsewhere, but it is a point that cannot be too strongly insisted upon. There is no reason why some Red-hills should not have originated in pre-Roman times, but this can only be determined by extended enquiry; such a conclusion cannot be drawn from isolated specimens. The weight of evidence so far points to their origin in Romano-British times."

As before stated, I simply put forward the above suppositions in a tentative way to suggest further enquiry, which the newly-appointed Committee of the Essex Archæological Society and the Club will doubtless give to the matter, to confirm, extend, or possibly confute, the conclusions here set forth. There are numerous very interesting questions connected with geology, topography, and even the biology of our coast suggested by the problems of the Red-hills. The density and salinity of the estuarine waters as compared with the open sea is one of them, and the age of the alluvium and the older sea-walls, are others. It is a large and very interesting subject, and one worker can do very little, but my brothers and I have had much satisfaction in making up the above sheets, and recalling the many pleasant days spent on the breezy Essex marshes with the Red-hills and the curlews.

[The Club is indebted to Mr. H. A. COLE, for the drawings accompanying this paper. It should be stated that the drawings on pp. 175 and 176 are one-half the natural size of the objects.]

<sup>8</sup> These pieces came from Mr. Stopes, and are presumably the fragments alluded to in his paper, *E.N.* I., page 99.

## STRAW-PLAITING—A LOST ESSEX INDUSTRY.

By I. CHALKLEY GOULD, F.S.A., *Vice-President, E.F.C.*

[*Read October 28th, 1905.*]

AT the outset of my remarks I must state that Mr. Miller Christy, our President, when writing on "Straw-Plaiting" for the *Victoria History*, derived certain information from me, in return for which he kindly gave me details relating to the early statistics of the plait trade in Essex, which I have used in this paper; and I must own my indebtedness to Mr. Aylott, of Hitchin, for much information as to the past and present trade in his district.

References exist to the plait trade in Bedfordshire at earlier dates, but so far as Essex is concerned it is not till the end of the 18th century that any record appears. Then the Marquis and Marchioness of Buckingham, living in that grand old Essex House, Gosfield Place—endeavouring something for the welfare of their cottage neighbours—introduced straw-plaiting to the villagers of Gosfield.

The coarse appearance of the early efforts of the Gosfield women hindered the sale, but their noble patrons encouraged the workers by wearing the results of their labour, and very soon fine work was produced; by 1806 the sales from Gosfield amounted to £1,700 in the year, and Arthur Young, writing in 1807, was able to refer to the village having received the greatest of temporal blessings by the trade.<sup>1</sup>

Other Essex villagers soon adopted straw-plaiting as a constant employment for the women and an occasional occupation for men and boys. The Colne Valley villages and the neighbourhood of Bocking were homes of the trade, but, curiously enough, it seems to have been confined to somewhat narrow limits instead of spreading over the country.

In the palmy days of the industry women produced three-score yards of plait in a week, selling at 7s. per score, but this halcyon condition did not last, for the farmer, instead of almost giving the straw away, made a business of selling it. Then too, as more villages took up plaiting, commercial competition increased and the earnings of the plaiters dropped, till in 1840 from 3d. to 10d. a score was all that was realized, the price

<sup>1</sup> *General View of Agriculture* (1807).

varying according to quality and the number of strands in a plait.

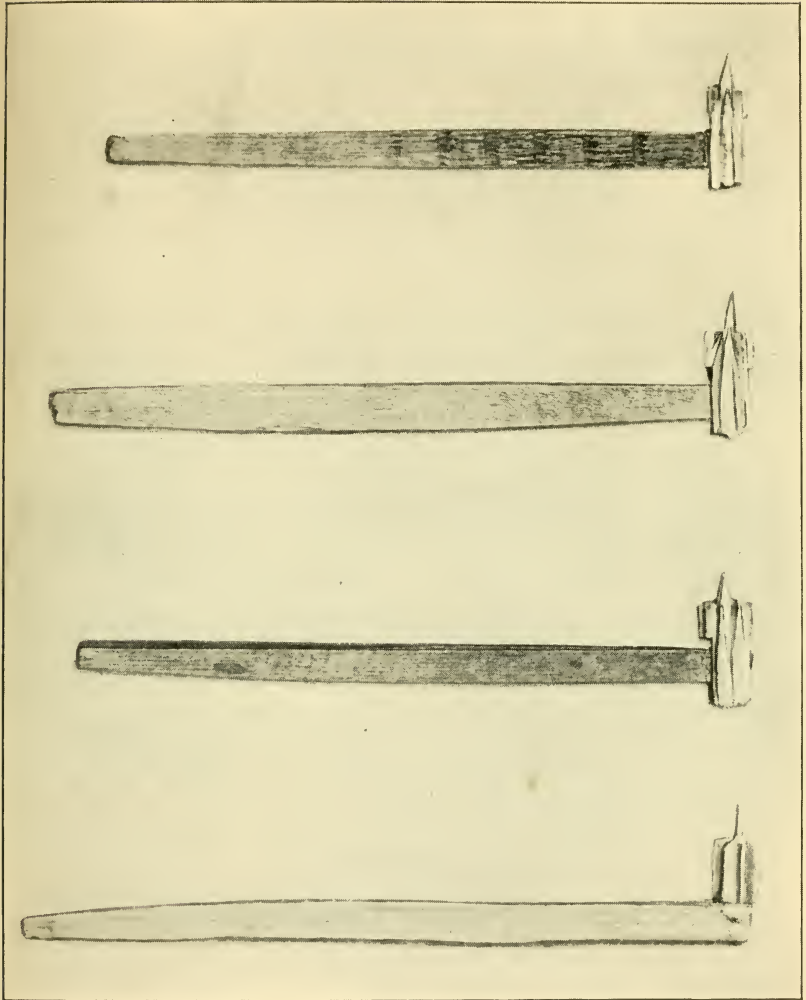


FIG. 1.—BONE "ENGINES" FOR SPLITTING STRAW.

White's *History, Gazetteer and Directory of Essex* (1863) states that the manufacture "gives employment to many women and o

children in the north-western parts of the county," and Mr. Christy's statistics show that so late as 1871 there were many people in Essex engaged in the trade, either as plaiters, dealers, or shop-keepers, and it lingered on here and there for nearly twenty more years.<sup>2</sup> Now the trade is absolutely dead in our county, and in the towns and villages of North Herts, where it lingers, 1d. per score is all that the dealers give the plaiters, who rarely earn more than 6d. a week, except for specially fine work such as the villagers of Offley turn out, thereby realizing a rather larger payment.<sup>3</sup>

Passing from statistics of the trade to the processes by which straw became a fit material for hats and bonnets, we have first to picture the crop on the farm. Farmers who laid themselves out for the trade grew wheat producing a fine straw suitable for plaiting, and it was reaped by hand with care to avoid bruising the straws. The breaking action of the reaping machine is fatal to stems intended for plaiting.<sup>4</sup> In the earliest days of plaiting the farmers (as I have said) charged a nominal price for the straw, having first cut off the heads of corn, relying on the wheat to repay them, as well it might in the days of £5 a quarter. But as the demand grew, the farmer found it better to prepare and cut the straw into lengths himself. Whether at the farm or in the cottage, the first process was, by rake and hand, to remove the flags or leaf growths from the sheaf of straw. The rake shown is the wreck of one long used in the North of Essex. The straw, being thus cleaned of superfluous growth, was next cut into lengths between the joints, the latter being cast aside. Often, however, we note that the joint is on some of the straws, where it certainly ought not to be.

The straw being thus cut into lengths, usually about nine inches, it is tied up into bundles such as the one shown, which costs 1d. in Hitchin market, the price the plaiters pay for it there. Bundles in her apron, the plaiter went to her cottage, when in some districts it was customary to bleach the straws, but as the bleaching process in Essex and Herts usually took

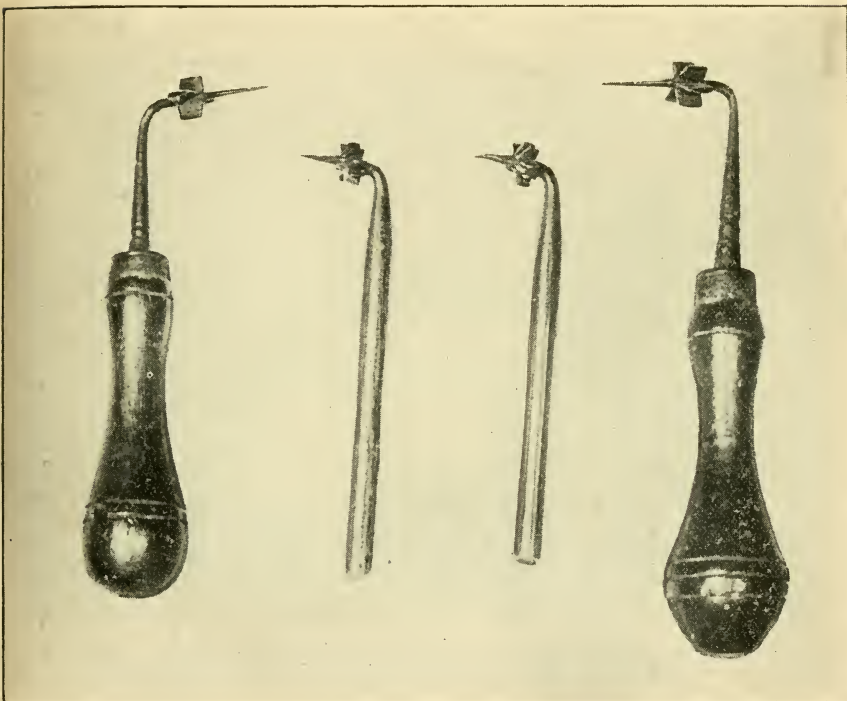
<sup>2</sup> Miss M. Ruggles-Brise writes that till about fifteen years ago straw-plaiting was extensively practised in Finchingfield.

<sup>3</sup> The villagers of Offley have retained in that little centre the traditions of their grandmothers as to the production of fine work worthy to compete with what was known in early Victorian days as Leghorn straw plait.

<sup>4</sup> Although Essex farmers grew and sold some straw for plaiting, the North Hertfordshire men appear to have made this more specially their trade, so much so that it was not an unusual occurrence for an Essex dealer to buy £100 worth of cut straws in Hitchin market and carry them to the Essex village plaiters.

place at a later stage, I defer the description of that process and pass at once to the splitting.

This was accomplished by means of one of the little bone "engines" as they were called. (Fig. 1.) Of late years the bone engine has entirely disappeared, and present day plaiters on the borders of Bedfordshire have told me that they have never used, or even seen, other than metal engines such as those shown,



B

A

A

B

FIG. 2.—IRON STRAW-SPLITTERS, FROM MR. E. BIDWELL'S COLLECTION.

which are modelled on the older instrument of bone. (Fig. 2 A.) Yet it cannot be 30 years since an old dame at Little Maplestead told me she "had tried them new-fangled iron things and did not hold with them; bone for her."

Thanks to Mr. E. Bidwell's courtesy, I am enabled to show two iron splitters, finished somewhat differently from those in my possession, and furnished with wooden handles. (Fig. 2 B.)

From Mr. Bidwell's collection also comes the neat, circular-faced, wooden article, perforated by four holes, containing steel straw splitters for four, five, six, and seven splints respectively.

This, with its cover, is so neatly turned and finished that Mr. Bidwell is justified in thinking it intended for use for fancy straw work in a lady's parlour rather than for the hands of peasant plaiters. (Fig. 3.)

The bone "engines" deserve a few words, for certainly if you examine them you will agree with me that the rustic lads,

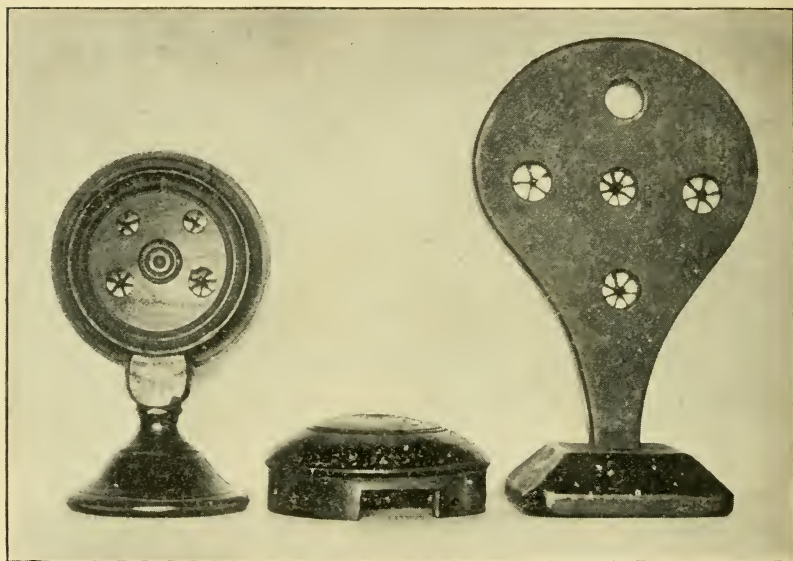


FIG. 3—STRAW-SPLITTERS, FROM MR. E. BIDWELL'S COLLECTION.

or men, who fashioned them had sharp eyes as well as sharp cutting tools.

Having secured a shank-bone of ox from a butcher, the lad sawed the hardest portion into cubes or dice, then with a sharp pen-knife and narrow chisel he fashioned the "engine." In the centre is a sharply-pointed cone from which, a little below, radiate the "cogs" or cutting edges.

Having fixed the engine in its homely wooden handle, the labourer sold it to the straw plaiters at 1d. or more, according to the number of cutting cogs contained therein.



The straw, being thrust over the cone, is pressed against the sharp-cutting edge of the cogs and so split into as many splints as there are cogs.

The resultant splints would, of course, retain their form as segments of a circle, therefore, to flatten them, they were wetted and passed between the rollers of the "mill," (Fig. 4) or, if the plaiter did not possess a mill, under a hand-roll, such as shown. (Fig. 5.)

The "mill" has two beech-wood rollers, the amount of pressure between them being regulated by a turn of the screw

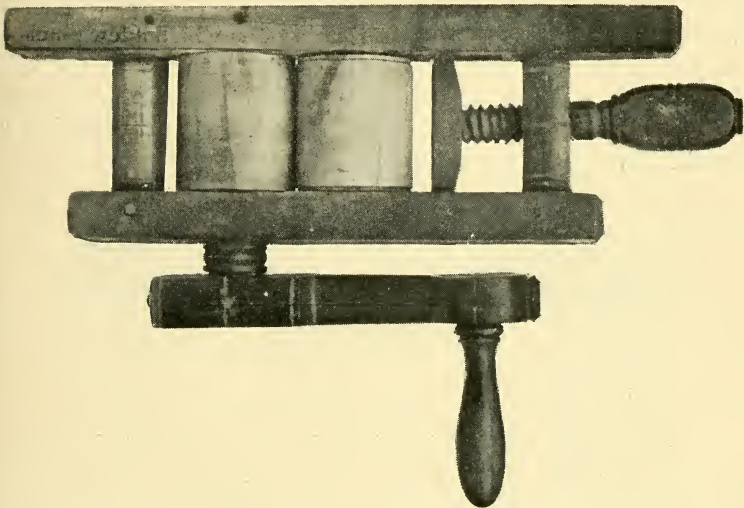


FIG. 4.—WOODEN MILL FOR FLATTENING THE STRAW "SPLINTS."

above, acting upon loose chucks which press upon the axle of the upper roller.

Having passed through the mill, or under the hand-roll, and been damped, the splints are taken by the plaiter (generally held in her mouth till she wants them) and then deftly and rapidly she plaits them, first graduating the lengths so that the projecting ends allow fresh splints, one by one, to be added to the plait till she judges that she has made twenty yards of plait. On this point she satisfies herself by the rough and ready method of placing the plait against her nose with one hand and with the other stretching the plait the full length of her arm; repeating this twenty times, she considers she has made twenty yards of plait.

The next operation is the removal of the projecting splint ends (Fig. 6 A) by the use of scissors or shears, and then the mill or the roller is again requisitioned and the plait is passed through or under till sufficiently flat.<sup>5</sup>

But even when passed through the mill the plait is not finished, for it retains the yellow brown tint of nature's painting. This has to be removed by bleaching, a process formerly carried out by the plaiters, but now done by the factors. The old plan was simple, just a wooden box, a foot or two long and proportionately broad, with a few bars inside, half way up its height, on which the plait was laid, while underneath was placed a pan of live charcoal, or glowing embers, on which a few pinches of brimstone were cast. The door or lid being shut, the box was covered with old clothes or carpet to keep in the fumes, and in a couple of hours the plait was removed white and ready for market. (Fig. 6 B.)

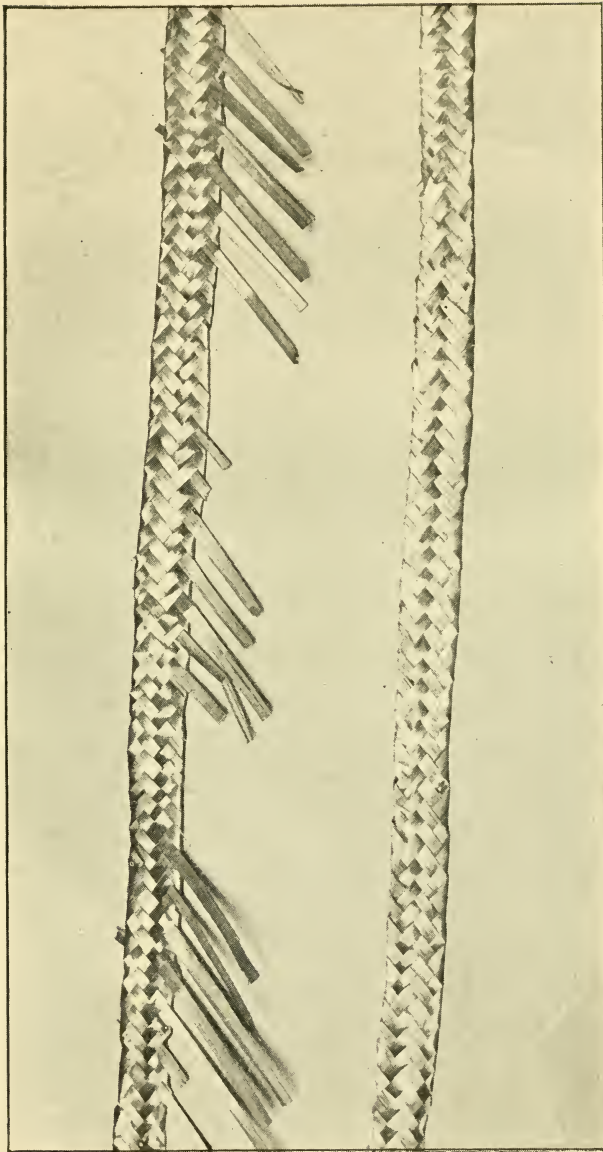


FIG. 5.—HAND ROLLER FOR FLATTENING THE STRAW.

As a collection of gaudy-coloured plaits is exhibited, I must explain that the villagers of Offley occasionally make up this material for the Luton trade. I am told that the factor's agent brings a pattern book of designs to some clever worker, who makes up plaits till the result is satisfactory to the agent. She then proceeds to instruct the other villagers, and the plait is in a few days ready for the factor who has provided the material. But as part of the material used is a foreign fibre, the subject is perhaps outside the scope of this paper.

Returning to the old Essex straw-plaiting, those of us who have seen women and children at their cottage doors on a fine summer day, busily plaiting straw, cannot but feel some sadness that this homely industry should have been killed by the

<sup>5</sup>But fashion having occasionally decreed that a lady's hat should be decorated by having slightly projecting ridges on its surface, it became necessary to produce what is called a whip-cord edge to the plait. Therefore, the upper roller of some mills is made with a little rebate on one end. The whip-cord edge of the plait projecting over this rebate, or groove, would not be crushed flat as the rest.



A

B

FIG. 6.—UNFINISHED AND FINISHED PLAITS

importation of foreign plait, but hard as it seems on widows and old folks, perhaps it is not an unmixed evil, for, as an old man remarked, "when the wives earned ten or twelve shillings a week, their men wouldn't work ; now they must."

My thanks are due to Mr. Sidney Browning for taking the photographs used in illustrating this paper.

[At the conclusion of the paper the President exhibited seven examples of fine plaiting, which he had obtained from Mr. William Simmons, of Castle Hedingham, whose name appeared in *Kelly's Directory* (1886) as that of a "Straw Plait Dealer." Owing to the sudden cessation of the trade a large stock is left in this dealer's hands.

Mr. Bryan Corcoran showed a small straw-mill which had, in recent times, been furnished with a hopper, and converted into a bird-seed crushing mill.

In the course of the discussion following the reading of the paper, Mr. Gould stated that the chief of several causes for the decay of the industry is that English wheat-straw is heavier than the Japanese, and ladies will have hats of light weight. The material is now so cheapened that we no longer find ladies turning and re-turning straw hats as in the days of a generation ago, when a hat was expected to last for years instead of a few months.

The present-day straw plait's of Hertfordshire and Bedfordshire are used almost wholly for men's hats.]

---

## EXPLORATION OF THE RED-HILLS.

(PRELIMINARY ANNOUNCEMENT.)

A Committee has been formed by the Essex Archæological Society and the Essex Field Club for the systematic study of these interesting relics of antiquity, and the settlement, if possible, of the many questions relating to them. The Society of Antiquaries and the Club have each made grants of £10 towards the expenses of exploration, and other bodies and private persons are expected to subscribe.

The Committee consists of:—I. Chalkley Gould, F.S.A. (*Chairman*), F. Chancellor, F.R.I.B.A., Miller Christy, F.L.S., William Cole, F.L.S., Rev. T. H. Curling, B.A., W. H. Dalton, F.G.S., T. V. Holmes, F.G.S., Dr. H. Laver, F.S.A., Dr. Philip Laver, Professor R. Meldola, F.R.S., Charles H. Read, F.S.A., Colonel O. E. Ruck, R.E., F. W. Rudler, I.S.O., F.G.S., and H. Wilmer, C.E., *Hon. Sec. and Treasurer*, St. Alban's Crescent, Woodford Green, Essex.

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# Essex Folk-Songs and Dialect.

---

As before stated, I am very desirous that an attempt at least should be made to preserve records of our Folk-Songs and peculiarities of dialect and intonation, before they are utterly exterminated by Cockney School-Boards and newspapers, while music-hall and concert ditties and the pronunciation of "Stratforde-atte-Bowe" reign in their stead. In this hope I have purchased the requisite Phonographic apparatus, and have made some progress in the art of recording.

But at the outset we are confronted by the difficulty of locating the few lingering native minstrels and *raconteurs*. As in the "Deserted Village":—

"No more the farmer's news, the barber's tale,  
"No more the woodman's ballad shall prevail"

along our forsaken country-side; the true Essex *patois* will ere long be as impossible of recovery as the rhythm of Chaucer.

I should be very grateful to any Essex patriot who will discover and enlist a warbler of the ancient folk or cradle-songs, or quaint harvest-home ballads—a clear voiced and sturdy old-time vocalist who will not fear to face the recording-horn of the phonograph.

This fascinating work of registering for all time native speech and song is being pursued vigorously in America and Austria, and in our own country in the Isle of Man. Essex has heretofore often come to the front in literary and scientific matters; let us then lead the way in rescuing the sound of the fast fading folk-song from oblivion.

I shall be glad to correspond with anyone about this.

WILLIAM COLE,

BUCKHURST HILL,  
July, 1906.

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OF THE

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WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary and Curator.*

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## The Recording and Preservation of examples of the Folk-Songs and Dialect of Essex and East Anglia.

---

The statement on the wrapper of the July part of the *ESSEX NATURALIST* has aroused considerable attention, and I have received promises of help. Some experienced musicians and experimenters have also given valuable advice. Local societies have been induced to take up the subject, and I am hopeful that an important East Anglian organisation will actively co-operate in our own district.

A few experiments carried on during last autumn fully demonstrated the practicability of recording accurately local songs and dialect "pieces" by the phonograph, and we anticipate making substantial progress during the ensuing summer and autumn. Perhaps some of our fellow-members will aid in the way indicated in the first notice.

I hope to be in a position to announce details of the proposed Committee and its work in the near future.

WILLIAM COLE.

THE ESSEX MUSEUM OF NAT. HIST.,  
ROMFORD ROAD,  
STRATFORD, ESSEX.

*February, 1907.*





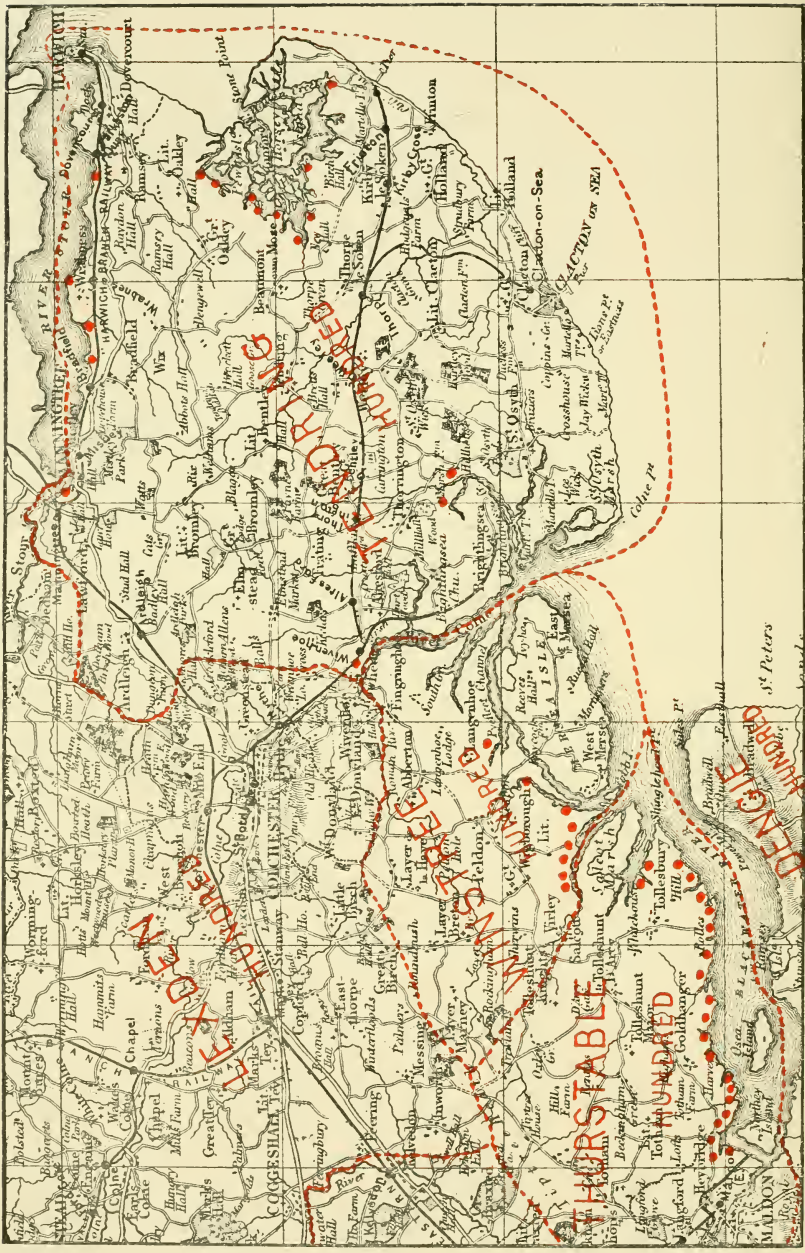


FIG. 1.—MAP OF THE NORTHERN HALF OF THE ESSEX COAST, SHOWING APPROXIMATELY THE SITES OF THE FORTY-FIVE ESSEX SALT-PANS MENTIONED IN DOMESDAY BOOK (1086).

## A HISTORY OF SALT-MAKING IN ESSEX.

By MILLER CHRISTY, F.L.S., *President E.F.C.*

(*With Plates xxx, xxxi, and xxxii*).

[*Read 7th April 1906*].

THE English salt-manufacturing industry has been concentrated so long and so completely in the rock-salt districts of Cheshire and Worcestershire that it is practically extinct everywhere else in Britain. It will be news, therefore, to most people—even to Essex people—that salt is still made in Essex. And not only is this the case, but the industry is one of the very oldest now existing in the county. There is clear documentary evidence that it has been carried on here continuously since the time of King Edward the Confessor (1041-1066), nearly a thousand years ago, and there can be little or no doubt that it is really very much older. It seems probable that the industry originated in Essex before the time of the Romans. In any case, it had become of considerable importance in Saxon days. By Norman times, it had grown to a large industry—at least as important, probably, as in any other English county, except, perhaps, Sussex; and it continued to be of great importance with us right through the Middle Ages and modern times, down to about a century ago, when it declined greatly. At the present time, it is carried on at only one small, though prosperous, establishment. It is of the history of this very ancient, interesting, and necessary industry that I propose to treat in what follows.

Salt-making, like many of our more ancient industries, has left a record of its former prevalence in the county in our modern place and field names. In the first place, the industry has given name to one of our Essex parishes—namely Salcot, at the head of Salcot Creek—in which, undoubtedly, there once existed (as in not a few adjacent parishes) at least one “salt-cote”<sup>1</sup> at which salt was made. Then, again, in the parishes which abut upon the many creeks, estuaries, and inlets on our coast, there are not a few fields called by names which show that salt-works formerly existed in them.<sup>2</sup> Such are “East Salts” in Great

<sup>1</sup> The *New English Dictionary* defines a “salt-cote” as “a place where salt was wont to be made on the sea-shore.” Originally, no doubt, it was the small shed or “cote” in which the manufacture was carried on. “Cote” appears frequently in English, meaning a small building used as a residence (“cot” or “cottage”), or as a shelter for small animals (“dove-cote” or “sheep-cote”), or for making or housing anything (“peat-cote” or “salt-cote”).

<sup>2</sup> See Mr. W. C. Waller’s “List of Essex Field Names” in *Trans. Essex Archaeol. Soc.*, n.s., vol. v., p. 174; vi., pp. 79 and 273; vii., pp. 87 and 319; viii., p. 200, and ix., p. 267. The extensive “saltings” round our coast have, of course, no connection with salt-making.

Wakering, "Home Salt-coats" in Stow Maries, "Salcote-stone Field" in Tollesbury, "Salcots" in Brightlingsea, "Salt-acre Marsh" in East Mersea, "Salt-coat Marsh" in Burnham, "Salt-bridge Field" in Eastwood, "Salt-bridge Field" in Rochford, "Salt-pan Marsh" in Paglesham, "Salt-reach Field" in Eastwood, and "Salts" in Barking. Less easy of explanation are "Salt Acre" in Roydon, "Salt Field" in High Easter, and "Salt Pasture" in Bocking. These are all inland, and were named, perhaps, after some saline excrescence noticed in them. "Salt-box Field" in Waltham Holy Cross was probably so-called from its shape. "Salter's Field" and "Salter's Ten-acres" in Great Oakley commemorate, beyond doubt, the making of salt at that place. "Salter's Piece," in Sible Hedingham, lying far inland, takes its name probably from some former owner named Salter, who, however, must have derived that name from the fact that one of his ancestors followed the occupation of a "salter" or salt-maker. It is worth noting, too, that the inn-sign of the "Three Cups" (generally spoken of as the "Cups"), representing the armorial bearings of the Salters' Company<sup>3</sup>, still occurs five times in Essex—at Harwich, Great Oakley, Colchester, Maldon, and Springfield. Two of the houses bearing the sign are still large and well-known hotels, and all, except the last-named, are situated either actually on or close to that portion of our coast on which salt was made largely. Moreover, in 1777, according to Chapman and André's map, there was a sixth house bearing this sign at Manningtree—another Essex town at which salt was made at the time. Clearly, therefore, the sign is with us a relic of the industry.

The kind of salt made in Essex in early times was that known formerly as "bay salt"—that is, salt made by evaporating sea-water in shallow pans by means of sun-heat.<sup>4</sup> The process, though successful in hot countries further south, must have been very tedious in our climate. Yet there can be no doubt that, during summer, salt could be made, and was made, by this means in Essex. The sea-water was let into large shallow ponds, where it remained until more or less reduced and

<sup>3</sup> Per chevron, azure and gules; three-covered sprinkling-salts argent, sprinkling salt proper.

<sup>4</sup> It was so called because it came originally from "La Baye" (of Biscay), round the shores of which there were many salt-evaporating pans.

concentrated by evaporation. The resulting brine was then further reduced and the salt crystallised by artificial heat.

The salt made here in later times (including the present) has been that known as "white salt"—that is, salt made by boiling sea-water by means of artificial heat. This latter process is now carried on nowhere in England (so far as I am aware), except at our one remaining salt factory, having been superseded everywhere else by the making of salt from rock-salt.

It seems probable that our Essex coast offers greater facilities for making salt from sea-water than any other part of the coast of England. In the first place, we have many extensive, shallow, narrow-mouthed estuaries, creeks, and inlets of the sea—together, probably, far larger, both in number and in area, than those of any other county. It is easy to understand that salt in large quantities must be deposited by evaporation on the extensive mud-flats and saltings which exist in and around these inlets, and that this salt must be taken up in solution and re-deposited, again and again, by each tide—twice, in fact, in every twenty-four hours—till the water becomes exceptionally salt. Further, these inlets lie on the east coast, where the rainfall is far less than on the west, and the water in them is likely, in consequence, to be less diluted by rain and river-water than the water in similar inlets lying on other coasts where the rainfall is greater. This comparatively-light rainfall and the extent, shallowness, and narrowness of our estuaries and inlets seem likely to cause the water in them to be of higher salinity than the water of other English inlets of the kind. It would be interesting if some of our chemical members would conduct experiments with a view to showing whether this is so or not, and, if so, to what extent.

However this may be, nearly all our Essex salt-works were situated, not on the open sea-coast, but on the shores of estuaries and inlets, and generally near their heads. Further, in Norman times (as will be seen from what follows), salt-pans were thickest around those inlets of the sea (as Hamford Water, The Ray, Salcot Creek, and Tollesbury Creek) which were *inlets merely*: not river estuaries. In these, probably, the water is of even higher salinity than that in the estuaries, as it is not diluted by river water. This is, no doubt, especially the case with Hamford Water, which is of very considerable extent, while its mouth is

very narrow and no river of any kind flows into it. At all events, there were many salt-pans round its shores in early days.

That the Romans made salt on our Essex coast is extremely probable, but I know of no actual evidence.<sup>5</sup> That the Saxons did so is certain; for not a few of the salt-pans mentioned in Domesday Book are stated to have been in existence in the days of King Edward the Confessor.

By the time of the Normans, salt-making was a considerable industry upon our coast, and some forty-six salt-pans (*salinæ*) are mentioned in the returns of the Great Domesday Survey made in 1086.<sup>6</sup> All of these (with one exception) were situate on the northern half of our coast-line, in the Hundreds of Tendring, Winstree, and Thurstable, as shown on the accompanying map (Plate xxx).

In Tendring Hundred, there were seventeen salt-pans, three of which (and one other which was disused) had existed in the time of the Confessor. Lawford, Wrabness, Ramsey, Great Bentley, Thorrington, and Elmstead had one each; Bradfield, Great Oakley, Beaumont, and the three Sokens jointly had two each; while Moze had three. Several of these parishes and others which follow lay mainly inland and scarcely touched the salt water, as will be seen on reference to a map. Of these seventeen pans, it will be found that five were situated on the south bank of the Stour Estuary; nine round the shores of Hamford Water; and the remaining three on the north side of the Colne Estuary.

In Winstree Hundred, further south, there were eight salt-pans, none of which are stated specifically to have existed in the time of the Confessor. Of these eight pans, Peldon and Langenhoe (both on the channel separating Mersea Island from the mainland) had one each and Great Wigborough (near the head of Salcot Creek) had no less than six. In this Hundred, too, is the manor or parish of Salcot, which must have derived its name from salt-cotes which existed there in Saxon times, for none remained at the time of the Great Survey.

<sup>5</sup> The late Canon J. C. Atkinson considered (see *Archæol. Journ.*, xxxvii., pp. 196-199; also *Essex Review*, iii., pp. 276-277) that our "Salting-mounds" or "Red-hills" (which are probably older than Roman times) were the sites of old salt-works. Others have held the same view, but the evidence available so far does not suffice to enable us to decide of what ancient industry these mysterious mounds are a relic.

<sup>6</sup> These were first studied by Dr. J. Horace Round (*Victoria Hist. of Essex*, i., pp. 380-382), to whose remarks on the subject I am much indebted.

In Thurstable Hundred, lying still further south, on the north bank of the Blackwater Estuary, there were no fewer than twenty salt-pans and one-half, of which three-and-one-half (and seven others which had disappeared) had existed in the time of the Confessor. Tolleshunt D'Arcy, Tolleshunt Major, Layer Marney, and Heybridge had one each; Goldhanger had one-and-a-half;<sup>7</sup> Great Totham had two; Little Totham had three; while Tollesbury had six (five of these being in the manor of Tolleshunt Guisnes, where there had been no fewer than *twelve* pans in the time of the Confessor). Further, somewhere in this Hundred, the King had four pans, which were in charge of the Sheriff of the County. Most of these pans (probably about twelve of them) were on Tollesbury Creek (an inlet merely), and the remainder on the north side of the Blackwater Estuary.

The only other Essex salt-pan mentioned in Domesday Book was at the opposite extremity of the county, namely at Wanstead, in Becontree Hundred. The locality is not one in which a salt-pan might have been expected; yet the pan in question had existed since the time of King Edward the Confessor.<sup>7A</sup> Wanstead lies mainly upon the River Roding, but it is scarcely credible that salt-water can ever have come up that river thus far. In all probability, therefore, the salt-pan was in the semi-detached portion of the parish (some 38½ acres in extent) which abutted on the River Lea, and was connected with the rest of the parish by a long narrow strip, known as Wanstead "Slip" or "Water slip."<sup>8</sup> The right to this "Water-slip" was formerly guarded very jealously by the parish authorities, but later it became a source of trouble, and it has now been merged in adjacent parishes. In early days, the salt water may have come up the Lea to this point. The only other possible solution is that the so-called salt-pan was a salt refinery of some kind, but there is no evidence in support of this.<sup>8A</sup>

From the foregoing, it would appear that, in Norman times, salt-making in Essex was confined practically to the three Hundreds mentioned above (namely, Tendring, Winstree, and

<sup>7</sup> The other moiety belonged, no doubt, to some other parish. The rights of the two parishes were satisfied, probably, by dividing either the produce or the profits.

<sup>7A</sup> See *Victoria Hist. of Essex*, i, p. 438.

<sup>8</sup> For this suggestion, I am indebted to the kindness of our Vice-President, Mr. Walter Crouch, of Wanstead.

<sup>8A</sup> As Professor Meldola has pointed out to me, a century ago there was a Salt's Green in or a little to the south of Leytonstone, but there is nothing to show that it had any connection with salt-making. It does not appear on modern maps.

Thurstable), which form the northern half of our coast-line. That this really was the case may be doubted. One cannot help thinking that many salt-pans must have existed in the four other Hundreds which form the southern half of our coast-line (namely, Dengie, Rochford, Barstable, and Chafford), but that, for some reason, they were not entered on the returns furnished by those who made the Great Domesday Survey.

At all events, it is certain that salt has been made, at some time or another, on this southern portion of our coast-line, as is proved by the field-names referred to above and other information given hereafter. In Dengie Hundred, on the north bank of the Crouch, there is still (as Dr. Laver has pointed out to me) a farm bearing the name of "Salt-coats," situated at the head of Clement's-Green Creek.<sup>9</sup> Further, Benton says<sup>10</sup> that "indications of old saltcotes or salt-pits" are to be found all along the south bank of the Crouch (in Rochford Hundred), from Heckley to Paglesham. In regard to Paglesham, Dr. Laver writes me as follows:—

"About 1820, when my father was tenant of East Hall, a marsh of thirteen acres, lying next the sea-wall and known as Salt-pan Marsh, was in grass. Its surface was very uneven, by reason of the large number of shallow ponds it contained—the pans in which sea-water had been evaporated formerly for salt-making. As my father wished to grow corn on it, he decided to level it, which he did during one winter by means of spade labour, thereby adding to the farm a most productive field. For many years after this, it was not uncommon for men working in the field to pick up small silver and copper coins—some, I believe, of the time of Charles II. : others, I fancy, earlier."

"I do not know when these salt-works ceased working; but there is evidence that they were in work so far back as the time of Queen Elizabeth. The materials of the store-houses were known to have been brought away after it fell into disuse and to have been used at East Hall in the erection of a barn, which was still standing in 1867. These timbers were of oak and were clearly of the age stated. Many of them retained grooves which had been intended to accommodate sliding window-shutters."

That salt-making continued to be a flourishing industry on the Essex coast throughout the Middle Ages is clear from the many references to it which occur in wills of the Fifteenth and Sixteenth Centuries.

Thus, in 1497, John Beriffe the Elder, merchant, of Brightlingsea, left, for the purchase of two bells for the parish

<sup>9</sup> It is marked on Chapman and André's Map of Essex (1777)

<sup>10</sup> *Hist. Rochford Hund.*, p. 286.



church, "one hundred marks which William Bounde and Robert Barlow owe me for one lot of salt."<sup>11</sup>

In 1501, Henry Boode, of Burnham, left his house to his wife, except "the berne [barn] in which my salte lyeth" and a new shop with an inner chamber in which more salt lay, and he directed that she was not to meddle with these until the salt was out of them.<sup>12</sup>

In 1547, John Creke, of Hockley, describing himself as a "weller" (by which, clearly, he meant a salt-boiler), left to his son Thomas his "salcotte and iiij lededs belonginge to the said salt house, with all other implements that a weller ought to have, but no salte."<sup>13</sup> By "lededs," Creke meant, no doubt, leaden evaporating pans. His salt cote must have been in that small part of Hockley which extends northwards and abuts upon the estuary of the River Crouch.

On Whit-Sunday in 1532, when the churchwardens of Heybridge made a "play" and a feast in their church, they paid two pence "for a pecke of whyte salte"—made, no doubt, in the vicinity.<sup>14</sup>

On 1 June 1567, one Edward Goodding wrote from Ipswich to Sir William Cecil:<sup>15</sup> "I trust to set the [salt-]house in Essex fullie on worke the nynthe of June at the furthest; and, upon one wick press made, I will await upon your honour."

The Rev. William Harrison, of Radwinter, writing in 1587, says<sup>16</sup> that "as wel the baie as white [salt] are wrought and made in England, and more white also upon the west coast, toward Scotland, in Essex, and elsewhere, but of the salt water."

Salt-making continued to flourish on our coast until the beginning of the Nineteenth Century, when it began to decline.

In or about 1710, when some bill relating to the salt trade was before Parliament, a return was made of the places at which salt was then made in England<sup>17</sup>; and from this it appears that, in Essex, salt was made or refined at Manningtree, Colchester,

11 Will dated 20 Jan. 1496-7, and proved 18 July 1497 (P.C.C., 10 Horne).

12 Will dated 20 Feb. and proved 20 April 1502 (P.P.C., 12 Moone).

13 Will dated 28 Mar. 1547 (Archd. Essex, 10 Bastwick, 100-101).

14 See Nichols' *Illustrations of the Manners and Expenses of Ancient Times* (1797), p. 181.

15 S.P.D., Eliz., xliii., no. 1.

16 See Holinshed's *Chronicles*, i., p. 241. In the earlier edition (1577) the words "in Essex and elsewhere" did not appear.

17 See copy in Brit. Mus. (816. m. 13, ff. 108 and 109).

and Maldon; at all of which places, the refiners used "water-borne" coal for boiling their brine-pans.

At Colchester, the industry continued until at least 1793, when John Buckingham was a "dealer in salt" there, and John Luff kept a "Salt Office."<sup>18</sup>

At Manningtree, the industry survived even later; for, in 1823, one James Monteith, residing there, was described<sup>19</sup> as a "salt-refiner and coal merchant."

In 1836, there were in England thirteen salt-works (or, rather, salt-refineries) making salt from rock-salt, using "sea water as a solvent." Of these, two are stated to have been in Essex—at Manningtree and Maldon.<sup>20</sup> Probably, however, it did not survive long at Manningtree.

At Maldon alone has the industry continued to the present day. That the town was formerly recognized generally as a centre of the salt-making trade is shown by the fact that, in 1785, a writer spoke<sup>21</sup> of the demand for "the famous Maldon salt," while in 1823 another described<sup>22</sup> Maldon as "famous for its salt." Yet it seems clear that much of the salt which passed as Maldon salt was made, in reality, in the adjacent parishes of Goldhanger and Heybridge, on the opposite side of the river.

In 1786, Morant wrote<sup>23</sup> that, at Goldhanger, there was a "a considerable salt-work, in which is used Rock-Salt brought from Cheshire, mixed with sea-water." This establishment was, apparently, still working at Goldhanger in 1819, when Cromwell wrote:—<sup>24</sup>

"The salt-works here are considerable. Rock-salt from Cheshire was formerly used; but, in consequence of the erection of very extensive works by Messrs. Bridges, Johnson, and Co., the manufactory of salt from the sea-water by steam has been practised with considerable success."

In all probability, Cromwell here confuses the "very extensive works" of the firm named (which appear to have been, in reality, in the adjoining parish of Heybridge: see *post*) with the earlier salt-works at Goldhanger.

In 1889, our Past-Presidents, Dr. Laver and Mr. E. A. Fitch,

<sup>18</sup> See *Brit. Directory*, 1793, ii., pp. 522 and 523. The "Salt Works" at the Hythe are shown on Thomas Sparrow's *Survey of Colchester* (1767) and on Chapman and André's Map of Essex (1777).

<sup>19</sup> *Pigot's Directory*, 1823, p. 299.

<sup>20</sup> See *Rep. of Select Com. on Salt (British India)* (1836), p. 218.

<sup>21</sup> See John Phillips, *Treatise on Inland Navigation* (1785), p. 18.

<sup>22</sup> *Pigot's Directory*, 1823, p. 289.

<sup>23</sup> *Hist. of Essex*, i., p. 389. See also the *Hist. of Essex*, by "a Gentleman," v (1772), p. 385.

<sup>24</sup> *Excursions through Essex*, i, p. 41.





FIG. 2.—THE MALDON SALT-WORKS.  
(From a photograph by MILLER CHRISTY.)



FIG. 3.—THE SETTLING-POND AT THE MALDON SALT-WORKS.  
(From a photograph by MILLER CHRISTY.)

excavated the site of some old salt-works on Bound's Farm, Goldhanger (very likely those mentioned by Morant), and found extensive flues of brick, pipes and pans of lead, and some small coal which had been used, no doubt, for boiling the water. Dr. Laver has been good enough to give me the following information :—

“ On arriving [he says], we found the men working in a field next to a grass marsh just inside the sea-wall. This grass marsh had in it various depressions, some of which might have been old salt-pans, but one had been, apparently, the bed of a small creek, of which there were much more distinct traces outside the sea-wall.

“ In the ditch and bank of the field in which work was going on, and in the adjoining portion of a field to the east, we found the surface of the ground slightly raised, due to a thick superimposed stratum of burnt earth. In this red and black soil, trenches had laid bare the remains of the foundations of buildings; and, as the trenches extended, the general ground-plan became more or less clear. I regret now that I did not go to the expense of having a plan drawn to scale, as this could have been done quite easily.

“ At one place, there was a well about three feet square and three or four feet deep. It was lined with planking, which had been very well jointed, and had in it the remains of a wooden pump.

“ Not far off was a small square building which had evidently contained the furnace; and, close by it, in another small square building, there remained a hundredweight or two of very good coal, which looked exactly like the bright coal, known as “ Wall's End,” used years ago in the district.

“ Near these, again, were some shallow brick tanks, clearly evaporating pans, about six feet long, three feet broad, and one foot deep. Their sides were formed of double layers of brick, containing flues leading from the furnace. Originally, no doubt, they were lined with lead, some pieces of which we found; but, the flue being contained within the brickwork, the heat did not come into direct contact with the lead. From one of the tanks, a brick drain led to the well above mentioned.

“ All these remains were covered by about three feet of the burnt red and black soil mentioned above. We came to the conclusion that this salt-cote had been destroyed by fire, and that the *debris* had been spread evenly over the whole site, covering the boiling house and everything else.

“ We could find no clear evidence as to the exact date of construction of these works, but the size of the bricks used showed that the works had been built not later than Jacobean times.”

The firm of Bridges, Johnson, and Co., of Heybridge, seems to have disappeared before 1823, when one John Bridges (who had been probably a member of it) owned “ very extensive works ” in Heybridge.<sup>25</sup> These works were situated on the sea-wall facing Collier's Reach, close to Heybridge “ Basin,” and on a marsh which is still called “ Salt Court.” Here are yet to

<sup>25</sup> *Pigot's Directory, 1823, p. 298.*

be seen the ruins of extensive walls, built of shingle, bricks, and cement. Close at hand is a large salt-pan, about fifty yards square and still full of water, while traces of other pans may also be seen. Near the high road skirting the marsh is the store-house in which the manufactured salt was kept. It is now used as a malting. Local tradition says that the business carried on at these works never yielded a profit, and that they ceased working altogether on the abolition of the salt tax in 1825, a few years only after the buildings had been erected.<sup>26</sup> Indeed, the name of Bridges does not appear in *Pigot's Directory* for 1826.

At this time, however, one Robert Worraker, described<sup>27</sup> as a "salt-maker," was living at Heybridge, having, perhaps, bought Bridges' business. Later, either he or one of his descendants appears to have removed the works to near Full-bridge, at Maldon, on the opposite bank of the river. Here he carried on a small and dwindling business till 1882,<sup>28</sup> when, as the only alternative to closing the works altogether, he sold the whole concern to Mr. T. Elsey Bland, of Maldon. That gentleman has since carried on the business in the old works (Fig. 2 Pl. xxxi), with increasing success, trading as the Maldon Crystal Salt Company. The method of manufacture is as follows:—

At the top of the highest spring tides (unless there has been recent heavy rain), the salt water of the river is let into a small reservoir (Fig. 3, Pl. xxxi), some thirty-five feet square and fifteen feet deep, on the river bank. After sufficient time has been allowed for any sediment to settle, as much of the water as is required is pumped up into a large wooden tank, holding some 1,000 gallons, in which it is clarified by a simple process, the exact nature of which is not disclosed. This tank is in the works (shown in Fig. 2). After this, the water is run off into two large boiling-pans, each about ten feet square and a foot deep, in which it is again "fined" by a simple process. The fires which heat these pans are lighted every morning between seven and eight o'clock; and, in about three hours, the water begins to boil, but is not allowed to continue to do so for more than ten or fifteen minutes. It is kept hot, but not boiling, for about ten hours, and is then allowed to cool gradually, any impurities which rise to the surface being removed by means of

<sup>26</sup> See Fitch, *Maldon and the River Blackwater* [1898], pp. 50-51.

<sup>27</sup> *Pigot's Directory*, 1826, p. 544.

<sup>28</sup> At the Census of 1871, four persons (all, no doubt, in Worraker's employ) were returned as engaged in salt-refining in Essex.

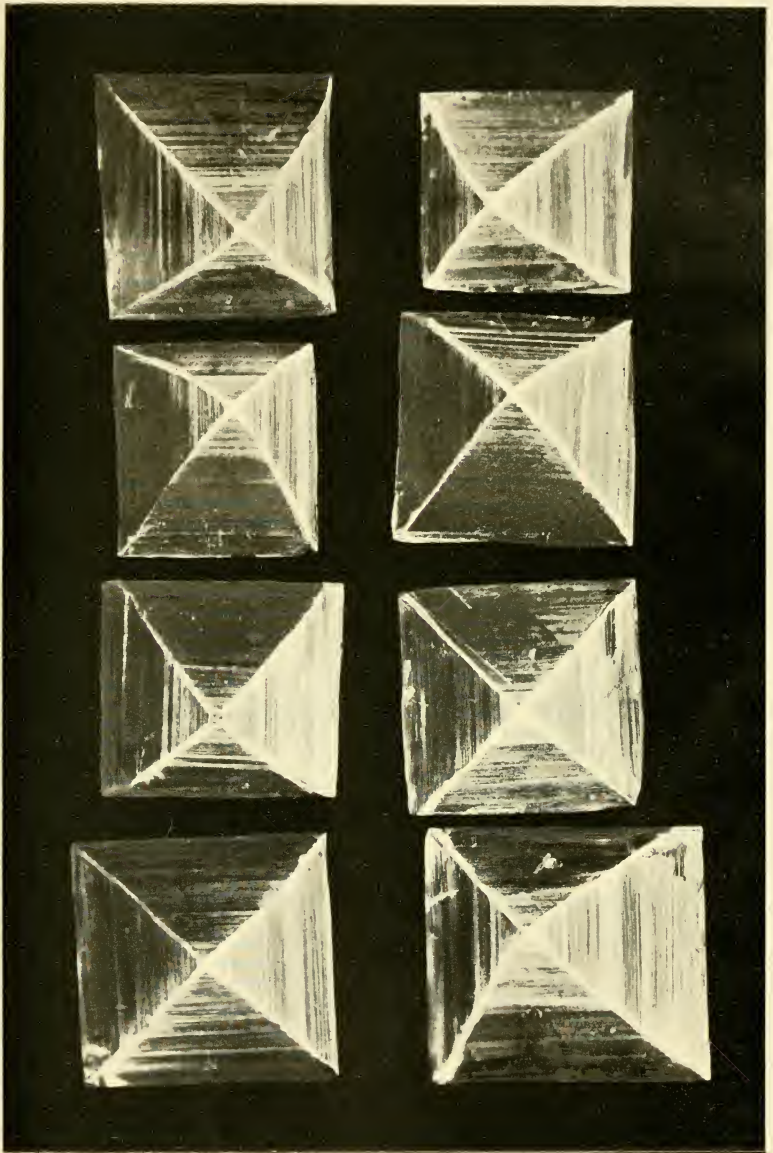


FIG. 4.—SALT CRYSTALS FROM MALDON SALT-WORKS.  
*(About two-thirds nat. size.)*





a brass skimmer. Soon after the water has boiled, salt-crystals begin to form on the surface, in a manner which is most interesting to watch. These crystals (Pl. xxxii) are extremely curious objects—thin, white, shell-like, quadrangular at base, rising in the shape of a pyramid with a truncated cone.<sup>29</sup> In size, they vary greatly—some being as much as two inches square: others, equally perfect, no more than one-eighth of an inch. The form is invariable, but the size seems to be determined at the commencement of crystallization; and, after a crystal has started to form, it does not grow. The gentler and shorter the boiling, the finer and more perfect the crystals: violent boiling breaks them into fragments. Such crystals as these are often called “hopper-crystals” (in French, *trémis*). Maxwell Lyte says<sup>30</sup> that they tend to form only in still brine. It is said,<sup>31</sup> too, that the addition of a small quantity of alum to the brine tends to increase their size, but this is not done, I believe, at Maldon. Finally, those crystals which have formed on the surface are skimmed off and set aside for use as the finest table-salt; those lower down are next taken out and used as pickling-salt; while the residue then left in the pan, being less pure, serves for agricultural purposes. This operation is repeated daily, two pans being boiled, the daily yield of salt being about half a ton, or about eighty tons annually.

This output is, of course, insignificant in quantity when compared with that of the Cheshire and Worcestershire rock-salt industry, amounting to hundreds of thousands of tons annually; but, in respect of purity and attractive appearance, Maldon Crystal Salt is far superior to any other produced in Britain, and this enables it to hold its own on the market. Practically, indeed, it reaches the standard of absolute chemical purity, consisting of common salt (chloride of sodium) with an admixture of no more than 0·383 per cent. of other matter, as the following analysis by Dr. A. H. Hassall shows:—

*Maldon Crystal Salt Company's Pure Table Salt.*

	(100 parts by weight)
Chloride of Sodium . . . . .	99·617
Chloride of Magnesium . . . . .	0·198
Sulphate of Magnesium . . . . .	0·067
Sulphate of Lime . . . . .	0·118
Total	100·000

<sup>29</sup> A salt-crystal forms the trade-mark of the company.

<sup>30</sup> Spon's *Cyclopædia*, ii, p. 1710 (1882).

<sup>31</sup> Thorpe's *Dic. of Applied Chemistry*, iii, p. 436.

Dr. Hassall adds that it is absolutely free from "mechanical impurity and . . . contains a remarkably small proportion of the salts of magnesia, lime, etc." In consequence of this unusual purity, it is in demand among medical men for stimulating the action of the heart. A far smaller quantity is required, either for table or pickling purposes, than of the ordinary salt of commerce, and there is an absence of that bitter after-taste so often noticed in the case of ordinary salt and due to impurities. Further, it is almost completely non-deliquescent—ininitely less so than ordinary salt—owing to the much smaller quantity it contains of chloride of magnesium, which greedily absorbs moisture from the atmosphere. In every respect, therefore, Maldon Salt is superior to ordinary salt.

The Maldon Salt is sold in card-board boxes of varying sizes, and priced from sixpence upward, each box bearing the Company's trade-mark, a salt crystal. It is stocked by some of the largest London shops and stores, and is used at some of the leading London restaurants. In appearance it bears little resemblance to ordinary table-salt, being sold, not in powder, but actually *in crystals*. The larger of these naturally get broken, but many small ones are to be found whole among the mass. For use at table, it requires crushing.

Let us hope that the manufacture of salt at Maldon, small though it is, may long continue to flourish.

[The Club is much indebted to Mr. Christy for the blocks and prints of the three plates illustrating this paper.—ED.]

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## THE MOSSES OF ESSEX : A CONTRIBUTION TO THE FLORA OF THE COUNTY.

By FRED. J. CHITTENDEN, County Technical Laboratories, Chelmsford.

[Read February 24th, 1906.]

THE Moss Flora of Essex is by no means a rich one, since, at present, the list (excluding the Sphagnaceæ, which formed the subject of a previous communication, see *ESSEX NATURALIST* xiv. (1906) pp. 111-116) includes only about 200 species and sub-species out of a total nearly approaching 600 known to occur within the British Isles. The shortness of this list is due to three principal causes:—

1. The fact that only certain parts of Essex have as yet

been carefully searched. Epping Forest, the district immediately round Chelmsford, the neighbourhoods of Witham, Kelvedon and Saffron Walden are the only parts at all thoroughly explored so far, and even in these some as yet unrecorded species, and especially varieties, will no doubt be discovered. The whole of the eastern coast district in the broadest sense, the Roothings, a large part of North Essex, and the whole of the south from Shoebury to Grays and Purfleet, in which district as the chalk crops up several unrecorded or rare species should be found, have yet to be carefully searched; it is therefore plain that in this direction much remains to be done.

2. The lack of diversity in the soils of Essex is another point of importance, and this, together with the low elevation of the whole of the county, has had a marked effect in lessening the number of species likely to be found, and is a very real cause of a poor Moss Flora.

3. The small rainfall of the county is another real cause not only of a lack of luxuriousness in the growth of the species occurring, but also probably of a smaller number of species being met with than in the west of the country. The arboreal species especially are poorly represented; the trees upon which they usually grow are present, but it is seldom that one finds a moss-grown tree, especially in the neighbourhood of London. This may be due in part to the large amount of acid brought down by the rain in many parts of the county, as Mr. Dymond has pointed out in his paper on "Sulphate of Lime in Essex Soils and Subsoils" (ESSEX NATURALIST, xiv., p. 62).

The fruiting of mosses as a general rule appears to be most abundant where the vegetative development is greatest, and we find, as a rule, much less production of fruit by mosses in Essex than we notice in the moister western parts of the country, where the vegetative growth is more luxuriant. In this connection it is worth noting that a considerable number of those mosses that fail to produce fruit, or that fruit but seldom, frequently form numerous small buds or gemmæ, which are capable of reproducing the plant, as we see in *Tetraphis pellucida*, *Tortula papillosa* and *T. mutica* (the leaves of which, like the last, are frequently covered with numerous round gemmæ), *Orthotrichum lyellii*, *Aulacomnium androgynum*, and to a less extent *A. palustre*, or even reproducing themselves by a piece of leaf which breaks off, as in *Campylopus*

*pyriformis*, a common moss of the peaty soil of heaths in the county, usually found in tufts covered with the broken leaves.

No species of moss is restricted in its British distribution to Essex, although until recently *Zygodon forsteri* had been found only in this county, at first on a felled tree in Walthamstow at the beginning of the last century; later, on beeches in at least two localities in Epping Forest. It has now been found in two other English counties. It is curious that wherever this moss occurs it is always found in a very scattered fashion, both in this country and on the continent. One would scarcely look for such an alpine species as *Grimmia commutata* in Essex, but Mr. H. N. Dixon found it growing on the roof of a house at Wickham Bishops; perhaps other alpine species may be discovered occasionally in a similar fashion if search is made for them. It was suggested that possibly the spores had been carried by the wind across the North Sea from the mountains of Norway, where the moss is common.

Among species of which there is at present no record for the county, but which should be found here, may be mentioned *Polytrichum urnigerum*, *P. gracile*, *Seligeria paucifolia*, *Ditrichum schreberi*, *Leptodontium flexifolium*, *Encalypta streptocarpa*, *Bryum pendulum*, *B. donianum*, *Mnium stellare*, *Hypnum polygamum*, and *H. lycopodioides*.

Not only is there much to be done in Essex as far as mere species recording goes, but anyone taking up the study of the mosses will find them of much interest in themselves. We have to deal with a series of plants in which the gametophyte generation has reached the fullest development forming the leafy plant, while in all other plants the leafy plant belongs to the sporophyte generation with the sole exception of the nearly allied Hepaticæ. The Musci have followed a line of development of their own, and it has come to an end with the more elaborate of their forms. The manner of obtaining water is full of interest and varies greatly in the different species, affording matter for much study; the form and papillosity of the leaves, the arrangements of lamellæ on the leaf surface, the presence of hair points, etc., are all matters apparently closely connected with the obtaining of an adequate supply of water. The part they play in the economy of Nature, the relation they bear to other forms of life, particularly as formers of soil, and lastly, a subject about which we probably

know least, although of the first importance, the distribution of the various forms according to the soil and situation in which they grow, are among other points of interest. This biological survey should go hand-in-hand with a similar survey of the flowering plants, and the land and freshwater molluscs particularly, but other forms of life should not be ignored. Something has been done in various parts of the world of late on these lines, but nothing so far as I know in Essex.

In the compilation of the following list I have had the kind assistance of, and desire to tender my best thanks to, Mr. W. Cole, through whom I have been able to carefully examine the collections belonging to the Essex Field Club; Mr. A. Gepp, for assistance in consulting the specimens collected by Mr. Forster, now in the Herbarium of the British Museum; Mr. G. Maynard, who kindly compiled a list of mosses collected by Mr. F. Y. Brocas, and now in the Saffron Walden Museum; Mr. W. Sherrin, for the list of mosses collected by himself in Essex; Mr. J. Wheldon, for naming the critical group of *Hypnum* known as *Harpidium*; the Rev. E. N. Blomfield, for additions to the list in the *Victoria History of Essex*; and Mr. H. N. Dixon for lists and much help when in doubt.

The following is a list of the sources from which the information contained in the following list of localities has been derived.

- (1) 1724. RAY; JOHN. *Synopsis Methodica Stirpium Britannicum*, Ed. III.
- (2) 1800. FORSTER, EDWD. Herbarium in the British Museum, Natural History, S. Kensington.
- (3) 1802. SOWERBY, JOHN. *English Botany*.
- (4) 1833. HOOKER, SIR J. *English Botany*, Vol. v.
- (5) 1856. COOPER, DANIEL. *Flora Metropolitana*.
- (6) 1843. SIDEBOTTOM, J. Specimens in Mr. Wilson's Herbarium in the British Museum, Natural History.
- (7) 1845. GREENWOOD, A. "Mosses found near Chelmsford" in the *Phytologist*, Vol. II.
- (8) 1860-1876. VARENNE, E. G. Collection in the Herbarium of the Essex Field Club.
- (9) 1874. BROCAS, F. Y. Collection in the Herbarium of the Saffron Walden Museum.
- (10) 1800-1905. BRAITHWAITE, DR. R. *British Moss Flora*.
- (11) 1885. ENGLISH, J. T. Exsiccata of the Mosses of Epping Forest, in the Herbarium of the Essex Field Club, also many loose specimens collected in the Forest, mostly near Epping.
1886. ENGLISH, J. T. MS. list of the Mosses of Epping Forest.

- (12) 1890. BUXTON, E. N. "Mosses." *Epping Forest*, Ed. III.  
[This list was made by Mr. English. Ed.]
- (13) 1890. HOLMES, E. M. Notes in the *ESSEX NATURALIST* and some loose specimens in the Herbarium of the Field Club.
- (14) 1898. DIXON, H. N. List of North Essex Mosses in the *Journal of Botany*, May, 1898.
1906. DIXON, H. N. MS. list of additional mosses collected in Essex.
- (15) 1900. SALMON, E. S. Notes on Essex Mosses in the *ESSEX NATURALIST*.
- (16) 1901. READ, MISS E. Mosses collected near Southend in the Herbarium of the Biological Dept., Technical Laboratories, Chelmsford.
- (17) 1903. TURNER, E. E. Mosses collected near Coggeshall, in my own Herbarium.
- (18) 1903. SHENSTONE, J. C. *Victoria History of Essex*. Article "Botany."
- (19) 1905. SHERRIN, W. R. MS. list of mosses collected in Essex.

The numbers in brackets following the name of a locality in which a moss has been collected correspond with the numbers in brackets in the list of authorities consulted, and indicate the source of the information. Only the first person recording a moss from a certain locality is indicated. The sign ! following a locality indicates that I have examined the specimen upon which the record is based, and the sign !! indicates that I have collected the species in the locality within the past five years.

\* This sign prefixed to a species indicates that I have seen fruiting specimens from the county.

The sequence followed is that of the arrangement in the *Students' Handbook of British Mosses*, Ed. II (1904), by H. N. DIXON.

#### TETRAPHIDACEÆ.

##### \**Tetraphis pellucida* Hedw.

Epping Forest (11) !; Monk Wood (13) !; Theydon Bois (15) !!; nr. Ambresbury Banks (12); nr. Chelmsford (7); Woodham Walter Common (7) !; Little Baddow Common !!

#### POLYTRICHACEÆ.

##### \**Catharinea undulata* Web. and Mohr.

Epping Forest (11) !; Loughton !!; Mill Green !!; nr. Chelmsford (7); N. Essex (14); Chignal Smealy !!; Little Baddow Common !!; Hazeleigh (13); Braxted (8) !; Feix Hall Shrubbery (8) !; Saffron Walden (9).

\**var. minor* Web. and Mohr.

Epping Forest (11) !; Braxted (8) !

**C. angustata** Brid.

Wickham Bishops (14).

\***Polytrichum nanum** Neck.

On the Forest between Nagg's (Hagger ?) lane and the Windmill (2) !; nr. Snaresbrook and nr. the gravelly ride by the south side of Snaresbrook pond (2) !; Walthamstow (2) !; Epping Forest (11) !; Theydon Road (11) !; Lower Forest (11) !; nr. Chelmsford (7); N. Essex (14); Tiptree Heath (8) !

\***P. aloides** Hedw.

Epping Forest (12); Mill Green !!; Galleywood Common (7); gravel pit, Totham (8) !

\**var. dicksoni* Wallen.

In gravel pit, Totham (8) !

\***P. piliferum** Schreb.

On the Forest (2) !; Epping Forest (11) !; Theydon (15); Warley Common !!; nr. Chelmsford (7); Danbury !!; Tiptree Heath (8) !; Osea Is. (13).

\***P. juniperinum** Willd.

"On the Forest, gravelly soil with the *piliferum*" (2) !; Epping Forest (11) !; gravel pits by the Wake Arms (12); Warley Common (8) !; nr. Chelmsford (7); Woodham Walter Common (8) !; Totham (8) !; N. Essex (14); Saffron Walden (9).

\***P. formosum** Hedw.

Epping Gravel pit (6) !; Epping Forest (11) !; Monk Wood (13) !; South Essex (14); Theydon Bois !!; Warley Common (8) !; nr. Chelmsford (7); Chalkney Wood (8) !; Pod's Wood (8) !; Woodham Walter Common (8) !; Wickham Bishops (8) !; N. Essex (14).

\***P. commune** Linn.

"On the Forest, very common" (2) !; Epping Forest (11) !; Leyton !!; Theydon Bois !!; nr. Chelmsford (7); Galleywood Common !!; N. Essex (14); Woodham Walter Common (8) !; Saffron Walden (9).

*var. minus* Weis.

Tiptree Heath (8) !

## DICRANACEÆ.

\**Archidium alternifolium* Schimp.

"On the forest near the great bog near Salter's Buildings" (2) ! ; in a woody part of the forest near Hagger Lane (2) ! The plate in Sowerby's English Botany of this species was drawn from specimens gathered in moist spots upon Epping Forest by Mr. Edwd. Forster. The plate is dated 1st January, 1810.

\**Pleurodium axillare* Lindb.

Hagger Lane, Walthamstow (2) ! ; Monk Wood and on banks of a stream crossing the green ride near Debden Slade (13) ; wood near Inworth Church (8) ! ; Saffron Walden (9).

\**P. subulatum* Rabenh.

Epping Forest (2) ! ; Lower Forest !! ; Mill Green !! ; Chelmsford (7) ; Witham (8) ! ; Braxted (8) ! ; Saffron Walden (9).

\**P. alternifolium* Rabenh.

Totham (8) ! ; Braxted (8) ! ; Kelvedon (8) !

\**Ditrichum homomallum* Huepe.

Mile End, Colchester (8) !

*Seligeria calcarea* Br. and Schimp.

Saffron Walden (9).

\**Ceratodon purpureus* Brid.

On the Forest (2) ! ; in gravelly soil on the Forest near High Beach (2) ! ; Epping Forest (11) ! ; Warley Common !! ; near Chelmsford (7) !! ; Galleywood Common !! ; Norton Heath !! ; Rivenhall (8) ! ; N. Essex (14) ; Kelvedon (8) ! ; Little Baddow Common !! ; Osea Island (13) ; Hatfield Forest (13) ; Saffron Walden (9).

\**Dicranella heteromalla* Schimp.

"In a ditch near Snaresbrook Pond" (2) ! ; near Hale Banks, Walthamstow (2) ! ; Epping Forest (11) ! ; Monk Wood, Epping Forest (13) ! ; Leyton !! ; Loughton !! ; Theydon !! ; Warley Common (8) ! ; Mill Green Common !! ; nr. Chelmsford (7) ; Linguard Common !! ; banks, Woodham Walter (8) ! ; Little Baddow Common (8) ! ; Braxted (8) ! ; Pod's Wood (8) ! ; Saffron Walden (9).



\**D. cerviculata* Schimp.

"On the forest near Wanstead Park in a gravel pit"  
(2)! All the specimens in Mr. Varenne's collection  
labelled as belonging here appertain to the last species.

\**D. rufescens* Schimp.

"Side of clay pits, Epping Plain, scarce, easily over-  
looked from its small size and colour" (11)!

\**D. varia* Schimp.

Pond near Barnes' Mill. Springfield (7); Kelvedon (8)!;  
in a field near Newport, Essex (2)!; Saffron Walden (9).

\**var. tenuifolia* Br. and Schimp.

Little Hale Bushes, Walthamstow (2)!

\**Dicranoweisia cirrata* Lindb.

"On the rails in our garden," Walthamstow (2)!;  
"on the bottom of an oak tree in a field in Hoe  
Street, Walthamstow" (2)!; High Beach (11)!!;  
Moreton (14); nr. Chelmsford (7); Broomfield!!;  
Kelvedon (8)!; N. Essex (14); Hatfield Forest (13);  
Saffron Walden (9).

\**Campylopus flexuosus* Brid.

Epping Forest (11)!; Loughton!!; nr. Chelmsford (7).

\**C. pyriformis* Brid.

"On the forest not far from Chingford Hatch" (2)!;  
very uncertain, cropping up in quantities after the  
felling of timber trees (11)!; Monk Wood (13);  
Theydon!!; Galleywood Common!!; Linguard Com-  
mon!!; N. Essex (14); Little Baddow Common (8)!;  
Wood near Woodham Walter (8)!

*C. fragilis* Br. and Schimp.

Chantrey Wood (8)!

*Dicranum fuscescens* Turn.

Epping Forest (12). I have seen no specimens.

*D. bonjeani* De Not.

"On the forest near Snaresbrook and Hale Banks" (2)!;  
Epping Forest (11)!; Loughton!!; Mill Green  
Common!!; Galleywood Common!!; Woodham  
Walter Common (8)!; Tiptree Heath!!; West  
Bergholt Heath (8)!

\**D. scoparium* Hedw.

On the forest (2) ! ; Leyton !! ; Loughton !! ; Mill Green Common !! ; Carpenter's Wood, Southend (16) ! ; near Chelmsford (7) ; N. Essex (14) ; Gt. Totham (8) ! ; Wood near Woodham Walter (8) ! ; Saffron Walden (9).

\**var. orthophyllum* Brid.

Tiptree Heath (8) ! ; wood at Wickham Bishops (8) !

*D. majus* Turn.

Monk Wood, Epping Forest (13) !

\**Leucobryum glaucum* Schimp.

On open parts of the forest (2) ! ; Epping Forest (11) ! ; Loughton !! ; wood near Warley Barracks (8) ! ; near Chelmsford (7) ; N. Essex (14) ; Tiptree Heath (8) !! ; wood near Woodham Walter (8) !

Mr. English recorded this species as in fruit in Epping Forest, but the fruit on all his specimens belongs to *Webera nutans* which was mixed with the *Leucobryum*. In ESSEX NATURALIST, VI. (1881), Mr. Waller, of Tottenham, records the fruiting of this species in the forest. I have seen no fruiting specimen from the county.

## FISSIDENTACEÆ.

\**Fissidens exilis* Hedw.

"In a damp shady place on a clay soil on the forest" (2) ! ; Hangboy Slade, Epping Forest (15) ; Kelvedon Hall Woods (8) !

\**F. viridulus* Wahl.

N. Essex (14) ; Braxted (8) ! ; Hatfield Forest (13) ; Kelvedon (8) !

\**F. pusillus* Wils.

Kelvedon (8) ! ; Great Tey (8) !

\**F. incurvus* Stark.

N. Essex (14) ; Bank near Kelvedon Hall Wood (8) !

\**F. bryoides* Hedw.

In hedges and woods, Epping Forest, common (2) ! ; Pilgrim's Hatch, Brentwood !! ; Galleywood Common !! ; nr. Chelmsford (7) ; Boreham !! ; N. Essex (14) ; Kelvedon (8) ! ; Coggeshall (17) ! ; Saffron Walden (9).

\***F. crassipes** Wils.

By side of a ditch, Kelvedon (8)!

\***F. adiantoides** Hedw.

In a long bog on the forest near High Beach and the King's Oak (2)!; Galleywood Common (7)!!; Hatfield Forest (13)!; Saffron Walden (9).

\***F. taxifolius** Hedw.

On the Forest (2)!; Hazeleigh (13); Writtle!!; Chelmsford (7)!!; Broomfield!!; N. Essex (14); Braxted!!; Kelvedon (8)!; Coggeshall (17)!; Earls Colne!!; Hatfield Forest (13); Saffron Walden (9).

## GRIMMIACEÆ.

\***Grimmia apocarpa** Hedw.

Nr. Chelmsford (7); wall, Kelvedon (8)!!; wall, Witham (8)!; on the bottom of a tree, Rivenhall (8)!; Saffron Walden (9).

\***G. pulvinata** Smith.

Walthamstow (2)!; Epping Forest (11)!; wall, Epping (11)!; nr. Chelmsford (7); Broomfield!!; Springfield!!; Chignal Smealy!!; N. Essex (14); Kelvedon (8)!!; Dovercourt (19)!; Hatfield Forest (13); Saffron Walden (9).

**G. commutata** Hub.

Tiled roof at Wickham Bishop's (14).

**Rhacomitrium canescens** var. *ericoides* Br. and Schimp.

Tiptree Heath (8)!

## TORTULACEÆ.

\***Acaulon muticum** C. Muell.

On a bank in the lane from Hoe Street to Markhouse Field, Walthamstow (2)!; nr. Chelmsford (7); Saffron Walden (9).

\***Phascum cuspidatum** Schreb.

Epping Forest (11)!; Walthamstow (2)!; nr. Chelmsford (7)!!; Broomfield!!; N. Essex (14); Kelvedon (8)!; Dovercourt (19)!; Saffron Walden (9).

\*var. *schreberianum* Brid.

Nr. Wicken Bonhunt (2)!

\***P. curvicolle** Ehrh.

Nr. Chelmsford (7); Audley End (10).

\**Pottia recta* Mitt.

Saffron Walden (9).

\**P. heimii* Furnr.

Dovercourt (19) ! ; nr. Manningtree (8) ! ; Alresford Creek (8) !

\**P. truncatula* Lindb.

Walthamstow (2) ! ; Epping Forest (11) ! ; Norton Heath !! ; nr. Danbury !! ; nr. Chelmsford (7) ; Hazeleigh (13) ; N. Essex (14) ; Broomfield !! ; Writtle !! ; Kelvedon (8) ! ; Tiptree Heath (8) ! ; Mark's Hall !! ; Hatfield Forest (13) ; Saffron Walden (9).

\**P. intermedia* Furnr.

On Epping Forest between Hagger Lane, Walthamstow, and the house where the windmill formerly stood (2) ! ; nr. the great bog by Salter's buildings (2) ! ; Carpenter's Wood, Southend (16) ! ; N. Essex (14) ; Broomfield !! ; Kelvedon (8) !

\**P. wilsoni* Br. and Schimp.

Nr: Wivenhoe (8) !

\**P. minutula* Furnr.

Westcliff (16) ! ; Rainsford End, Chelmsford !! ; N. Essex (14) ; Braxted (8) ! ; Kelvedon (8) !

\**P. starkeana* Mull.

Kelvedon (8) ! ; Feering (8) !

\**P. lanceolata* C. Muell.

On a bank between Quendon and Newport (2) ! ; Feering (8) ! ; Kelvedon (8) ! ; Yeldham (8) ! ; nr. Chelmsford (7) ; Saffron Walden (9).

\**Tortula pusilla* Mitt.

Kelvedon (8) ! ; Rivenhall (8) ! ; Saffron Walden (9).

\**T. rigida* Schrad.

Chalk pits, Purfleet (9) ! ; near Chelmsford (7).

\**T. ambigua* Angstr.

Kelvedon (8) !

\**T. aloides* De Not.

Kelvedon (8) ! ; near Halstead (8) ! ; near Yeldham (8) !

[**T. atrovirens** Lindb.

This species is recorded for Essex in the *Victoria History of Essex*, probably on the strength of a specimen so labelled in Mr Varenne's collection; but this is a species of *Pottia*. The record must therefore be considered unconfirmed.]

\***T. cuneifolia** Roth.

Near Springfield (7) ! ; Military Road, Colchester (8) ! ; near W. Bergholt (8) ! ; near Wivenhoe (8) !

\***T. marginata** Spruce.

Kelvedon (8) !

\***T. muralis** Hedw.

On walls, very common (2) ! ; Epping Forest (11) ! ; Leyton !! ; near Chelmsford (7) ! ; N. Essex (14) ; Kelvedon (8) !! ; Stisted !! ; Broomfield !! ; Dovercourt (19) ; Saffron Walden (9).

*var. aestiva* Brid.

Kelvedon (8) ! ; Nayland (8) !

\***T. subulata** Hedw.

Epping Forest (12) ; near Chelmsford (7) ; Broomfield !! ; N. Essex (14) ; Wickham Bishops !! ; Kelvedon (8) ! ; Dovercourt (19) ! ; near Quendon (2) ! ; near Henham (2) ! ; Saffron Walden (9).

\***T. mutica** Lindb.

Cobbin's Brook (11) ! ; nr. Chelmsford (7) ; Rainsford End !! ; Writtle !! ; Boreham !! ; Wickham Bishops (14) ; Notley (8) ! ; Kelvedon (8) ! ; nr. Bures (8) !

\***T. laevipila** Schwaegr.

Trees, Walthamstow (2) ! ; Epping Forest (11) ! ; Hazeleigh (13) ; N. Essex (14) ! ; nr. Chelmsford (7) ; Pleshey !! ; Braxted (8) ! ; Stisted !! ; Kelvedon (8) ! ; Hatfield Forest (13) ; Saffron Walden (9).

\***T. intermedia** Berk.

Chelmsford !! ; Kelvedon Church (8) !! ; Little Greenstead Church (14).

\***T. ruralis** Hedw.

Tiles, Walthamstow (2) ! ; on the ground in a gravel pit between Woodford and Chingford Hatch (2) ! ; N. Essex (14) ; Kelvedon (8) ! ; Feering (8) !

**T. ruraliformis** Dixon.

Dovercourt (19).

**T. papillosa** Wils.

Witham (14) ; Wickham Bishops (14) !! ; Inworth (8) !

**Barbula lurida** Lindb.

Sea cliffs, Southend (7).

\***B. rubella** Mitt.

Epping Forest (11) ! ; on a tree by the side of Blackwall Chase off the Hare and Hounds Inn, Roxwell (7) ; Inworth (8) ! ; near Halstead (8) ! ; Saffron Walden (9).

**B. tophacea** Mitt.

N. Essex (14).

\***B. fallax** Hedw.

Epping Forest (11) ! ; nr. Chelmsford (7) ; N. Essex (14) ; Broomfield !! ; Braxted (8) ! ; Kelvedon (8) ! ; Tiptree Heath (8) ! ; Yeldham (8) ! ; Dovercourt (19) ; Saffron Walden (9).

*var. brevifolia* Schultz.

In a lane between Hall Lane and Grove Lane, Henham (2) ! ; on a bank between Ugley and Quendon near the 35-mile stone (2) ! ; Dovercourt (19).

\***B. rigidula** Mitt.

Wall, Little Bardfield (14).

\***B. cylindrica** Schimp.

Nr. Chelmsford (7) ; N. Essex (14) ; Yeldham (8) !

**B. sinuosa** Braithw.

Wickham Bishops (14).

**B. hornschurchiana** Schultz.

Wall of Colchester Castle (8) !

**B. revoluta** Brid.

Oyn's Brook Bridge (8) ! ; Kelvedon Church wall (8) !! ; Saffron Walden (9).

\***B. convoluta** Hedw.

On the Forest near Hale End (2) ! ; in fields near Quendon and Newport (2) ! ; Saffron Walden (9).

\***B. unguiculata** Hedw.

On a wall, Greenleaf Lane (2)!; on a wall between Northfields, Hoe Street and the garden of Mr. White's house, Walthamstow (2)!; Epping Forest (11)!; N. Essex (14); nr. Chelmsford (7)!; Kelvedon and Copford (8)!; Dovercourt (19); nr. Quendon (2)!; nr. Rickling (2)!; nr. Widdington (2)!

*var. cuspidata* Braithw.

Rainsford End, Chelmsford!!; Marks Tey (8)!

*var. apiculata* Braithw.

On the forest near Hale End and on banks, not uncommon (2)!; near Wicken Bonhunt (2)!

\***Weisia crispa** Mitt.

Near Chelmsford (7); Kelvedon (8)!; Saffron Walden (9).

\***W. microstoma** C. Muell.

Inworth (8)!; near Sible Hedingham (8)!

\***W. viridula** Hedw.

On a bank in a lane leading from Hoe Street to Markhouse field and in the lane leading from Hoe Street to Mr. Biggs', Great House (2)!; Forest near the great Bog (2)!; near Hale End (2)!; Coopersale (11)!; Writtle!!; near Chelmsford (7); Kelvedon (8)!; Saffron Walden (9).

\***W. mucronata** Br. and Schimp.

Near Halstead (8)!

**Cinclidotus brebissoni** Husn.

On a tree in the meadows, Widford (8)!; Writtle!!; Great Bardfield (8)!

**Encalypta vulgaris** Hedw.

"*Bryum erecta capitulis, calyptra laxa conica, foliis serpilli pellucidis angustioribus. Observed by Mr. Vernon in Essex at Sir Thomas Middleton's House.*" Mr. Fitch informs me that in Ray's time Sir Thomas Middleton's House was Stanstead Hall. This quotation from Ray's Synopsis, Ed. III., is the only record I am able to find of the occurrence of this species in the county.

## ORTHOTRICHACEÆ.

**Zygodon viridissimus** R. Br.

In my garden, Hoe Street, Walthamstow (2) ! ; on a hornbeam, Epping Lower Forest (11) ! ; nr. Chelmsford (7) ; N. Essex (14) ; Hatfield Forest (13) ; Inworth (8) ! ; Rivenhall (8) ! ; Easthorpe (8) ! ; Ugly Holes (2) !

**Z. conoideus** Hook. and Tayl.

Epping Forest (11) ! ; on a tree, Kelvedon (8) !

**Z. forsteri** Wils.

On a felled tree in a timber yard at Chapel End, Walthamstow (2) ! (this tree was probably brought from Epping Forest) ; Monk's Wood (13) ; on beeches near the Wake Arms (14).

[*Ulotia bruchii* is recorded in the *Victoria History of Essex*, probably on the strength of the specimen so named in Mr. Varenne's collection, but that specimen belongs to the next species.]

**\*U. crispa** Brid.

On trees and bushes on the forest between Loughton and Debden Green (2) ! ; on an oak, Ongar Park (11) ! ; Chantry Wood (8) ! ; near Chelmsford (7) ; Felix Hall Shrubbery (8) ! ; Great Tey (8) ! ; Mile End, Colchester (8) ! ; wood near Colchester (7) ! ; Saffron Walden (9).

**Orthotrichum rupestre** Schleich.

Saffron Walden (9).

**\*O. anomalum** var. *saxatile* Milde.

Wall of garden, Walthamstow (2) ! ; on a tree in the meadows, Kelvedon (8) ! ; Feering (8) ! ; tiles on an old barn near Halstead (8) ! ; Roman Wall, Colchester (8) ! ; on a stone by the water in Hatfield Forest (8) ! ; Saffron Walden (9).

**\*O. leiocarpum** Br. and Schimp.

Walthamstow (2) ! ; near Chelmsford (7) ! ; near Halstead (8) ! ; Saffron Walden (9).

**O. lyellii** Hook and Tayl.

Epping Forest (14) ; Wickham Bishops (14) ; Felix Hall Wood (8) ! ; tree in a wood at Copford (8) ! ; wood at Messing (8) !



**O. affine** Schrad.

On oak and poplar side of Cobbin's Brook (11) ! ;  
 Writtle !! ; N. Essex (14) ; near Chelmsford (7) ;  
 Wickham (8) ! ; Kelvedon (8) ! ; Alresford (8) ! ;  
 Hatfield Forest (13) ; Saffron Walden (9).

**O. sprucei** Mont.

Old pales near the Chelmer, Chelmsford (8) !

[**O. stramineum** has been recorded in the *Victoria History*  
 as occurring in the county, but I cannot find any  
 specimens of the true plant.]

**\*O. schimperi** Humm.

Near Chelmsford (7) ; Kelvedon (8) !

**\*O. tenellum** Br.

Kelvedon (8) ! ; Feering (8) ! ; Pod's Wood (8) ! ;  
 Lyston (8) !

**\*O. pallens** Br.

Ash tree, Kelvedon (8) !

**\*O. diaphanum** Schrad.

Epping Forest, on a beech (11) ! ; Walthamstow (2) ! ;  
 near Chelmsford (7) ! ! ; Writtle ! ! ; Broomfield ! ! ;  
 Rivenhall (8) ! ; N. Essex (14) ; Kelvedon (8) ! ;  
 Hatfield Forest (13) ; Saffron Walden (9).

## FUNARIACEÆ.

**\*Ephemerum serratum** Hampe.

On the Forest near the great bog near Salter's  
 buildings (2) ! ; Epping Forest (12) ; N. Essex (14) ;  
 Kelvedon (8) ! ; Braxted (8) !

*\*var. angustifolium* Br. and Schimp.

Broomfield ! !

**\*Physcomitrella patens** Br. and Schimp.

Hazeleigh (13) ; Kelvedon (8) !

**\*Physcomitrium pyriforme** Brid.

Walthamstow (2) ! ; Epping Forest (11) ! ; Plaistow  
 Levels (2) ! ; near Chelmsford (7) ! ! ; Osea Island (13) ;  
 N. Essex (14) ; Kelvedon (8) ! ; river side, Braxted (8) ! ;  
 Saffron Walden (9).

\**Funaria fascicularis* Schimp.

“ On the edge of a ditch running from a spring on the forest between Snaresbrook and Shrub bush ” (2) ! ; near Chelmsford (7) ; Galleywood Common !! ; Kelvedon, Langford, etc., on gravel and clay (8) ! ; Halstead (8) !

\**F. hygrometrica* Sibth.

“ In garden, waste ground,” Walthamstow (2) ! ; “ on a bank in the lane leading from Hoe Street to Markhouse field,” Walthamstow (2) ! ; Epping Forest, abundant where fires have been (11) ! ; N. Essex (14) ; near Chelmsford (7) ; Galleywood Common !! ; Hatfield Peverel !! ; Kelvedon (8) ! ; Dovercourt (19) ; Saffron Walden (9).

\**var. calvescens* Br. and Schimp.

Chelmsford !!

## MEESIACEÆ.

\**Aulacomnium palustre* Schwaegr.

“ On the forest between Chingford Hatch and Woodford Road ” (2) ; “ near Chingford Hatch with gemmæ ” (2) ! ; in the moist parts of the forest, common (11) ! ; Epping Forest (2) ! ; Theydon (15) ; Loughton !! ; Warley Common (8) !! ; Galleywood Common (8) !! ; N. Essex (14) ; N. Weald !! ; Linguard Common !! ; Woodham Walter (8) ! ; Tiptree Heath (8) !! ; West Bergholt Heath (8) !

This moss is a constant companion of most species of *Sphagnum* in the county but appears to fruit but rarely, the only fruiting specimen I have been able to find having been collected by Mr. English in the bog near the Wake Arms.

\**A. androgynum* Schwaegr.

“ In the gravel pits near Forest House and on the bank near Low Leyton ” (2) ! ; Epping Forest, frequent in hollows in the trunks of pollard hornbeams (10) ; side of Theydon Road and Hill Hall Wood (11) ! ; N. Weald !! ; N. Essex (14) ; Writtle !! ; Little Baddow Common !! ; Totham, on gravelly banks (8) ! ; inside an old decayed willow trunk, Feering (8) ! ; near Wivenhoe (8) !

This moss is usually found bearing gemmæ ; very rarely in fruit.

## BARTRAMIACEÆ.

\**Bartramia pomiformis* Hedw.

By the roadside between Woodford Wells and the Bald-faced Stag (2) ! ; Epping Forest (11) ! ; side of the Theydon Road (11) ! ; N. Essex (14) ; near Chelmsford (7) ; Hatfield Peverel (14) !! ; Springfield !! ; Little Waltham !! ; Woodham Walter !! ; Great Totham (14) ; Tiptree (14) ; Pod's Wood Lane (8) ! ; Stanstead (2) !

\**Philonotis fontana* Brid.

Epping Forest (11) ! ; Theydon Bois and Loughton Road (11) ! ; near Chelmsford (7) ; Galleywood Common (8) !! ; West Bergholt Heath (8) !

## BRYACEÆ.

\**Leptobryum pyriforme* Wils.

N. Essex (14) ; Chelmsford !! ; on the brick of a culvert, Feering (8) !

\**Webera nutans* Hedw.

Old gravel pits and damp heaths, Epping Forest (11) ! ; Epping Lower Forest (11) ! ; Leyton !! Theydon !! ; wood near Warley (8) ! ; nr. Chelmsford (7) !! ; Woodham Walter Common (8) ! ; Braxted (8) !

\**var. longiseta* Br. and Schimp.

Epping Forest (11) !

\**W. annotina* Schwaegr.

“ In woods, fallow fields, &c., and barren in shady places in the garden, Walthamstow ” (2) ! “ In this species are a number of red substances like berries in the alæ of the leaves and about the stalk. They first appeared bright green.” Edwd. Forster.

Mr. English says “ found in damp places in the Stump Road, Epping Lower Forest, fruit scarce,” but all the specimens I have seen of his collecting so labelled belong to *W. nutans*.

\**W. carnea* Schimp.

Hale End (2) ! ; “ on a tree near the great bog on the Forest ” (2) ! ; Theydon (11) ! ; Hazeleigh (13) ; pond near Barnes' Mill, Springfield (7) ; Pleshey !! ; Kelvedon (8) ! ; Marks Hall (8) !

**W. albicans** Schimp.

Dovercourt and Wrabness (19).

[*Bryum pendulum* Schimp. is recorded for Essex in the *Victoria History*, but I have seen no specimens. It is a species that should be looked for.]

**B. pallens** Sw.

N. Essex (14).

\***B. inclinatum** Bland.

Kelvedon and Tiptree Heath (8) !

\***B. pseudotriquetrum** Schwaegr.

“ In a bog on the forest between Salter’s buildings and the Windmill (now Windmill Cottage)” (2) ! ; Epping Forest (12) ; Ewell Hall, Kelvedon, habitat now destroyed (8) !

\***B. bimum** Schreb.

Bog on Galleywood Common (7) !! ; damp place near Kelvedon (8) !

\***B. affine** Lindb.

Cook’s wall, Kelvedon (8) ! ; Tiptree (8) ! ; Brightlingsea Common (8) !

\***B. intermedium** Brid.

Coopersale Forest, local (11) ! ; N. Essex (14) : Kelvedon (8) ! ; Bradley Wood (8) ! ; Wrabness (19).

\***B. caespiticium** Linn.

“ Under the pump in our garden”, Walthamstow (2) ! ; “ on walls and on the ground, common, Walthamstow” (2) ! ; Epping Forest (11) ! ; Kelley’s wall, Epping (11) ! ; N. Essex (14) ; near Chelmsford (7) ; Springfield !! ; Kelvedon (8) ! ; Pod’s Wood (8) ! ; trunks of felled trees Inworth (8) ! ; on culvert, Beckingham (8) ! ; Saffron Walden (9).

\***B. capillare** Linn.

“ On a bank in a hedge, High Beach” (2) ! ; Epping Forest (11) ! ; Rifle ball bank, High Beach (11) ! ; Pilgrim’s Hatch, Brentwood !! ; N. Essex (14) ; near Chelmsford (7) !! ; Broomfield !! ; Kelvedon (8) ! ; Inworth (8) ! ; Osea Island (13) ! ; Hatfield Forest (13) ! ; Saffron Walden (9).

- \***B. erythrocarpum** Schwaegr.  
Forest near Hale End (2)!; garden walls, Epping Forest (11)!; N. Essex (14); Broomfield!!
- \***B. atropurpureum** Web. and Mohr.  
Epping Forest (11)!; near Chelmsford (7); wood near Wickham Bishops (8)!; Kelvedon (8)!; Dovercourt (19); Saffron Walden (9).
- \***B. murale** Wils.  
Epping, on walls (11)!; garden wall, Rivenhall (8)!; Roman wall, Colchester (8)!; church wall, Kelvedon (8)!
- \***B. argenteum** Linn.  
"On the forest near Golder's Hill" (2)!; Epping Forest (11)!; Theydon Bois (11)!; N. Essex (14)!; near Chelmsford (7); Kelvedon (8)!; Harwich (19); Saffron Walden (9).
- B. roseum** Schreb.  
Near Chelmsford (7).
- Minum affine** Bland.  
Saffron Walden (9).  
*var. elatum* Br. and Schimp.  
Bog, Theydon Bois (11)!
- M. cuspidatum** Hedw.  
"Among bushes on the forest near Whipp's Cross and elsewhere" (2)!; N. Essex (14); gravel pit near Springfield Gaol (7).
- \***M. rostratum** Schrad.  
Epping Forest (11)!; Lower Forest!!; N. Essex (14); Chignal!!; Kelvedon (8)!; Felix Hall Shrubbery (8)!; Copford (8)!; Hatfield Forest (13)!; Saffron Walden (9).
- \***M. undulatum** Linn.  
"Among bushes in Clay Street and in the second field we had in Wood Street when we lived there" (2)!; Epping Forest (13)!; Monk Wood (11)!!; Epping Lower Forest (12); N. Essex (14); nr. Chelmsford (7); Chignal!!; Broomfield!!; Little

Baddow !!; Woodham Walter Common (8) !; Hazeleigh (13); Kelvedon (8) !; Hatfield Forest (13) !; Saffron Walden (9).

\***M. hornum** Linn.

“On Ambrs. banks, the old camp near Epping” (2) !; in the woody part of the forest near Hagger Lane in shady places (2) !; Epping Forest (11) !; Monk Wood (13) !!; Warley Common !!; Pilgrim’s Hatch !!; Norton Heath !!; Mill Green !!; N. Essex (14); nr. Chelmsford (7); Danbury !!; Carpenter’s Wood, Southend (16) !; Pod’s Wood Lane (8); Saffron Walden (9).

**M. punctatum** Linn.

“On the Forest beyond Loughton” (2) !!; Epping Forest (11) !; nr. Loughton (11) !; “in Hainhault Forest between Chigwell Row and Bourn Bridge” (2) !; nr. Chelmsford (7); Brook bank, Chedingsell Grange Farm (8) !; Saffron Walden (9).

\***M. subglobosum** Br. and Schimp.

Epping Forest (11) !; Epping Lower Forest (11) !; Galleywood Common !!; Woodham Walter Common (7).

FONTINALACEÆ.

\***Fontinalis antipyretica** Linn.

Epping Forest (11) !; N. Essex (14); nr. Chelmsford (7); Springfield !!; pond in Allshott’s Farm, Kelvedon (8) !

CRYPTHÆACEÆ

\***Cryphæa heteromalla** Mohr.

“On a maple tree in Loughton Street near the small mound that crosses (?) the road” (2) !; near Chelmsford (7); White Notley (8) !; Kelvedon (8) !; on trees near Shortgrove, near Newport (2) !; Saffron Walden (9).

NECKERACEÆ

**Neckera pumila** Hedw.

Loughton Forest (13); on hornbeams, Epping (7); Saffron Walden, very sparingly (9).

**N. complanata** Hubn.

Epping Forest, principally on hornbeam and maple (11) ! ; Monk Wood (13) ; N. Essex (14) ; near Chelmsford (7) ; Broomfield ! ! ; Pleshey ! ! ; trees, Prested Hall Wood (8) ! ; Saffron Walden (9).

\***Homalia trichomanoides** Brid.

In a thicket near Chingford lane on the Forest (2) ! ; in a wood near a footpath from Hale End to Chapel End (2) ! ; Crane's Brook, Epping Forest (11) ! ; near Chelmsford (7) ; N. Essex (14) ; Kelvedon (8) ! ; Rivenhall (8) ! ; Saffron Walden (9).

HOOKERIACEÆ.

**Pterygophyllum lucens** Brid.

In a boggy thicket near Warley Common (2) !

LEUCODONTACEÆ.

\***Leucodon sciuroides** Schwaegr.

"On the trees in the forest near Chingford Hatch, and elsewhere" (2) ! ; on maple trees, Lower Forest, scarce (11) ! ; nr. Chelmsford (7) ; Hazeleigh (13) ; N. Essex (14) ; Pleshey ! ! ; trees, Messing (8) ! ; Saffron Walden (9).

**Antitrichia curtipendula** Brid.

"On a tree in the forest between the Ball-faced stag and Muncombe," (Monkhams ?) (2) ! ; Saffron Walden (9).

\***Porotrichum alopecurum** Mitt.

Epping Forest (11) ! ; nr. Chelmsford (7) ; N. Essex (14) ; Coggéshall (17) ; Broomfield ! ! ; Kelvedon (8) ! ; near the east pales of Shortgrove, near Newport (2) ! ; Widdington (2) ! ; Chickney (2) ! ; Saffron Walden (9).

LESKEACEÆ.

\***Leskea polycarpa** Ehrh.

Side of Cobbins brook, Epping (11) ! ; N. Essex (14) ! ; Writtle ! ! ; Broomfield ! ! ; Kelvedon (8) ! ; Saffron Walden (9).

\***Anomodon viticulosus** Hook. and Tayl.

Hale End (2) ! ; Epping Forest (11) ! ; "on a birch in a lane near Nazing Church" (2) ! ; Chelmsford ! ! ;

Broomfield !! ; N. Essex (14) ; Chignal !! ; Roxwell !! ;  
Little Boyton Hall Farm (7) ; Pleshey !! ; Kelvedon  
(8) ! ; Hatfield Forest (13) ! ; Saffron Walden (9).

**Leptodon Smithii** Mohr.

"Gathered by Mr. Dillwyn near Walthamstow" (3) ;  
this specimen was figured in *British Botany* (1804).

**Thuidium abietinum** Br. and Schimp.

Saffron Walden on chalk ridges and in chalk pits along  
with *Hypnum molluscum* (9).

\***T. tamariscinum** Br. and Schimp.

"On the forest very common but seldom seen in fruit"  
(2) ! ; Epping Forest (11) ! ; Loughton !! ; Hazeleigh  
(13) ; near Chelmsford (7) ; Mill Green !! ; N. Essex (14) ;  
Little Baddow !! ; Woodham Walter !! ; Linguard  
Common !! ; Braxted (8) ! ; Earls Colne !! ; Hatfield  
Forest (13) ; Saffron Walden (9).

HYPNACEÆ.

**Climacium dendroides** Web. and Mohr.

Near the shore below Southend (2) !

\***Pylasia polyantha** Br. and Schimp.

Elm tree, Ewell Hall, Kelvedon (8) !

\***Isothecium myurum** Brid.

Epping Forest 12) ; near Chelmsford (7) ; N. Essex  
(14) ; Little Baddow !! ; Kelvedon (8) !

\***Pleuropus sericeus** Dixon.

"On the forest" (2) ! ; "principally on elm trunks,  
especially prostrate ones" (11) ! ; near Chelmsford (7) !! ;  
N. Essex (14) ; Writtle !! ; Chignal !! ; Braintree !! ;  
Kelvedon (8) ! ; Earls Colne !! ; Dovercourt (19) ; Hat-  
field Forest (13) ; Saffron Walden (9),

\***Camptothecium lutescens** Br. and Schimp.

Southend (2) ! ; near Chelmsford (7) ; N. Essex (7) ;  
Kelvedon (8) ! ; Saffron Walden (9) ; Wicken Bonhunt  
(2) !

**Brachythecium salebrosum** var. *palustre* Schimp.

Wrabness (19).

**B. glareosum** Br. and Schimp.

Saffron Walden (9).



\***B albicans** Br. and Schimp.

On the forest near Hale End, Walthamstow (2) ! ; near Chelmsford (7) ; Osea Island (13) ; N. Essex (14) ; Maldon (19) ; Danbury !! ; Norton Heath !! ; Donyland Heath (8) ! ; Wivenhoe (8) ! ; Dovercourt (19) ; Saffron Walden (9).

\***B. rutabulum** Br. and Schimp.

In a wood near Hale End (2) ! ; Epping Forest (11) ! ; Galleywood Common !! ; Chelmsford (7) !! ; Prittlewell (16) ! ; N. Essex (14) ; Kelvedon (8) ! ; Inworth (8) ! ; Cressing Temple (8) ! ; Woodham Walter !! ; Tiptree Heath !! ; Wickham (8) ! ; Saffron Walden (9).

\***B. rivulare** Br. and Schimp.

Cobbins brook, on prostrate trunks submerged (11) ! ; Hatfield Forest (13) ; Chalkney Wood (8) !

\***B. velutinum** Br. and Schimp.

Walthamstow (2) ! ; Epping Forest (11) ! ; Coopersale (11) ! ; nr. Chelmsford (7) ; Writtle !! ; Broomfield !! ; N. Essex (14) ; Woodham Walter !! ; Kelvedon (8) ! ; Dovercourt (19) ; Hatfield Forest (13) ! ; Saffron Walden (9).

**B. populuem** Br. and Schimp.

Saffron Walden (9).

**B. plumulosum** Br. and Schimp.

Nr. Chelmsford (7) ; Saffron Walden (9).

**B. illecebrum** DeNot.

" In open parts of Epping Forest " (2) ; Little Baddow Common (7) !

\***B. purum** Dixon,

" In hedges and in woods, Epping Forest " (2) ! ; Monk Wood (11) ! ; Loughton !! ; Ramsden Heath (7) ; Hazeleigh (13) ; Southend (16) ; Galleywood Common !! ; N. Essex (14) ; Kelvedon (8) ! ; Broomfield !! ; Hatfield Forest (13) ! ; Saffron Walden (9).

**Eurhynchium piliferum** Br. and Schimp.

Mattham's Lane and Crane Wood, Epping 11) ! ; N. Essex (14) ; Bligh's Wood, Springfield (7) ; Kelvedon (8) ! ; Donyland Heath (8) ! ; Colne, near Wivenhoe (8) ! ; Hatfield Forest (13) ; Saffron Walden (9).

- E. crassinervium** Br. and Schimp.  
Hatfield Forest (13); Saffron Walden (9).
- \***E. praelongum** Br. and Schimp.  
Near Loughton, very common in hedges (2)!; Epping Forest (11)!; Loughton!!; Mill Green Common!!; near Chelmsford (7); Prittlewell (16)!; Hazeleigh (13)!; Osea Island (13); N. Essex (14); Broomfield!!; Pleshey!!; Kelvedon (8)!; Dovercourt (19); Hatfield Forest (13); Saffron Walden (9).
- \***E. swartzii** Hobk.  
Epping Forest (11)!; Hazeleigh (13); Broomfield!!; Kelvedon (8)!; Rickling (2)!; Wicken Bonhunt (2)!; Saffron Walden (9).
- \***E. pumilum** Schimp.  
Kelvedon, Inworth and Aldham (8)!; Hatfield Forest (13).
- \***E. tenellum** Milde.  
Near Chelmsford (7); Inworth, "with slightly scabrous seta" (8)!; Saffron Walden (9).
- \***E. myosuroides** Schimp.  
"On the forest" (2)!; "to such an extent in Epping Forest that sometimes whole trunks are covered with it" (11)!; near Chelmsford (7); Kelvedon (8)!; Saffron Walden (9).
- \***E. striatum** Br. and Schimp.  
"On banks, very common," Essex (2)!; Epping Forest (11)!; nr. Chelmsford (7)!!; N. Essex (14); Kelvedon (8)!; Chalkney Wood (8)!; Hatfield Forest (13); Saffron Walden (9).
- \***E. rusciforme** Milde.  
Malt Kiln, Epping (11)!; nr. Chelmsford (7)!; Kelvedon (8)!; Stisted!!; Dunmow!!; Saffron Walden (9).
- \***E. murale** Milde.  
N. side of Chingford Church, L. W. Dillwyn (3); Hoe Street, Walthamstow (2)!; Epping Forest (11)!; nr. Chelmsford (7); Springfield Church (7)!; Chignal Smealy!!; Kelvedon (8)!!; Saffron Walden (9).

**\*E. confertum** Milde.

Epping Forest (11) ! ; Prittlewell (16) ! ; nr. Chelmsford (7) ; N. Essex (14) ; Chignal Smealy ! ! ; Gt. Braxted (8) ! ; Dovercourt (19).

**\*E megapolitanum** Milde.

Kelvedon (8) ! ; Copford (8) !

**Plagiothecium pulchellum** Br. and Schimp.

Saffron Walden (9).

**\*P. denticulatum** Br. and Schimp.

In a wood near Hale End, Walthamstow (2) ! ; Epping Forest (11) ! ; " a variety that occurs on shady banks scarcely ever produces fruit " (11) ; Copt Hall ! ! ; Crane's Wood (11) ! ; Theydon Bois ! ; Mill Green Common ! ! ; Warley Common ! ! ; nr. Chelmsford (7) ; Boreham ! ! ; Broomfield ! ! ; Little Baddow ! ! ; Chantry Wood, Chalkney Wood and Pod's Wood Lane (8) ! ; Norton Heath ! ! ; Hatfield Forest (13) ! ; Dovercourt (19) ; Saffron Walden (9).

*var. majus* Boul.

Loughton ! !

**\*P. sylvaticum** Br. and Schimp.

Mill Green ! ! ; Danbury ! ! ; Chalkney Wood (8) ! ; Epping Lower Forest (11) ! ; Broomfield ! !

**P. undulatum** Br. and Schimp.

Epping Forest (11) ! ; Monk Wood (13) ! ! ; Coopersale (11) ! ; nr. Chelmsford (7).

**Amblystegium serpens** Br. and Schimp.

" On trees in the Forest " (2) ! ; Epping Forest (11) ! ; nr. Chelmsford (7) ! ; N. Essex (14) ; Broomfield ! ! ; Kelvedon (8) ! ; Copford (8) ! ; Coggeshall (17) ! ; Hatfield Forest (13) ; Saffron Walden (9).

**A. irriguum** Br. and Schimp.

Hatfield Forest (13).

**A. filicinum** De Not.

Epping Forest (11) ! ; N. Essex (14) ; nr. Springfield (7) ; Queen's Wood, Great Leighs (7) ; Coopersale (11) ! ; Kelvedon (8) ! ; Messing (8) ! ; Braxted (8) ! ; Bergholt (8) ! ; banks of the Colne, Yeldham (8) ! ; Saffron Walden (9).

**Hypnum sub.-gen. Campylium****H. riparium** Linn.

"In a pond not far from the back of Paradise Row, Walthamstow" (2)!; "under a bridge nr. the Lea Bridge Road" (2)!; "against a wall in Mr. Todd's horsepond, Marsh Street," Walthamstow (2)!; "on the bank of a brook nr. Shernhall Street," Walthamstow (2)!; Leyton (10); "scarce in gravel pits," Epping Forest (11); nr. Chelmsford (7); N. Essex (14); Springfield!!; Writtle!!; Broomfield!!; waste water near Kelvedon Mill (8)!; in a well, Inworth (8)!; Danbury Common, a somewhat elongated form!!; Saffron Walden (9).

The figure of this species in Dr. Braithwaite's *British Moss Flora* was drawn from the specimen collected at Leyton.

*var. longifolium* Schimp.

Walthamstow, Epping Forest!!

**H. stellatum** Schreb.

"In the long bog on the forest beyond the King's Oak" (2)!; nr. Quendon (2)!; nr. Chelmsford (7); Galleywood Common (8)!!; Linguard Common (8)!!; West Bergholt Heath (8)!; Saffron Walden (9).

**H. chrysophyllum** Brid.

Saffron Walden (9).

*Sub-genus Harpidium.*

(In this sub-genus I have had the invaluable assistance of Mr. J. A. Wheldon, the British authority on the group, who has most kindly examined and named all the available specimens. Where specimens do not exist the naming is exceedingly doubtful.)

**H. aduncum** Hedw.

Nr. Chelmsford (7). (This specimen probably belongs to *H. exannulatum*.)

Group *Typicum* Ren.

*var. falcatum* Schimp.

Kelvedon (8)! This specimen is almost midway between *var. falcatum* and *var. aquaticum* J.A.W.

*var. aquaticum* Sanio.

Kelvedon (8)!

Group *Kneiffii* Ren.

N. Essex (14); Loughton Forest (13).

*var. polycarpon* Bland.

Norton Heath!!

*var. intermedium* Schimp.

Norton Heath!!

Group *pseudo-fluitans* Sanio.

*var. paternum* Sanio.

Kelvedon (8)!; High Easter!!

### H. *fluitans* Linn.

The following in the absence of specimens cannot be placed; some may belong to the next species.

Thomas Warner's gravel pit in the Forest near Woodford Row (2); "pond in Greenleaves Lane," Walthamstow (2); in Walthamstow Marshes (2); nr. Chelmsford (7); N. Essex (14); Saffron Walden (9).

Group *Amphibium* Ren.

*var. jeanbernati* Ren.

Loughton!!; Warley Common!!

### H. *exannulatum* Gumb.

"Scarce, Epping Forest" (11).

Group *Typicum* Ren.

*var. pinnatum* Boul.

Cuckoo Pits, Chingford!!; Tiptree Heath (8)!

*var. pinnatum* forma *stenophylloides* Ren.

Epping Forest in a gravel pit (11)!; Epping Forest (19); nr. the Earl's Path, High Beach!!; nr. the Rising Sun, Walthamstow!!; Norton Heath!!; Mill Green Common (approaching the *var. brachydictyon*. —J.A.W.)!!

*var. brachydictyon* Ren.

Norton Heath!!; Galleywood Common (8)!!; West Bergholt Heath (an extreme form diverging strongly towards *var. pinnatum*, due to the less alpine habitat. J.A.W.) (8)!

*var. molluscum* Sanio.

Leyton, Epping Forest!!

Group *Rotae* Ren.

var. \* *falcifolium* Ren.

“Nr. the Menyanthes Bog, Epping Forest” (2) ! ;  
Epping Forest (11) ! ; Warley Common (8) ! ; Tiptree  
Heath (8) ! ! ; Galleywood Common (an unusually  
dwarf form but I have a similar form from Derbyshire.  
J.A.W.) ! !

var. *falcifolium* forma *heteroptera* Ren.

High Beach, submerged in a gravel pit, and at  
Walthamstow in a similar locality ! !

This is a somewhat puzzling form, which Mr. Wheldon  
submitted to Mons. Renauld, who coined the name  
for it. M. F. Renauld says, regarding it, “Cette forme  
ne se classe pas facilement dans les groupes admis.  
C’est un fait qui produit rarement ; mais cependant qui  
se produit et j’en ai eu d’autres exemples. La couleur  
est celle des formes boreales du group *falcatum*, la  
forme des feuilles la nervure forte et tres longue et les  
cellules moyennes longues sont du group *Rotae* ; mais  
les oreillettes sont peu developpees, mal separees,  
presque comme dans le group *amphibium*, et nullement  
caracteristiques. C’est cette derniere particularite qui  
rend le classement difficile et incertain. Nous sommes  
donc en presence d’une forme accidentelle, curieuse,  
mais sous importance par son cas isole, par suite de la  
structure des oreillettes, qui est en accord avec les  
autres caracteres on pourrait la nommer (avec un point  
de doute) *H. fluitans* (*Rotae*) var. *falcifolium*, forma  
*heteroptera*.”

\* *H. uncinatum* Hedw.

Tiptree Heath (8) !

*H. commutatum* Hedw.

Hickmore Fen Wood (8) ! ; “in a bog in a marshy  
meadow nr. Tuddington Parsonage, 1792” (2) !

*H. falcatum* Brid.

Linguard Common (8) !

[*H. intermedium* Lindb.

This species is recorded for Essex in the *Victoria  
History*, but that record is probably based on the  
specimen so named in Mr. Varenne’s collection, which

proves on re-examination to belong to *H. falcatum*. This species must for the present therefore be expunged from the list.]

*Sub-genus Drepanium*

**H. cupressiforme** Linn.

An exceedingly abundant and very variable species.

On trees in the forest very common (2)!; "on forest near the bog and near the gravel pits" (2)!; wood, near Hale End (2)!; Epping Forest (11)!; Monk Wood (13); Leyton!!; Theydon!!; Carpenter's Wood, Southend (16)!; N. Essex (14); Chelmsford (7)!!; Norton Heath!!; Mill Green!!; Kelvedon (8)!; Hazeleigh (13); Chauntrey Wood, Witham (8)!; Tiptree (8)!; Feering (8)!; Hatfield Forest (13); Saffron Walden (9).

*var. resupinatum* Schimp.

"In a wood near Hale End, Walthamstow" (2)!; on the Forest (2)!; N. Essex (14); Hatfield Forest (13); nr. Quendon (2)!; Mill Green!!

*var. filiforme* Brid.

"Trunk of a tree, Epping Lower Forest" (11); Saffron Walden (9).

*var. ericetorum* Br. and Schimp.

N. Essex (14); Tiptree (8)!

*var. elatum* Br. and Schimp.

Maldon (19).

**H. molluscum** Hedw.

Epping Forest, Theydon and Coopersale. This pretty moss cropped up after the lopping in quantity: the third year after it had entirely disappeared (11)!; nr. Chelmsford (7); Rivenhall (8)!; Hatfield Forest (13); Saffron Walden (9).

*Sub-genus Calliergon*.

**H. stramineum** Dicks.

Walthamstow, near the Rising Sun; a very curious form (♀) differing from the fell plant of the North of England in its loosely arranged, less appressed leaves!!; Woodham Walter Common (8)!; West Bergholt Heath (8)!

**H cordifolium** Hedw.

Epping Forest (11)!; margin of the Wake Valley Pond!!; Thrift Wood and Wood by the Ship Inn, Galleywood (7); Wood near Totham (8)!

[*H. giganteum* Schimp.

This species has been recorded for the county in the *Victoria History*, but all the specimens I have seen collected in Essex and so labelled have proved to belong to the preceding species. The record needs confirmation.]

**\*H. cuspidatum** Linn.

"In the great bog near Salter's Buildings and the old Windmill, Epping Forest" (2)!; Epping Forest (11)!; Loughton!!; clay pit by Styles, Epping Forest (11)!; Norton Heath!!; nr. Chelmsford (7); Writtle!!; N. Essex (14); Danbury!!; Tiptree Heath!!; Kelvedon (8)!; clay pit near Felix Hall (8)!; Hatfield Forest (13)!; Saffron Walden (9).

**H. schreberi** Willd.

"In a hedge, Loughton and elsewhere, not uncommon" (2)!; Epping Forest (11)!; Loughton!!; Mill Green!!; nr. Chelmsford (7); Galleywood Common (8)!; N. Essex (14); Woodham Walter Common (8)!!; Tiptree Heath (8)!!; Saffron Walden (9).

**Hylocoimum splendens** Br. and Schimp.

Hale End (2)!; Epping Forest, very scarce (11)!; Monk Wood (13)!; Epping Lower Forest (11)!; Tiptree Heath (8)!; Saffron Walden (9).

**H. loreum** Br. and Schimp.

Hatfield Forest (13).

**H. squarrosum** Br. and Schimp.

On the Forest (2)!; nr. Hale End (2)!; Epping Forest (11)!; Loughton!!; Ramsden Heath (7); Mill Green!!; N. Essex (14); Tiptree Heath (8)!; Chauntrey Wood, Witham (7); Hatfield Forest (13); Saffron Walden (9).



\**H. triquetrum* Br. and Schimp.

On Forest, very common (2) !; Loughton (2) !; Epping Forest (11) !; nr. Chelmsford (7) ; N. Essex (14) ; Chalkney Wood, Earls Colne (8) ! ; Saffron Walden (9).

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[The Club is greatly indebted to Mr. Chittenden, not only for collating the information concerning the Museum Herbaria of Mosses, and identifying doubtful examples, but also for actually mounting and arranging the specimens. Mr. Chittenden's work in this way has been of the highest Museum value and a great aid to the Curator.—Ed.]

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## ON THE SALINITY OF THE SEA-WATER ALONG THE COAST OF ESSEX.

By H. C. SORBY, LL.D., F.R.S., F.L.S., F.G.S., &c.

[*Read October 27th, 1906.*]

FOR a number of years (1884 to 1888, both inclusive) I systematically studied the salinity of the water along the coast and in the estuaries of Essex, and found that one of the most important facts in connection with the distribution of the marine animals was the difference between the density of the high and low water. My results, however, apply only to the summer months, from the early part of May to the latter end of September ; and no doubt they differ widely from the conditions in winter. The comparative salinity was determined by a hygrometer, which was far the most convenient method on board a yacht.

What struck me much was that in some years at Burnham-on-Crouch the density of the low water was greater than at high water ; and, in passing up the river to Battles Bridge, the density became greater and greater. To my surprise I found the well-marked Alga, *Chorda*, growing in some quantity not much below Battles Bridge in 1885, when the density of the water was very high, but I looked for it in vain in 1885, when the density was much lower. I do not remember seeing it elsewhere along the coast of Essex. This excess in density in

particular years is, of course, easily explained by greater evaporation and smaller rainfall.

I have observed similar facts at Paglesham and West Mersea, but not in Brightlingsea Harbour and the adjoining creeks, or in Harwich Harbour and up the Stour.

It thus appears that, at all events in the summer of certain years, the water in some of the Essex estuaries is even more salt than the water outside coming in with the high tide. Along the coast of Essex in summer the sea-water is also somewhat more dense than that of the contiguous part of the North Sea.

The following table shows the mean densities of the water in summer off the coast, and at high and low water in the estuaries, and the differences, plus or minus, of the low water compared with the high. As will be seen, these differences, though not great, are well marked. It will also be observed that, at all events in summer, the water in the estuaries would be very suitable for the purposes of salt-making by evaporation.

				High.	Low.	Difference.
Burnham, 1885	...	...	...	26·37	26·76	+ '39
„ 1888	...	...	...	25·92	24·36	- 1·56
Near Battles Bridge, 1885	...	...	...	27·24		
„ 1888	...	...	...	22·33		
Paglesham	...	...	...	25·36	24·92	- '45
„ 1885	...	...	...	26·45	27·28	+ '83
West Mersea, 1886	...	..	...	26·19	26·54	+ '35
Brightlingsea Harbour	...	...	...	25·90	25·07	- '83
Pyefleet, mean	...	...	...	25·86	23·86	- 2·00
„ 1885, maximum	...	...	...	26·27		
Harwich Harbour	...	...	...	25·66	25·18	- '48
Open water off the coast, mean	...	...	...	26·53		

N.B.—All these numbers refer to the excess of density above rain water, reckoned as 1000. Thus, in the case of the first item in the above list, I give 26·37 instead of 1026·37, which shows the effect of the salts more distinctly, independent of the weight of the water.

THE CORRESPONDING SOCIETIES'  
COMMITTEE OF THE BRITISH ASSOCIATION,  
YORK, 1906.

REPORT OF THE CLUB'S DELEGATE,

F. W. RUDLER, I.S.O., F.G.S., *Secretary of the Conference of Delegates.*  
[Read November 24th, 1906.]

AT the first meeting of the Delegates held under the chairmanship of Sir Edward Brabrook, C.B., who fitly represented the new group of "Associated Societies," the chief subject for discussion was that of Meteorology. Dr. H. R. Mill, the distinguished authority on rainfall, introduced the subject by an admirable address, in which he commended the study of meteorology as one peculiarly fitted for cultivation by provincial societies, inasmuch as it needed for its prosecution comparatively simple appliances, whilst it developed habits of strict accuracy and method in the observers. At the same time it contributes to the advancement of knowledge in directions much needed. The determination of local climate can be best effected by the work of local societies, since it requires long continuous records usually beyond the power of individual observers. Dr. Mill remarked that a society should be, by its nature, immortal—a remark which, it is hoped, may be applied to the Essex Field Club. But as our Club does not contemplate the formation of a meteorological station the subject need not be enlarged upon.

Of more direct interest to the Club were the proceedings at the second meeting. This was held under the chairmanship of Mr. John Hopkinson, for many years the honorary secretary of the Hertfordshire Natural History Society, and was attended by the President of our Club. The main subject of discussion at this meeting was that of County Photographic Surveys, which was introduced by Mr. W. Jerome Harrison, of Birmingham. In an elaborate paper Mr. Harrison traced the history of the survey movement, which was really initiated by him, when, in 1889, he proposed a photographic survey of Warwickshire. From Warwickshire the work has spread, and surveys are now in active operation in Worcestershire, Kent, Surrey, Yorkshire, and Edinburgh, as well as in Essex. Mr. Victor Taylor had kindly sent your delegate some notes on the photographic survey of Essex, which he used. Mr. Harrison

advocated the appointment of a Committee, which should (1) collect details as to the exact work already accomplished, (2) circulate printed matter making the aims and methods of the surveys widely known, (3) endeavour to co-ordinate the photographic societies on the one hand, and the literary and scientific societies on the other, so that all may unite in the work of the survey, (4) obtain lists of experts willing to advise on details of the work, and (5) secure the publication of series of prints dealing with either districts or subjects.

The delegates who were present warmly supported Mr. Harrison's project, and it was proposed to secure, if possible, at next year's meeting of the British Association at Leicester, the appointment of a County Photographic Committee. It may be noted that in the course of the discussion Dr. H. H. Turner, F.R.S., professor of astronomy in the University of Oxford, pointed out the desirability of taking photographs on stereographic principles, for use in making a ground-plan of the objects photographed as explained in the *Monthly Notices of the Royal Astronomical Society* for December, 1901, p. 126.

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## SEA BREAM IN ESSEX WATERS.

By JAMES MURIE, M.D., LL.D., F.L.S.

SO far as I am aware there is no record of the Sea-Bream (*Pagellus centrodontus*) having been met with strictly within Essex waters. Dr. Laver does not mention it in *The Mammals, Reptiles and Fishes of Essex*,<sup>1</sup> or in his additions since in the *Victoria History*, Vol. I.

Neither to my knowledge is it included in any of Mr. E. A. Fitch's lists of captures in his various notes in several volumes of the *ESSEX NATURALIST*. The above two naturalists being reliable authorities on our local fish-fauna, their silence doubtless betokens absence of information thereon. I have, however, been fortunate enough to obtain a true Essex example, inasmuch as it was obtained within half a mile of low-water mark.

The fish in question was caught by one of our Leigh white-baiters, Harry Johnson (best known by nickname—"Roughy"), on 5th November last (1906). He and his mate were then using the stow-net, between the Crow Stone and the end of

<sup>1</sup> *Special Memoirs of Essex Field Club*, Vol. III.

Southend Pier, in water about three fathoms deep. The fish was new to them as others of fishermen at work hard by. When fresh caught its brilliant silvery scales immediately attracted attention. According to the men its head and dorsum were only slightly tinted with pale orange pink, the silvery hue visibly predominating. Such certainly was the case when brought to me. Moreover, it was destitute of the black shoulder patch so specifically characteristic of the full-grown *Pagellus centrodontus*.

Extreme length,  $9\frac{1}{4}$  inches. It barely turned the scale at  $\frac{1}{2}$  lb. weight. Greatest depth of body just behind the pectoral fin 2.9 inches. Eye  $\frac{1}{4}$ ths of an inch in diameter. Sex doubtful. Food, quite a number of young of the Greater Pipefish (*Sygnathus acus*) ranging from  $2\frac{1}{4}$  to  $3\frac{1}{4}$  inches in length; also a post-larval Butterfish or Gunnell (*Centronotus gunnellus*) 38 mill. =  $1\frac{1}{2}$  inches long.

This Essex specimen of immature Sea Bream (yearling or thereabouts) seems to come under what are known by the local name of "Chad" by the Devon and Cornwall fishermen. Theirs is an indefinite term for the young bream of various sizes destitute of the adult's dark-coloured shoulder mark and deep orange hue of the dorsum. Our estuary example may have been a straggler from a roving squad; for in their immature stages during the autumn months they crowd in shoals among the inshore shallows of the above counties, whereas the older bream are stated to keep to deeper water and more rocky grounds.<sup>2</sup>

The species in question may be said to have its headquarters quite within the western area of the English Channel. At times it is plentiful and exposed for sale in the fish-marts of Plymouth and Brixham.<sup>3</sup> There seems to be a gradual diminishment in numbers, proceeding eastwards, up channel. For example, on the Sussex coast,<sup>4</sup> they are relatively fewer, and still less so around Kent, which, indeed, somewhat resembles Essex in paucity of their visits. On the Suffolk and Norfolk seaboard they are now seldom caught.<sup>5</sup>

It was originally intended that the specimen of Thames Estuary Sea Bream should have been exhibited to the members

<sup>2</sup> Wilcocks, *The Sea Fisherman*, 3rd Ed. (1875), p. 189.

<sup>3</sup> Houghton, *Commercial Sea Fishes* (1884), p. 100.

<sup>4</sup> Yarrell, *British Fishes*, 3rd Ed., Vol. II., p. 147; also Merrifield, *Natural History of Brighton* (1869), p. 112.

<sup>5</sup> Patterson, "Fishes of Great Yarmouth," *Zoologist*, 1897, p. 544.

of the Club on the reading of this paper, and afterwards deposited in the Essex Museum of Natural History. As it happened, Mr. Boulenger, of the British Museum, requested it for the National Collection, where it can now be consulted by those interested.

P.S.—Since this paper was in type, on comparing the description here given with the preserved specimen in the British Museum, there is a distinctly appreciable, but rudimentary, condition of dark spot behind the upper part of the operculum. It consists of some five pigmentary serrations above, and as many below, the commencement of the lateral line. Mr. Boulenger remarks that he has previously observed spirit immersion bring out markings barely visible in the fresh condition of other kinds of fish.—J.M.

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**The Daffodil Fly in Essex.**—This fly, *Merodon equestris*, appears to be spreading in Essex and likely to become a pest of economic importance in the county as a destroyer of daffodil bulbs. The fly, a Dipteron, belonging to the Syrphidae, appears in May, and is exceedingly bee-like, having its abdomen, as a rule, covered with foxy hair, but very variable both in size and coloration. When flying it emits a very shrill sound and has the habit characteristic of many of the Syrphidae of remaining poised in the air for a time, and then of suddenly darting a distance of about a yard away. It lays its eggs near the base of the daffodil leaves, and the grub hatching in July eats its way into the bulb, afterwards making a hole to the outside through the side or base of the bulb, through which it can dispose of its ejection. The grub, which is legless, and dark gray or blackish in colour, reaches a length when full grown of about  $\frac{3}{4}$ -inch. It turns into a black pupa in November, in those cases I have had an opportunity of examining, outside the bulb in the soil. The only means of dealing with the pest appears to be to wait until October is well advanced before planting the bulbs and then to reject and burn all those that feel soft owing to the eating away of the interior of the bulb.

FRED. J. CHITTENDEN, *Biological Laboratory, Chelmsford.*

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ESSEX MUSEUM OF NATURAL HISTORY.

---

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JOURNAL

OF THE

ESSEX FIELD CLUB,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.,

*Honorary Secretary and Curator.*

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*The Authors alone are responsible for the statements and opinions contained in their respective papers.*

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# The Recording and Preservation of examples of the Folk-Songs and Dialect of East Anglia and Essex.

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The statement on the wrapper of the July part of the *ESSEX NATURALIST* has aroused considerable attention, and I have received promises of help. Some experienced musicians and experimenters have also given valuable advice. Local societies have been induced to take up the subject, and I am hopeful that an important East Anglian organisation will actively co-operate in our own district.

A few experiments carried on during last autumn fully demonstrated the practicability of recording accurately local songs and dialect "pieces" by the phonograph, and we anticipate making substantial progress during the ensuing summer and autumn.

As an exemplification of the danger of delay, I regret to mention that an old Essex yeoman in a village on the Colne, from whom we took "records" of two or three "Ballets" and "Horkeys" in the autumn, has just died, and with him expires, probably, our chance of obtaining material, in his parish. If the work is not done during the present generation of old folk it will be too late. It will daily become more difficult to save from oblivion the old carols, hunting songs, rent-dinner songs, fair-day songs, sheep-shearing songs, horkey songs and country dances, which delighted our forefathers. They are dying out with our peasantry, and with them the wealth of music transmitted to us from our Norse and Danish ancestors, as well as from Flemish, Dutch, and French sources, will perish—a great loss to students of folk-lore and dialect, and a reproach to East Anglians for ever.

I hope to be in a position to announce details of the proposed Committee and its work in the near future.

WILLIAM COLE,  
*Member of the  
Folk-Song Society.*

THE ESSEX MUSEUM OF NAT. HIST.,  
ROMFORD ROAD,  
STRATFORD, ESSEX.

May, 1907.

## ON A RECENT SUBSIDENCE AT MUCKING, ESSEX.

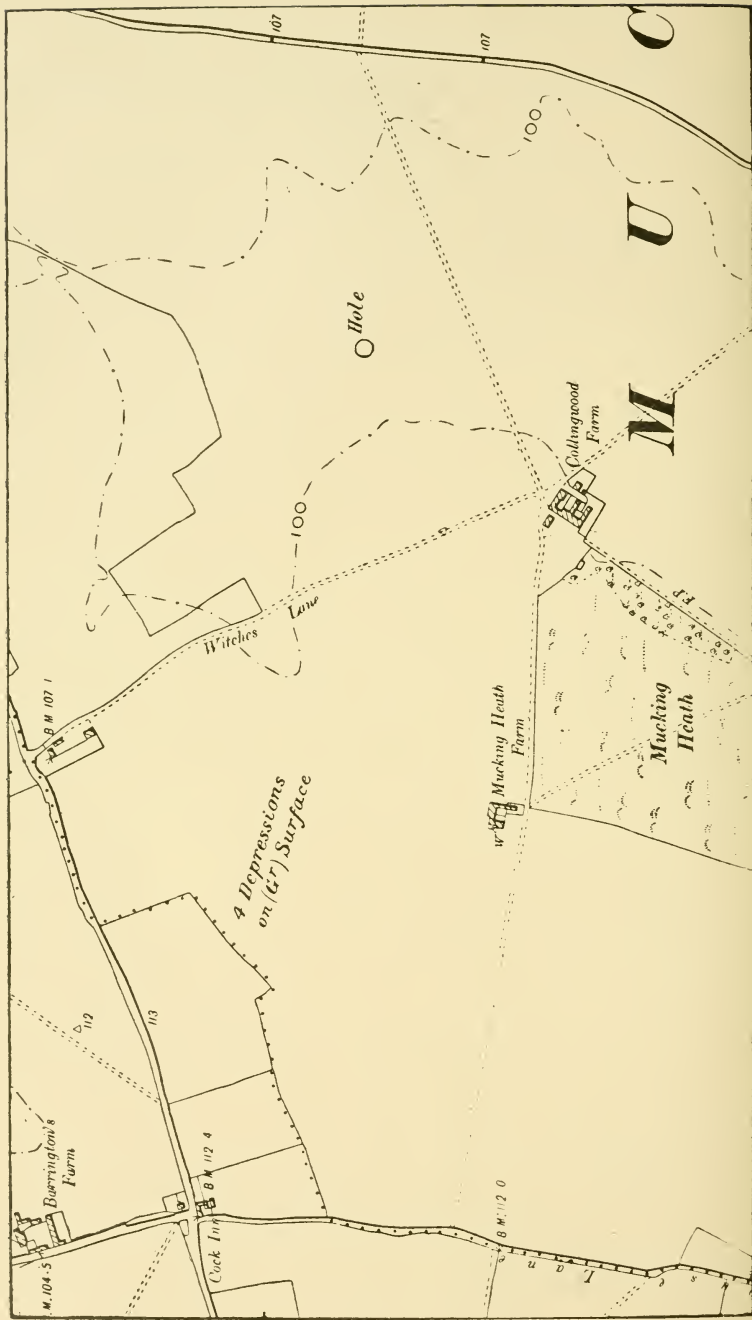
By T. V. HOLMES, F.G.S., *F.Anthrop.Inst.*, Vice-President, *E.F.C.*

[*Read February 24th, 1906.*]

ON January 12th (1906), our Secretary, Mr. W. Cole, received a letter from Mr. S. J. Squier, of the Rookery, Stanford-le-Hope, Essex, stating that "in the middle of one of our fields in Mucking parish, the surface has dropped in, leaving a big circular hole like a great well, measuring 25 feet across and 20 feet in depth." Mr. Squier added that in the fields near appeared, in a line, hollows suggesting the former existence there of similar holes, though he could not find anyone in the neighbourhood who remembered the occurrence of anything of the kind in past years.

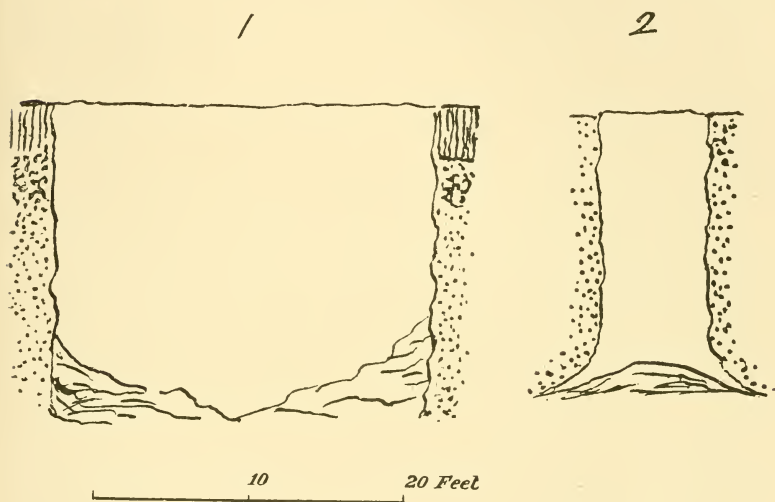
Mr. Cole having kindly forwarded the letter to me, I wrote to Mr. Squier, who was good enough to arrange to show me this strange hole on January 24th. Accordingly, on that day, I visited the spot in Mr. Squier's company. Its position is about 400 yards north-east of Collingwood Farm, which appears on the six-inch to the mile ordnance map (84 N.W.) at the north-eastern corner of Mucking Heath (see map). It was still circular in shape, though its diameter was slightly greater than when it was first seen, being a little more than 30 feet. The fall of material from its sides had left them still vertical, though it had reduced the depth of the pit from 20 feet in the centre to about 16 feet, and at the sides to 11 or 12 feet. The material seen at the bottom was simply that which had tumbled in from the sides. The lowest bed visible consisted of yellow sand, of which a thickness of about six feet was seen. Above it was about two feet of sand somewhat more clayey, containing small pebbles, and here and there fragments of shells, there being no definite line of separation between it and the sand beneath. The surface bed consisted of reddish-brown clay, precisely like London Clay which has lost the bluish tint characteristic of it at a certain depth.

Leaving this remarkable hole, we proceeded in a direction a little north of west, traversing the field on the western side of Witches Lane. There, Mr. Squier pointed out four circular depressions, with sloping sides, as probably marking the spots at which subsidences similar to that just seen had once occurred.



Map to show the position of the Mucking Subsidence (1966). Its position is shown by "O Hole." The four depressions occupy the ground covered by the words "4 Depressions on Surface." The "Gr" was probably meant for gravel.

These depressions were in a line from 400 to 800 yards westward of the recent subsidence, and their similarity in shape and breadth, though their sides were sloped, certainly makes this view highly probable. The only other explanation of their existence would be to consider them as simply disused gravel-pits. But their uniformity of shape, and distribution along a line across a single field, makes any supposition of this kind improbable in the extreme. For there is plenty of surface gravel in the fields around all the depressions mentioned, and many



Section No. 1—Mucking Subsidence (1906). No. 2—Blackheath Subsidences (April, 1878, and November, 1880). Both the latter were practically identical in size and shape.

gravel pits in all directions. There is no gravel at the surface of the recent subsidence, simply because it is at the head of a slight valley ranging southward from the plateau of old Thames gravel in which these (in all probability) older subsidences occurred. About a week later, wishing to examine the country west of these depressions, I noticed a shallower hollow of similar shape, on the southern side of the footpath leading to Orsett, in the field north-west of the Cock Inn.

It seems necessary at this point to introduce a brief account of the geological structure of this district, by which I mean that

part of Essex lying south of a line from Purfleet to Stanford-le-Hope. The lowest formation seen is the chalk, which is visible over a considerable part of it as far eastward as Grays and Stifford. Thence to Stanford-le-Hope and East Tilbury it appears only here and there, at the base of the higher ground bordering the marshes south of Little Thurrock and West and East Tilbury. Above the Chalk, with a northerly dip, come the Tertiary formations; the Thanet Sand, the lowest of them, being the only one now existing south of a line ranging from a point north of Hangman's Wood to Mucking Ford. North of this line the Woolwich and Reading Beds and the Blackheath Beds come on above the Thanet Sand. Then the London Clay (which makes so much of the surface of Essex north of this district) comes on above the other formations mentioned. But it attains but little thickness, and covers but little ground within our area, though prominent at Horndon-on-the-Hill, just beyond it.

Later in date than any of the Tertiary formations mentioned, and of comparatively little thickness, is the old Thames Gravel, formed ages ago when that river was flowing at a much higher level than at present. The deposition of this bed has been a most important influence in the production of the present physical geography of the district. Here, as higher up the stream, the old course of the Thames was usually northward of that which it now has, the result having been the deposition of River-gravel over most of the surface between Purfleet and Stanford-le-Hope and East Tilbury, the Tertiary formations having been much planed down during the operation. To illustrate the effects of this planing down I may mention the following examples. In the great chalk pit west of the road between Grays and Stifford we find old Thames Gravel with only 8ft. of the Thanet Sand between it and the Chalk. Then at Hangman's Wood there is about 46ft. of Thanet Sand between the Chalk below and the Thames Gravel above. At the recent Mucking subsidence there is in all probability a thickness of about 150ft. of Tertiary beds between the surface and the top of the Chalk. And though, owing to its position at the head of a slight valley, there is no old Thames Gravel at the surface of the recent subsidence, there is a broad plateau of it a few yards away both eastward and westward. And in each of these instances the height of the surface of the plateau above ordnance datum is

about 100ft., though the depth to the Chalk varies from 8ft. to 150ft.

At the Mucking Hole we have not merely the full thickness of the Thanet Sand, but also that of the Woolwich and the Blackheath beds between the surface and the top of the Chalk. For the strata seen in the sides of the pit evidently belong to the basement bed of the London Clay. And the Geological Survey map shows London clay around the spot where the pit exists, while it evidently would also be found where the older depressions appear in the field westward, beneath the gravel forming the surface.

As regards the "Basement-bed" of the London Clay, the following details may be useful. Mr. W. Whitaker remarks in his Memoir, *The Geology of London and of Part of the Thames Valley*, Vol. I., p. 238 :—"Immediately at its base the London Clay commonly contains a greater or lesser admixture of green and yellow sands, generally mixed with rounded flint pebbles, and not unfrequently cemented by carbonate of lime into semi-concretionary tabular masses. These mixed beds, however, never exceed a few feet in thickness, and pass upwards rapidly into the great mass of the London Clay. To this part of the formation Mr. Prestwich has given the name of the 'basement bed.' "

The nearest section that I can find which will illustrate the nature and thickness of the strata between this basement bed of the London Clay and the top of the Chalk in this district is that of the well at Broad Hope Farm, about a mile eastward of Stanford-le-Hope. It is given in Mr. Whitaker's collection of *Essex Well Sections (Part IV.)* ESSEX NATURALIST, Vol. IX., p 178. For our present purpose a somewhat condensed account of it will suffice :—

	ft.	in.	ft.	in.
London Clay {clay .....	45			
{clay and sand .....	5			
Blackheath Beds (sands and gravels) .....	49	8	}	147 2
Woolwich Beds (sand, gravel, and a little clay) .....	33	6		
Thanet Sand (sand) .....	64			
Chalk				

The section at Thames Haven, given in Mr. Whitaker's memoir, *Geol. Lond., etc.*, Vol. II. p. 37, shows, when similarly treated :—

	ft.	in.	ft.	in.
London clay				
Oldhaven (or Blackheath) Beds (sand) .....	5	3	}	150
Woolwich and Reading Beds (sand and sandy clay) .....	33	3		
Thanet Beds (sand and clayey sand) .....	111	6		
Chalk				

Of course, in classifying variable sands, gravels and clays, much depends on the nature of the information attainable by the geologist recording sections in them. However, in the present case the one important point is the depth to the Chalk from the base of the London Clay, which is nearly the same at each place. From the same volume of Mr. Whitaker's memoir we may learn that at Corringham a section showed that there were Tertiary beds 137ft. in thickness between the London Clay and the Chalk; at Laindon 138ft., and at Vange 127ft. 6in. Thus, remembering that the uppermost 11 or 12ft. in the recent Mucking subsidence are the lowest beds of the London Clay, and that the older subsidences westward have some old Thames gravel at the surface in addition, it is very improbable that the Chalk is at a less depth than 150ft. beneath any of them.

This depth makes it in the highest degree improbable that these Mucking subsidences owe their existence to a natural cause, such as the sudden filling in of a pipe in the Chalk. On the other hand this thickness of the intervening beds also makes it very improbable that they are the result of the collapse of a denehole *ending in the Chalk*. And the vertical sides and great breadth of the recent hole in themselves suggest the collapse of a chamber or chambers at no great depth. Then, while a single pit of the denehole class might be a rare possibility (as in the case of that at Eltham), yet it is in the highest degree unlikely that a group of them would be made in a district where the total depth would be from 160 to 170ft., that is, double the depth attained by the deneholes of Hangman's Wood. At Mucking, too, besides the mere depth, there would be water difficulties, arising from the presence of clayey bands in the Woolwich series, from which the Hangman's Wood pits are free.

In short, a single pit ending in the Chalk, where these Mucking subsidences occur, might be a bare possibility, just as a well of that or greater depth might be sunk for the supply of some public institution, brewery or factory situated in a village. But the existence of a group of pits of this depth and special difficulty of construction is as unlikely as that of a group of very deep wells for the supply of the cottagers in the village street. In this district, too, where deneholes are known to abound wherever the Chalk is at the surface, or not more than 60 feet



beneath it, the ancient inhabitants were evidently familiar with the knowledge of practical geology necessary to prevent them from wasting their time and labour in profitless excavations.

Indeed, the number of deneholes known to exist in this district suggests that it was one in which deneholes, or secret subterranean storehouses, were specially advantageous or even necessary to the residents within its borders in early times. And a glance at the geological map seems to indicate why this was so. Proximity to that great highway, the Thames, was once a matter of much greater importance and advantage to the people of Kent and Essex than can easily be realised now. But if we look at the course of the river we may note that spots close to it, and yet sufficiently high to be above the reach of floods, and consequently suitable for settlements, are not very numerous. We must remember, too, that in early times the marshes were not easily traversed as they now are, inasmuch as they were not enclosed by the banks which now exclude the water even at the highest tides. But the district in question has places on it which must always have been specially suited for settlement at Purfleet, West Thurrock, Grays Thurrock, and East Tilbury, close to the river, while Stanford-le-Hope and Mucking had a stream allowing the passage of boats to and from the Thames. On the other hand, the great drawback inherent in these advantages was the special temptation offered by the district to piratical raiders coming up the Thames, especially in times before and after the Roman occupation, when there was no Count of the Saxon Shore to keep pirates in check. Part of a piratical squadron might land on the eastern side of the Essex promontory at Stanford-le-Hope, the rest of the crews at Grays Thurrock or Purfleet, or at some spot on the Mardyke. Gravesend, on the Kentish shore, would be equally eligible as a site for dwellings, but its inhabitants, on the landing of pirates, would not find themselves liable to have their retreat inland cut off, as would the dwellers on the Essex promontory opposite. Hence, probably, a special demand for, and supply of, the secret storehouses known as deneholes, which might also during a raid serve as hiding places for women and children, while the fighting-men drew the attention of the invaders elsewhere.<sup>1</sup>

<sup>1</sup> Those who fail to realise how mighty a terror pirates were but one thousand years ago to dwellers on the banks of the Thames and other rivers, should read the Anglo-Saxon Chronicle from the year 787 onwards, and remember that only the more important raids are mentioned.

But the fact that the deneholes which we know either in this part of Essex or at Bexley in Kent, end in Chalk, has caused the identification of deneholes with pits *in* the Chalk, if not *for* chalk, which is purely the result of accident. Chalk is the one comparatively hard rock existing at or near the surface where groups of deneholes have been found. Hence some of those ending in Chalk have lasted to this day. The depth, too, at which the chambers in the Chalk exist has caused them to be more or less choked up, after a period of disuse, by the fall of material down the shaft, there being a funnel-like orifice at the surface corresponding to the amount of material which has thus fallen, and the chambers themselves having suffered comparatively little by collapse. But deneholes in soft material, more or less strengthened by timber or brickwork, being often little, if any, deeper than many modern cellars, would collapse entirely after disuse, through the rotting of their timber supports, with a result at the surface more or less resembling that seen at the Mucking Hole. Indeed, one of them would scarcely ever be found except when its site was revealed by a subsidence. And should one be accidentally discovered uninjured, it would probably suggest to the discoverer, not an ancient structure, but simply a comparatively modern disused cellar, having no interest whatever for the antiquary.

Yet in the paper by Mr. F. C. J. Spurrell, entitled "Ensilage or Preserving Grain in Pits," appended to our Denehole Report<sup>2</sup> in 1887, we have abundant evidence that "the excavation of hollows in the soil for the purpose of hiding stores, whether in great *Silos* or in little *Caches*, is a common practice over the whole world." Also that, while a very ancient method, it is in full exercise at the present time. The size of these pits, says Mr. Spurrell, varies considerably where they are still used. In central Asia a comparatively small hole is used for one family, while many small or one large pit would be required by the more wealthy. "Several families living near each other have their hoards close together, partly for convenience in finding them, and partly to prevent mutual robbery, a difficult feat where all eyes would be watching." Pits more or less similar are, we learn, common in Europe now, especially in the countries

<sup>2</sup> Report on the Denehole Exploration at Hangman's Wood, Grays, 1884 and 1887. By T. V. Holmes and W. Cole, ESSEX NATURALIST, December, 1887 (Vol. I.)

bordering the Mediterranean. And, of course, the excavations are made in the surface rock of the locality in which they are needed. "The effort to keep out the damp is a constant trouble. It is accomplished in a measure by beating hard the sides of the pit, if of clay; by enveloping the deposit of corn with straw, reeds, fern, or bavons; by endeavouring to harden the sides by burning with fire, which could only be done in very shallow pits; by erecting wooden walls and floors; by covering with mastic or cement; and finally by building the interior either with stones, finished masonry, or with bricks and *terra cotta*."

I would also remind members of the Essex Field Club that on pp. 5 and 6 of Vol. II. of the *ESSEX NATURALIST* (1888) there is a "Note on the use of Pits in Brittany for Storage of Grain," by Charles Browne, M.A., who states that when travelling in Brittany in the preceding autumn he noticed slight mounds, sometimes in the centre, sometimes at the sides of the fields. Upon inquiring of the country people he was told they marked the sites of pits used for the storage of corn. They also told him that after filling a pit with stores of this sort they covered over the top with a layer of clay or earth, rammed hard to keep out the wet. The slight mound was simply to mark the position of the pit. Mr. Browne, unfortunately, was not able to examine any of these pits, but his note is valuable as showing subterranean storage to be still in use in a country so near our own as Brittany, and one, like Essex, bordering the sea.

I now pass on to consider the bearing of the remarks of Mr. Spurrell and Mr. Browne on the nature and distribution of these underground storehouses on the recent and (in all probability) earlier subsidences at Mucking.

I have already noted the advantages and disadvantages of the position of this Essex district between Purfleet and Stanford-le-Hope, and the special need of its inhabitants many centuries ago for secret storehouses when there was no Count of the Saxon Shore to protect south-eastern Britain from pirates. Hence, no doubt, the abundance of deneholes in the chalk between Purfleet and Hangman's Wood. But the people of that part of the district between Hangman's Wood and Stanford-le-Hope would need secret storehouses as much as their neighbours south and west, and would be compelled to make their subterranean granaries in the sands near the surface. For it

would soon be obvious to them, on trial, that nothing whatever was gained (around their dwellings) by an extra ten or twenty feet of depth, and that, in strata consisting of sands and gravels, with an occasional clayey band, though a foot or two of clay at the surface tended to keep a pit dry, a clay band near the bottom of the excavation tended to keep it wet.

Thus the three or four feet of London Clay at the surface where the recent Mucking subsidence took place would tend to keep dry any chambers in the sands beneath. The section where the older depressions westward exist is probably similar, with the addition, in their case, of a few feet of old Thames gravel. And the shape of the newest subsidence decidedly suggests the former presence of a large chamber, or group of chambers, at no great depth in the sands, which has now collapsed. In all probability a similar statement would be true of the depressions in the field westward. And it seems to me that the only probable explanation of their existence is that they mark the site of ancient pits of the denehole class, once used as granaries and storehouses.

In Palin's *More about Stifford* the author remarks, p. 40 (after quoting an account by Mr. R. Lloyd Williams of the deneholes of Hangman's Wood and elsewhere):—

“ We may add that a ‘ Danehole ’ partly filled up is to be found in the Stifford chalk quarry. But to show that chalk was not the object in making them, it may be mentioned that a series of them in Mucking Woods was filled up within the last few years, and these were in sand.”

And on the same page he notes that :—

“ Mr. J. E. K. Cutts, in an interesting paper on Billericay, read to the Essex Archaeological Society at its annual meeting at Chelmsford, 1871, says, ‘ Not far from this tumulus is an excavation like a gravel pit, which the young labourer's father had told him was a ‘ Denehole ’ which had ‘ caved in. ’ He (Mr. Cutts) dug down 3 feet, but found nothing but a few broken tiles. ’ ”

We have seen that at the Mucking hole the Chalk is probably about 150ft. beneath the surface. Now at Billericay, which is about eight miles nearly due north of it, and on the Bagshot Beds, which overlie the London Clay, the distance to the Chalk from the surface must certainly be more than 500ft. Yet we find “ the young labourer's father ” had no doubt that the excavation there was a “ denehole ” which had “ caved in, ” and his recognition of it as a *denehole* showed that, at a place where there could never have been a denehole ending in Chalk,

they were nevertheless recognised by their traditional name. On p. 41 of Palin's *Stifford and its Neighbourhood*, Mr. R. Meeson says :—"A curious feature of the district is the occurrence of the Dane-holes *as they are called by the country people*," etc. (the italics are mine). He looks upon them as "simply excavations to obtain chalk for lime-burning," a view which the remark of the young labourer's father at Billericay is in itself sufficient to refute. In such a matter, indeed, the view of a man ignorant of and consequently free from the influence of antiquarian theories is of special value. And as apparently the caving in of a denehole at, or near, Billericay was not an excessively unusual occurrence in the experience of an agricultural labourer of middle or old age in 1871, this recognition of them there seems to suggest that they were known and used by the agricultural population down to a comparatively modern period. And the few broken tiles found in this Billericay pit, unsatisfactory as they may be as affording evidence of its antiquity, are at least important as human work found in it. For as these pits were mainly storehouses for grain and other vegetable produce, and were often strengthened where necessary by timber supports, their sudden collapse would leave in the ruins few objects of an imperishable kind besides the bricks or tiles which may have been used in their construction. Old villages and farmhouses are, in the great majority of cases, on sandy or gravelly soil, for the sake of the water supply attainable at a moderate depth ; and Billericay is no exception to this general rule. But underground chambers in such strata would have special need of an approximately water-tight roof. This might be afforded by a covering of tiles above a timber framework. Decay of the timber would in time cause a sudden collapse, with the result that tiles would naturally be the first and possibly the only durable objects of man's handiwork to be discovered by digging.

A paper, entitled "Miscellaneous Notes on Deneholes," which I read before the Essex Field Club on October 27th, 1883, ends with the following note, re-introduced here on account of its bearing on the Mucking subsidences and their probable explanation.

" Norfolk

My friend Mr. H. B. Woodward, of the Geological Survey, has kindly sent me the following account of the discovery of some buried wheat near Lammas

in E. Norfolk. It is given in a letter from Thomas Munro (?) to the late Samuel Woodward, dated 29th August, 1834. Mr. Munro thus writes:—"It was discovered on the side of a lane a little to the left of the road leading through Lammas to Buxton, where an acquaintance of mine was allowed to dig sand and gravel for top-dressing an adjacent meadow, and the quantity was not less than eight or ten quarters. . . . An oak tree of considerable age grew near the spot, the fibrous roots of which had insinuated themselves among the wheat, which lay in two distinct compartments at the bottom of the sloping bank, separated by a natural division running transversely through the pit."

Also in Norfolk, at Caister near Yarmouth, was found in 1837 a bricked pit, an account of which appears in the *Gentleman's Magazine Library (Romano-British Remains), Part I.*, pp. 230-5. From the very full description of this pit we learn that:—"The masonry [of Roman bricks and tiles] was very rude, and there was no appearance of covering above, nor could we discover any traces of a paved bottom, there being nothing but the natural clay in which the whole was imbedded forming the floor of this oblong pit." Its length at the bottom was 11ft., and its breadth 7ft. At the top the length was 12ft. and the breadth 8ft. Its height had probably been "at least 4 feet." Among the remains found in the pit were oyster shells and fragments of Roman pottery. The writer of the account (T. Clowes) discusses the purposes to which this pit may have been devoted, rejecting the notions that it may have been a bath or a tanner's pit, and adding that it was "in truth so rude a building that my own idea is that its use was one of so ordinary and commonplace a nature as scarcely to be worth much speculation; that it was Roman, beyond doubt, is I conceive the only point of interest."

We have, however, some reason for thinking that this rude pit was not devoid of interest, as Mr. Clowes supposed, for we find that "Mr. Woodward suggests that the building was intended for a corn store, but I scarcely incline to this supposition, as an underground vault, though very well for concealment in cases of necessity, would by no means be a corn store in a well-defended Roman encampment."

It is somewhat singular that Mr. Clowes was disinclined to accept Mr. Woodward's view for the reason given, even though he considered this pit as "constructed for some domestic purposes." For in a "Notice of the Barrier of Antoninus" by John Buchanan, which appears in the *Archæological Journal*, Vol.

15 (1858), we learn that "stones for grinding wheat, nay, large quantities of that grain itself, apparently charred, were found in what had been a subterranean granary in one of the Castella" (Castlecarey).

It is also worth recording here that in the *Gentleman's Magazine Library (Romano-British Remains, Part. II., p. 352)* it is mentioned that in the old British camp in Wiltshire, known as Battlesbury, "a quantity of parched corn was found, some years ago, curiously preserved under ground in a sort of stone trough." Battlesbury is near Warminster, and stands on the western edge of Salisbury Plain. The date of this account of Battlesbury is 1787.

It may also be useful to note in this place that a brief account is given in *Trans. Essex Field Club, Vol. iv., pp. 108-110*, of ancient British subterranean granaries discovered in the camp known as Winklebury, on the borders of Wiltshire and Dorset, and of others in the Isle of Portland. A considerable amount of blackened corn was found in them at both the places mentioned.

Deneholes in the Chalk, even when destroyed (for instance) during the enlargement of a great chalk-pit, are visible during the progress of their destruction. If, like those of Hangman's Wood, and of Stankey and Cavey Spring, Bexley, they exist in groups which have made the areas they occupy useless for other purposes, they retain for centuries a certain proportion of open shafts, which allow their characteristic features to be noted. Consequently, whatever may be the views held by their explorers as to the purposes of their makers, to all they are obviously ancient and remarkable. But the shallower subterranean storehouses, in sand, gravel, and clay, would very seldom have their existence revealed except when the sudden collapse of their chambers disclosed their sites. When this occurred, they would be much more likely to have their true nature and former uses recognised by farmers and labourers whose families had long been resident in the locality, and who possessed traditional information about them, than to attract the attention of a local antiquary. For, apart from the fact that antiquaries are few in number, they naturally tend (like Mr. Clowes) to be interested in a rude subterranean chamber only when it contains coins, pottery, or inscriptions, and not when it

simply suggests some merely prehistoric or primitive domestic purpose. And unless seen when quite fresh, the subsidence caused by the collapse of an old subterranean storehouse would suggest something of special interest as little as the sight of a disused gravel or sand-pit.

I have, therefore, much pleasure in saying that we are greatly indebted to Mr. Squier for so promptly sending information about this most interesting Mucking subsidence. I have scarcely any doubt that in this, and in the hollows in the adjacent field, we have examples of those deneholes in sand mentioned by Palin as found in Mucking Woods, and which have been hitherto in this country almost entirely ignored, though recognised as existing, and now in use over large areas in Europe and Asia. Indeed, as I have already remarked, from the fact that the deneholes of south-eastern England have been preserved only when they end in the Chalk, simply because it is the only comparatively hard rock in those parts of Kent and Essex where they abound, their connection with the Chalk, which is only local and accidental, has been erroneously supposed to be essential. This mistake is one which the evidence afforded at Mucking and Billericay in Essex, and by Lammas and Caister in East Norfolk, will decidedly tend to correct.

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## THE ESSEX FIELD CLUB.—REPORTS OF MEETINGS.

### SPRING RAMBLE IN EPPING FOREST AND 246th ORDINARY MEETING.

SATURDAY, MAY 19TH, 1906.

It has become almost an annual custom to open the summer session of the Club with a ramble in Epping Forest, and on this day one of these pleasant meetings was held. The assembling place was Theydon Green, and between 30 and 40 members attended. The route was through some of the most beautiful parts of the woodlands, looking their best in a delicate livery of pale green opening buds and white hawthorn blossoms.

The Conductors were Mr. S. A. Skan, of the Royal Herbarium, Kew; Mr. Miller Christy, President; and the Hon. Secretaries. Mr. Skan gave several extemporary demonstrations in the woods, his main text being the coming science of "Ecology" or "Plant Relationships," which is rapidly assuming importance because of its direct bearing on agriculture, horticulture, and forestry. Mr. Skan explained by means of fresh specimens from Kew, some most interesting examples of the methods by which plants adapt themselves to varying conditions of moisture, drought, shade, and sunshine, and the ways in which particular species



may spread themselves or even become dominant in certain localities. This last effect may be seen in Epping Forest in the great increase of birch trees in late years.

Mr. W. Cole gave a demonstration of the two kinds of oak-galls, which were to be observed so plentifully on the trees. One was the well-known "oak-apple" (*Teras terminalis*), the sexual generation of the root-gall *Biorhiza aptera*, found in the winter on the rootlets of the oak. The other was the currant-gall on the catkins (*Spathegaster baccarum*), the sexual gall of the oak-spangle found on the under side of the leaves from July to September. Mr. Cole gave a sketch of the life-histories of these, and the extraordinary dimorphism or "alternation of generations," which are so well illustrated by the two dual species of Cynipidæ under consideration. (The reader is referred to Mr. Lewis' paper in volumes XII. and XIII. of the ESSEX NATURALIST.)

Tea was taken in a tent, erected in Monk Wood by the kind permission of Mr. McKenzie, the Superintendent of the Forest, and afterwards the 246th Ordinary Meeting was held under the chairmanship of the President.

**New Members.**—Mr. F. McArthur Moir (*Indian Forest Service*), Deoban, Lexden Road, Colchester, and Mr. George Cross, Lee Wick, St. Osyth, were elected members.

Mr. Skan then continued his remarks on certain curious structures in plants having an oecological bearing. On the motion of the President a cordial vote of thanks was passed to him for his services at the meeting.

After some formal business and the announcement of the meeting of the Photographic Survey of the Club at Colchester on June 23rd, the members strolled through the woods to Loughton.

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## INSPECTION OF HAINHAULT FOREST.

SATURDAY, JUNE 9TH, 1906.

This meeting took place under very favourable conditions. The forest was entered by the road from Hainault station. At the gate of the woods the party was met by Mr. Francis Dent, who very kindly acted as Conductor during the afternoon. Great regret was expressed at the absence of Mr. E. N. Buxton, who was unavoidably summoned to town for business connected with the Education Committee. Much interesting information as to the work being carried out was given by Head-keeper Jones, who takes much care of the developing plantations.

Demonstrations were given in various parts of the recovered lands by Mr. Dent, and also by Mr. T. S. Dymond, F.I.C., F.C.S., who had advised Mr. Buxton during the operations of laying down the land for grass, etc.

Everyone was pleased to notice the marked improvement since the visit last year, but several members were somewhat surprised at finding cattle roaming over all the lands, plantations as well as the open. It is obvious that a natural woodland can never grow while this system obtains. Our member, Mr. McArthur Moir, late of the Imperial Indian Forest Service, and Mr. W. Cole, from his knowledge of what has happened in Epping Forest, were very emphatic in their condemnation of the policy apparently being pursued in this regard.

Tea was taken in a tent erected on Cabin Hill, by kind permission of the London County Council. Afterwards an Ordinary Meeting (the 247th) was held, Mr. Miller Christy, F.L.S., President, in the chair.

Prof. E. G. Coker, M.A., D.Sc., etc., 3, *Farnley Road, Chingford*, and Mr. Charles E. Sankey, *Glen Lea, Dulwich Common*, were elected members.

Professor R. Meldola said that very many members would regret to hear of the death of Mr. Thomas Royle, F.C.S., who for three years had acted as Treasurer of the Club. Happily the Club had not before lost any officer by death, unless they excepted the late Mr. W. J. Argent, who had acted as Librarian for a short time in the first days of the Society. Professor Meldola moved that a message of regret and condolence should be sent to Mrs. Royle.

The motion was seconded by the President, and spoken to by the Rev. W. C. Howell, and was carried in silence.

Mr. Dent then delivered an address on the present condition of the Forest, and the prospects of the work of re-forestation. He was followed by Mr. Dymond, who gave some particulars of the kinds of grasses sown, and the characteristics of the soil. etc.

A short discussion followed in which Mr. E. McArthur Moir, Mr. W. Cole, Rev. W. C. Howell, Mr. W. H. Dalton, F.G.S., Head-keeper Jones, and the President took part, and Mr. Dent replied on some points as to the admission of cattle, etc., which had been raised.

A very cordial vote of thanks was given to Mr. Dent for his services during the afternoon.

It is hoped that Mr. Dent's observations on the planted and grass lands made during the past few years may be embodied in a paper for the *ESSEX NATURALIST*. There can be no doubt but that Mr. Buxton's and Mr. Dent's records would be of great interest and value in time to come.

The ramble and demonstrations were continued during the evening, and the return train was taken at the Grange Hill Station.

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## PHOTOGRAPHIC AND PICTORIAL SURVEY OF ESSEX. ANNUAL MEETING.

SATURDAY, JUNE 23RD, 1906.

On this day a number of members and others interested in the Survey visited Colchester, and some very pleasant and instructive hours were spent in inspecting notable spots in the town, culminating in the first annual meeting of the Survey, which was held in the early evening in the Masonic Hall.<sup>1</sup>

The Survey has been inaugurated as a permanent Committee by the Essex Field Club for the purpose of gathering together a permanent collection of photographs and other pictures or objects of interest, and maps, plans, and other documents, so as to form a permanent and comprehensive survey and record of all that is valuable and representative in the county and the neighbouring rivers and sea. The rules also include the promotion of intercourse with kindred bodies, archæological and photographic societies, etc., and to arrange for the photographing of any objects not generally accessible. With such a worthy object in view, this offspring of the Essex Field Club should have a long and prosperous career, and the collections should prove interesting and instructive to all who appreciate this historic and picturesque county.

The general scope of the scheme upon which the survey is working was set out by Mr. A. E. Briscoe in a paper published in the *ESSEX NATURALIST* (Vol.

<sup>1</sup> The Editor is indebted for the major portions of this account to the excellent reports of the meeting in the *Essex County Standard* and the *East Anglian Daily Times*.

XIII., pp. 1-5). A full prospectus was inserted in the part of the same journal for October, 1904 (Vol. XIII., part 7).

Favoured with delightful weather the company gathered at Colchester Cattle Market at 11 a.m., and were met by Alderman Henry Laver, F.S.A., Councillor Shenstone, F.L.S., Mr. W. Gill, F.R.Photo.Soc., and these gentlemen acted as guides throughout the day. Much of the success of the ramble was due to the lucid and full explanations of Dr. Laver, whose knowledge of the history and archæology of the town is probably possessed by no other man in such degree.

The party ascended Balkerne Hill, Dr. Laver explaining the various points of interest associated with the building of the old Roman wall in the first or second century A.D. At the Balkin Gate—which was viewed with special interest—the doctor remarked that this was one of the original entrances to the town, and shared, with a gate at Lincoln, the distinction of being the only two Roman archways of the kind remaining in England. Having viewed the old Roman guard-room, the company proceeded to St. Mary's steps, where they inspected the remains of one of the towers built in the wall for defensive purposes by the Romans.

At Mr. Gill's house in High Street, some beautiful specimens of the new art of tricolour photography were much admired, and Mr. Gill took an excellent photograph of the company in his garden.

At Sir Isaac's Walk, Alderman Laver pointed out stones at the side of the roadway, forming the top of the Roman Wall. Scheregate Steps, and the two bastions on the wall in Vineyard Street and Priory Street having been viewed, the ruins of St. Botolph's Priory were then visited. The Priory, remarked Dr. Laver, was founded in 1109, being entirely built with Roman tiles and *debris*. It was dedicated to St. Botolph, and was a very important monastery—indeed, in 1116 Pope Pascal gave it priority over all other Augustine monasteries in England. It was one of the most beautiful examples of early Norman building, but great care was needed to preserve the ruins. There was considerable difficulty in regard to this, as there were those who did not like to sacrifice the ivy which clung to the building. They thought it picturesque; but Dr. Laver said soon there would be no church and no ivy. The Church of St. Giles containing the vault where lie the remains of the "two valiant knights," Lucas and Lisle, who were shot after the surrender of Colchester, was then visited. The tomb, said Dr. Laver, was of special interest to him, for an ancestor of his was one of the Royalist colonels.

St. John's Abbey was then visited, the doctor remarking that its abbot was one of three who, at the dissolution of the monasteries, refused to acknowledge the King's supremacy, and was therefore tried for high treason, and hanged.

An adjournment to the Masonic Hall for luncheon was then made. Dr. Laver presided, and was supported by the Mayor of Colchester (Alderman Henry Goody), Alderman Wilson Marriage, Councillor J. C. Shenstone, Mr. A. E. Briscoe, B.Sc. (former principal of the Technical Institute, West Ham, and originator of the survey), and Mrs. Briscoe, Mr. A. Horsley Hinton (Editor of *The Amateur Photographer*), Mr. Horace Wilmer, F.R.P.S., Mr. Bryan Corcoran, Mr. E. McA. Moir, Mr. W. Gill, Mr. M. Veasey and Miss Veasey, Mr. W. Ping, Mr. G. E. Lyddon (hon. secretary Ilford and District Camera Club), Mr.

A. V. Taylor, Mrs. Robert Allen, Mr. T. W. Reader, F.G.S., Mrs. and Miss Crump, Mr. W. Cole, F.L.S. (Hon. Sec. E.F.C. and Curator of the Survey), and Mr. Victor Taylor (hon. secretary), with many others.

Dr. Laver gave the loyal toast, and said he must take that opportunity of thanking the Mayor for his personal interest, as displayed by his presence. (Applause.) The Mayor of Colchester represented the government of a town which was a municipality in A.D. 43 or 44, and had continued a municipality until the present time. Colchester had been represented in Parliament from time immemorial—even before London—and they were certainly much before London in the foundation of the town. The origin of London in all probability was that a Roman General had to wait on the shores of the Thames in some convenient position until they could get help from Rome, and Claudius settled down in that position, and hence came London. Colchester was very much more an antiquity than London, and was as old as any place in the Kingdom.

The Mayor, in acknowledging, said that it afforded him very much pleasure to meet that company on that their first visit, as a Society, to the town. He had reason to be proud of the town of which he had the honour of being Mayor, for to be Mayor of a city which took precedence over London in point of age must, they would agree with him, be a privilege to be appreciated. He congratulated the members on having such able guides as Dr. Laver, Mr. Shenstone, and Mr. Gill, and in conclusion he assured them that if they came again to the interesting old town, they would be exceedingly glad to welcome them. (Applause.)

Mr. Shenstone added a word of thanks to Mr. Marriage for his presence and referred to the trouble and interest he had taken in preserving the antiquities of Colchester, an example of which—an old house in East Bay—they would visit during the afternoon.

Mr. Marriage said it had been a pleasure to make arrangements for an inspection of the place, and in referring to the objects of the society remarked, amidst laughter, that he would always be found ready and willing to do anything he could to welcome any of those who came from their younger and somewhat overgrown sister, London.

The company then proceeded to Tymperleys (Dr. Gilberd's birth place) and Trinity Church (his burial place), the old Grammar School in Culver Street, the Castle quadrangle and the Museum, and went by way of the Park, the Roman Wall, and Land Lane, to the old house by the side of Marriage's mill, which was inspected with interest, particularly the Board Room, which has been as far as possible preserved in its original state. An Elizabethan half-sovereign, of bright gold, had been found during the week in the earth under the flooring of the shop, which is still in the workmen's hands. Afterwards the members walked by the side of the mill river to view the pretty scenery. It is a diversion of the river, which was owned by the Colchester Corporation for an extent of more than 12 miles till it reached the sea, and Dr. Laver gave some interesting facts regarding the purity and extent of the beds of the celebrated Colchester oysters, and the steps taken to protect them by an efficient force of river police. Dr. Laver then left the company in the hands of Mr. Shenstone, but before he went Mr. A. E. Briscoe proposed a hearty vote of thanks to him for the trouble he had taken. Dr. Laver, in returning thanks, said it always afforded him great pleasure in taking strangers round the town, of which he was so proud, and which was, in an historic sense, one of the most interesting in Europe.

A short journey on the tram took the party to the residence of Dr. Nicholson, by whose kindness and hospitality tea was partaken in the lovely rose garden, and before leaving a vote of thanks, proposed by Mr. Briscoe and seconded by Mr. W. Cole, was accorded to Dr. Nicholson.

The first Annual Meeting was held in the Masonic Hall under the Chairmanship of Mr. Briscoe, who was supported by Mr. Victor Taylor (hon. sec.) and Mr. Shenstone. Mr. Taylor read letters of apology for absence from Lord Rayleigh (Patron of the Survey), Mr. J. McIntosh (Secretary of the Royal Photographic Society), Viscount Middleton (President of the Photographic Survey of Surrey), Professor Meldola, F.R.S., Sir Benjamin Stone, Mr. F. W. Rudler, I.S.O., F.G.S., Mr. G. Scammell (hon. sec. National Photographic Record Association), and a number of other gentlemen. Mr. Taylor read the Annual Report for the year ended December 31st, which was as follows:—

“Considering that this Association has only recently completed the first year of its existence, fair progress has to be recorded, although so far fewer contributors have offered their assistance either in donations towards the expenses or in kind than had been anticipated. Among those who have come forward to assist in the important work, the thanks of the Council of the Survey are especially due to the Woodford Photographic Society, whose handsome contribution of a set of about 200 prints, comprising the survey of Woodford, is as artistic as it is comprehensive. Fortunately this Society commenced the work several years ago, and some of the prints record parts of the district the aspect of which has since been completely changed in giving place to modern requirements. This only emphasises the necessity of record work being proceeded with without further delay, for our towns and villages are rapidly undergoing change, and relics of bygone days and curious customs are fast disappearing, soon to become merely a memory, unless a systematic record is now undertaken. Many good prints, and also engravings of value, showing the old mansions and churches as they were a century or more since, have been sent in by members of the Council and by individual contributors; the Essex Field Club has contributed towards the requirements of its child, the Survey; Mr. Miller Christy, the President, has generously handed over about 200 rare and interesting engravings and process-prints; while numerous friends are engaged in surveying. The accounts made up to the end of 1905 showed there were only 26 subscribers, and there was a balance in hand (which has since been diminished) of £5 10s. 9d.”

The Chairman said the report, on the whole, was a very satisfactory one, and he hoped that at the end of next year, when the Survey had become better known, they would have to record a larger number of gifts. In giving a short address on the object and work of the Survey, Mr. Briscoe mentioned that the Town Council of West Ham had agreed to house the prints and other contributions in the Essex Museum of Natural History, and to provide cabinets and other necessities for safe preservation, on the condition that the collection was a permanent one. Should the Survey go out of existence at any future time the Corporation would take up the control of it, so that permanency would be secured. The Chairman appealed to the amateur photographers in Essex to give the Survey as much help as possible. They could communicate with the Secretary, who could suggest a particular district for their operations, so that every neighbourhood in the county might be properly worked. From a neighbourhood like Colchester they ought to have the assistance of 30 or 40 photographers, and they would be pleased to receive contributions. He also appealed to all who had

interesting prints or drawings that they would be willing to contribute. In conclusion, he thanked Dr. Laver and Mr. Shenstone for what they had done that day, and Mr. Victor Taylor, who had made such excellent arrangements. (Loud applause.)

Mr. Shenstone acknowledged the compliment, and the Meeting ended.

## MEETING IN THE DANBURY AND LITTLE BADDOW DISTRICTS IN CONJUNCTION WITH THE GEOLOGISTS' ASSOCIATION.

SATURDAY, JULY 7th, 1906.

*Directors* : A. E. BRISCOE, B.Sc., MILLER CHRISTY, F.L.S., W. COLE, F.L.S., F.E.S., T. W. READER, F.G.S., and A. E. SALTER, D.Sc., F.G.S.

This meeting was a whole-day one, planned for visiting the commons and woods of this delightful part of our county, and, with the assistance of expert members of the Geologists' Association—particularly Dr. Salter—special attention was paid to the geology of the district traversed.<sup>1</sup>

The party assembled at Chelmsford Station soon after 10 a.m., and proceeded in brakes to Great Baddow, where the waterworks belonging to the District Council of Chelmsford were inspected under the direction of Mr. J. Dewhurst, A.M.I.Mech.E., who had placed out a sectional diagram of the bore-hole and samples of the various strata passed through for the inspection of the members. His remarks are embodied in the following account :

“ The position of this bore-hole is at the outcrop of the clay bed forming the valley of the Chelmer, and is the site also of a strong spring of water draining the gravel which extends from the site to Galleywood, and which for many years was the source of the supply of water for these works. ”

“ The yield of the spring from this gravel formation varies from 60,000 to 120 000 gallons per 24 hours, and is now supplemented by water obtained from the bore-hole. ”

“ The surface level is 97ft. O.D ; the boring is 311ft. deep and 10in. in diameter. It is lined with steel tubes of 10in. internal diameter to a depth of 350ft., beyond which are 8½in. internal diameter perforated steel tubes. ”

“ The work of boring was commenced in February, 1891, and was completed in October of the same year. ”

“ The strata passed through are as follows :—

				Depth from Surface.	
	ft.	in.	ft.	in.	
Soil .. ..	2	0	—	—	
Yellow Clay .. ..	1	6	3	6	
Yellow Gravel .. ..	10	6	14	0	
Red Loamy Sand .. ..	1	0	15	0	
Yellow Gravel .. ..	12	0	27	0	

<sup>1</sup> The Editor is greatly indebted to Dr. Salter for furnishing nearly all the matter of this report.

						Depth from Surface.
						ft. in.
Black Gravel	..	..	1	6	..	28 6
Yellow Loamy Sand	..	..	1	0	..	29 6
Yellow Gravel (very sandy)	..	..	9	6	..	39 0
Brown Clay	..	..	1	6	..	40 6
Blue Clay	..	..	68	0	..	108 6
Clay Stone	..	..		6	..	109 0
Blue Clay	..	..	141	6	..	259 6
Dead Clay Sand	..	..	16	6	..	267 0
Dead Grey Rock	..	..	1	6	..	268 6
Dark Grey Dead Sand	..	..	12	0	..	280 6
Black Pebbles	..	..	1	0	..	281 6
Live Grey Sand	..	..	5	0	..	286 6
Sand and Sea Shells	..	..	1	6	..	288 0
Grey Sand	..	..	13	0	..	301 0
Sandy Clay mottled	..	..	28	6	..	329 6
Grey Sand	..	..	64	0	..	393 6
Green Flints	..	..	1	6	..	395 0
Chalk	..	..	2	0	..	397 0

"The rest level of the water on commencing pumping was 80ft. from the surface, and after continuous pumping day and night for 14 days this was lowered to 145ft. from the surface; the rate of pumping was 72,000 gallons per 24 hours. In this boring no attempt was made to obtain water by going into the chalk formation, and other borings in the immediate neighbourhood have proved that little water is obtained from that source.<sup>2</sup>

"Pumping from this bore-hole is now carried on at from 4,000 to 5,000 gallons per hour by means of an air-lift plant, and after heavy continuous work the water level is occasionally lowered to 160 ft. from the surface, but afterwards the water rises rapidly.

<sup>2</sup> The following data kindly supplied to Mr. A. C. Young, F.C.S., by Mr. Reginald Watney, may be of interest for comparison:

## WELL SECTION GREAT BADDOW BREWERY.

						Depth from Surface.
						ft. in.
Dug well	...	...	...	...	300 0	...
Broken brick rubbish	...	...	...	...	16 0	...
Hard Clay	...	...	...	...	10 0	...
Claystone	...	...	...	...	1 6	...
Hard Clay	...	...	...	...	3 6	...
Clayey Sand	...	...	...	...	1 6	...
Pebbles	...	...	...	...	3 6	...
Live Sand	...	...	...	...	11 0	...
Hard Clay	...	...	...	...	5 0	...
Pebbly Sand	...	...	...	...	0 6	...
Mottled Clay	...	...	...	...	6 6	...
Sand and Stone	..	..	..	..	9 0	...
Sand and Clay	...	...	...	...	30 0	...
Thanet Sand	...	...	..	..	48 0	...
Chalk and Flints	...	...	...	...	304 0	...

No water in the Chalk. Water came in at 332 ft. 6 in. to 347 ft. and at 359 ft. to 368 ft.

"The water is absolutely pure and very soft, as the following analysis made by Dr. J. C. Thresh, at the County Public Health Laboratories, Chelmsford, in March, 1902, will show :—

"*Saline Constituents of a sample of water from Great Baddow (Bore) Waterworks.*

"*Estimated in parts per 100,000.*

Ca.	Mg.	Na.	CO <sub>3</sub>	SO <sub>4</sub>	Cl.	NO <sub>2</sub>	Probable Combinations.		
·8	·325		21·2	7·3	37·6	·2			
·8	..	..	1·2	..	..	..	Calcium Carbonate ..	2·0	
..	·325	..	·8	..	..	..	Magnesium Carbonate ..	1·1	
..	..	14·7	19·2	..	..	..	Sodium Carbonate ..	33·9	
..	..	3·5	..	7·3	..	..	Sodium Sulphate ..	10·8	
..	..	24·45	..	..	37·6	..	Sodium Chloride ..	62·05	
..	..	..	..	..	..	·2	Nitrates, etc.. ..	1·65	
Total solid constituents dried at 180° C. ..								..	111·5

"Other determinations :

Hardness, Temporary or Permanent—total	..	..	4°
Free Ammonia	..	..	0·08
Organic Ammonia	..	..	0·002 <sup>3</sup>
Oxygen absorbed in four hours at 27° C..	..	..	0·012 <sup>3</sup>
Nitrates	..	..	Nil.

"*Note.*—To convert the above parts per 100,000 into grains per gallon multiply by ·7."

The party now proceeded across the road to the large gravel pits known as the Old Bee Hive Quarry, where they were met by the owner, Mr. Robert Jackson, who afforded every facility for the examination of this interesting section.

The gravel is worked to a depth of 45 ft. The lower portion consists of finely stratified gravel, above which is a gravel arranged somewhat tumultuously. In the surface soil above fragments of Roman or Romano-British pottery are occasionally found. Mr. Jackson exhibited to the members some pieces recently obtained.

The constituents of the gravel are principally flints, some of which are over a foot long. Sarsens of moderate size occur, the one at the "Beehive" close by having been obtained from this pit. Others were seen lying about. Quartz blocks and large pebbles from the Bunter formation were abundant, and many small boulders of Rhyolite similar to those found at higher levels (*cf.* Beggar Hill, near Fryerning) at 300ft. O.D. Some large blocks of conglomerate resembling Hertfordshire "Pudding-stone" also occur.

The materials appear to be derived from higher and older gravels which formerly existed to the south and west.

Mr. Jackson kindly provided some photographic picture-cards as mementoes of the visit. A very hearty vote of thanks was given to him for his assistance and courtesy.

The drive was then continued to Danbury Palace, where the members were heartily and hospitably received by Sir Thomas Hanbury, K.C.V.O., and an inspection made of the house and pictures. Under Sir Thomas' guidance a very



pleasant ramble was taken in the park, which comprises about 250 acres. It is an undulating expanse with fine oaks and cedars, and parts of the estate are covered with virgin woodland.

The party then ascended the hill to the well-known hostelry the "Griffin" (mentioned in the introduction to "Waverley" and in Strutt's romance of "Queenhoo Hall"), where lunch was served.

This was the fourth visit of the Club to this notable district, and many particulars of Danbury will be found in our publications. The remains of the old Danish Camp were described by Mr. F. C. J. Spurrell, F.G.S., in the *ESSEX NATURALIST*, vol. iv., p. 138, and there a plan of the relic was given. Many notes on the natural history of the district may be read in the reports referred to. The botany has been celebrated since the time of Gibson's *Flora of Essex*. As may be gathered from our President's book, the bird fauna is exceptionally rich, while many rare insects have occurred in the old days on these upland commons, now, alas, so woefully diminished by "land-grabbers"—the fate of nearly all open land in our county.

The Church of St. John-the-Baptist<sup>3</sup> was visited under the guidance of the Vicar, the Rev. J. B. Plumtree, M.A., who gave a full and interesting account of the building. The church occupies the highest point in the village, and its tapering spire is a well-known landmark over a large part of the county. Danbury Common, 300 ft. O.D., was then crossed in order to view the large excavations for gravel which are to be seen there. Dr. Salter showed that Danbury Hill owed its existence to the sheet of gravel which capped it, and which had resisted denudation while the softer clay land around had disappeared. The gravel, sand, and clay were much contorted, and the Director pointed out that these might be due to one or more of the following causes:—

(a) The former presence of calcareous beds below the gravels, which, on being dissolved away by the water percolating through the gravel and sand, caused the superincumbent insoluble beds to fall in. This explanation is not probable, as the only calcareous beds likely to occur would be Crag, and of this there is no sign.

(b) Earth-movements of a wide-spread character.

(c) The slipping of the subjacent London Clay down the steep slope, thus disturbing the gravels, etc., above. In this connection it is noteworthy that an important spring occurs close by at a rather lower level.

(d) The impact of an ice-sheet. Mr. F. W. Harmer, F.G.S., writing to the Director regretting his inability to attend the excursion, wished him to state that he believes "the mounds of gravel, etc., at Danbury and Tiptree Heath represent the terminal moraine of the Essex ice-sheet, rather than the denuded remnants of a once more widely-spread deposit."

Dr. Salter pointed out that the constituents of the gravel showed it belonged to the same series of deposits as are found at Beggar Hill, around the Stevenage Gap, and along the northern slope of the Lower Thames Valley at various localities, which he regarded as of fluviate origin. The time allowed did not permit of a thorough examination of all the interesting points connected with this important deposit, and it is to be hoped that in the near future another opportunity for doing so will arise.

<sup>3</sup> For a description of the church consult Mr. Chancellor's paper in the *Essex Review* for January, 1893.

The conveyances were sent off to Little Baddow and the party walked across Lingfield Common (noticing the sundew (*Drosera*) and other interesting plants by the way) to Little Baddow. At the small and ancient church (Virgin Mary) the party was met by the Rector, the Rev. T. J. Taylor, who described the interesting features of the building. It is chiefly of rubble-work, and with Roman tiles in places. The south door is probably Norman. It contains many interesting monuments, two at least supposed to date from the time of Stephen, and there are two piscinæ. Altogether a church well worth visiting. At the "Hoppitt" the members received a very hearty welcome from Mr. and Mrs. Briscoe, and tea was taken in the garden. Then, in the building itself, which closely adjoins, the Rev. J. Burgess gave an account of the Old Independent Chapel, and the notable men who had been connected with it. The Huguenot family of Morrell<sup>1</sup> were closely connected, with Little Baddow as pastors of the Chapel. The most distinguished was John D. Morrell, who was born at the Manse in 1816, who was well-known as a philosophical writer and author of Morrell's *Grammar*. John Elliott, the "Apostle to the Indians," lived at the farmhouse called the "Cuckoos," where with Thomas Hooker, excommunicated by Laud, he carried on a school, and preached at the Chapel, before both embarked on the "Lyon" for Boston.

A short **Ordinary Meeting** (the 248th) was held to confirm the minutes, and very hearty votes of thanks were passed to Mr. and Mrs. Briscoe for their kindness, and to Dr. Salter and the Rev. J. Burgess for their most valuable services. The return journey was by way of Boreham and Springfield to Chelmsford. The day was beautifully fine, and a most enjoyable day was spent in this pleasant district, one of the most delightful in Essex to the naturalist and archæologist.

*References to Geological Papers :*

Geological Survey Map, No 1, N.E.

Ordnance Survey Map, No. 241.

1899. WHITAKER, W. "Geology of London," vol. i.

1904 SALTER, A. E. "On the Superficial Deposits of Central and parts of Southern England." *Proc. Geol. Assoc.*, vol. xix. pp. 30, 31, where other references are given.

## DEDICATION OF PART OF HAINHAULT FOREST AS AN OPEN SPACE,

SATURDAY, JULY 21ST, 1906.

On this afternoon the dedication of the rescued portions of Hainhault Forest for the use of the public for ever was made by the Right Hon. the Earl of Carrington, President of the Board of Agriculture and Fisheries, under the conduct of Mr. Evan Spicer, J.P., Chairman of the London County Council. An account of the ceremony and details of the lands dedicated is crowded out in this place ; but will be given in the next volume of the *ESSEX NATURALIST*.

1. A very full account of the Morrells and of John Elliott, and their connection with Little Baddow, will be found in the *Essex Review*, vols. i. and iii.

MEETING IN THE BRAINTREE-FINCHINGFIELD DISTRICT  
AND VISIT TO SPAINS HALL.

SATURDAY, JULY 28TH, 1906.

This meeting had been arranged to traverse an interesting stretch of country not previously visited by the Club, and to take advantage of the very hospitable invitation of Mr. and Mrs. Archibald Ruggles-Brise to visit them at their fine old mansion, Spains Hall, which is so interesting and attractive to all taking an interest in Tudor domestic architecture.

The party assembled at Braintree Railway Station at a quarter to eleven, where it was met by our member, the Rev. J. W. Kenworthy, Rector of Braintree, under whose guidance several interesting features of the twin-towns of Braintree and Bocking were inspected—particularly the many picturesque Tudor and Jacobean houses in Bradford Street, with carved beams and parge-wood fronts, and the extremely picturesque old mill by the bridge over the River Pant, in Bocking. Thence the conveyances were resumed to Bocking Church, where the more interesting features of the fine building were demonstrated by the Very Rev. J. S. Brownrigg, Dean of Bocking, and Colonel G. S. Saville, J.P., one of the Churchwardens. Time would not permit of a prolonged stay, and the drive of ten miles to Spains Hall was resumed, the route being by way of the villages of Panfield, Shalford and Wethersfield. Much of the way was through charmingly picturesque country, and with perfect weather, and flower-decked lanes and hedgerows, the drive was much enjoyed by all taking part in it.

Finchingfield Church was reached at one o'clock, and here Mr. Ruggles-Brise met the members. Mr. Ruggles-Brise being one of the Churchwardens and thoroughly acquainted with the building, was enabled to give much information, and Mr. Kenworthy ably seconded his expositions.

At the Hall, a mile or more distant, a most kindly and hospitable welcome was given to the company by Mrs. Ruggles-Brise, who led the way to the luncheon table, spread on one of the lawns in the shade of the mansion. Here were several ladies and gentlemen of the neighbourhood, including Sir Fortescue Flannery, Bart., of Wethersfield Manor, Colonel Gordon, of Wethersfield Place, and the ladies of the family.

After lunch, the members were invited to inspect the fine old Tudor mansion and its extensive and beautiful grounds. In the latter are the seven fish-ponds—now all dry, except one—dug by William Kemp, a former owner of the estate, about the year 1620, one being made by him during each of the seven years of silence which he imposed upon himself as a penalty for a hasty word to his wife. Among much beautiful timber, one lime tree of exceptional size and three fine cedars, growing close to the house, were greatly admired.

Leaving the gardens, the dairy—probably the largest and best equipped in East Anglia—was visited. An extremely fine herd of no fewer than fifty pure-bred Alderney cows is kept, and as much as 250 lbs. of butter have been made in one week.

Miss Ruggles-Brise's stable of no fewer than fourteen pedigree donkeys was next inspected, and her singularly skilful exhibition of driving a four-in-hand team of well-bred donkeys formed one of the most original and charming features of the day.

The mansion was also viewed, within and without, under the guidance of our hosts. Though not large, it is an extremely good and pure example of a

Tudor country house, built wholly of red brick, as were most of the many fine Essex houses of the period—one of great prosperity in the county. Two gables on the western side appear, however, to be considerably—probably more than a century—earlier, and they have carved barge boards. The interior of the house shows much fine oak panelling. In the dining room hang portraits of the Ruggles family, to which Mr. Ruggles-Brise belongs, by Russell, the great pastel-painter, dating 1794. Among them is one of Mr. Thomas Ruggles (who died 1813), a prominent agriculturist in his day and one of the original founders of the Board of Agriculture, and an intimate friend of Arthur Young, the famous traveller, writer on agriculture, and Secretary of the Board, of whom also there is an original portrait in oils by Russell. Young was a frequent visitor to Spains Hall and a number of his letters are preserved in the house.

With regard to the period of the house (which in the guide-books is commonly referred to the “spacious days of Great Elizabeth”) Dr. Henry Laver, F.S.A., in a letter to the Editor, dated July 22nd, remarked:—“Spains Hall is in a very small degree Elizabethan. All the north side, where the old entrance was, with a later bridge across the moat, is not later than Henry VIII; the chimneys, several of them, are also of this period. In fact the house may be said to be of the time of Henry VIII, with Elizabethan and later additions. It was also a moated house, and I was able, when I saw it, to find very evident traces of the whole course of the moat. I mention this, as the Tudor, as distinct from Elizabethan work might be possibly passed over, but after careful study there can be no doubt of the period. The first thing which struck me, in driving up to the house, was the distinctly pre-Elizabethan chimneys.”

During the afternoon a formal Ordinary Meeting (the 249th) was held on the lawn, the President in the chair.

The following were elected members of the Club:—Mr. G. L. Bruce, M.A., *Woodberry Knoll, Loughton*; Colonel A. Gordon, *Wethersfield Place, near Braintree*; and Mr. Harold F. Hodgson, 60, *High Street, Brentwood*.

On the motion of the President a very cordial vote of thanks was passed, amid hearty applause, to Mr. and Mrs. Ruggles-Brise, for their kind and hospitable reception of the Club.

Mr. Ruggles-Brise showed a large manuscript map, dated 1618, of the Spains Hall Estate, with pheasants, rabbits, squirrels, and other animals curiously represented in the woods surrounding the mansion.

Owing to lack of time, a paper by the Hon. Secretary (Mr. William Coie, F.L.S.), on “The Exploration of some Red Hills in Essex, with remarks upon the Objects found” (see *ESSEX NATURALIST*, Vol. xiv., pp. 170-183), had to be taken as read.

The return journey was made by way of Great Bardfield, the Salings, and Rayne. Tea was taken by the way at the ancient “Vine Inn” at Bardfield, and the members returned to their homes by evening trains from Braintree, having enjoyed a singularly pleasant meeting.

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## EXCURSION TO RAYLEIGH HILLS, ESSEX (HADLEIGH, THUNDERSLEY, AND DAWES HEATH).

SATURDAY, SEPTEMBER 15TH, 1906.

A Field Meeting in conjunction with the Geologists' Association was held on this afternoon. The Directors were A. E. Salter, D.Sc., F.G.S., and

Thomas W. Reader, F.G.S. (the *Hon. Librarian*), who kindly acted for the Secretaries during their absence on vacation.

The Editor is much indebted to Dr. Salter for the ensuing report of this meeting.

The party left Fenchurch Street at 2.6 p.m., and on arriving at Leigh-on-Sea ascended the steep slope which leads to Leigh Church, and after some difficulty obtained conveyances to Thundersley.

The first section visited was situated a little east of the Reservoirs, where 5 ft. or 6 ft. of gravel resting on sand was exposed, at about 250 ft. O.D.

Dr. Salter pointed out that the Rayleigh Hills, upon one of the highest parts of which they were then standing, were formed of London-clay, which was overlaid by Bagshot-sand. Above these, patches of gravel similar to that now before them occurred, and these by preserving the subjacent strata from the action of denuding agencies, had preserved them, while all around had been denuded away. The Director then drew attention to the composition of the gravel, which, in addition to débris from Tertiary strata, *e.g.*, sarsens, flint, pebbles, etc., contained a considerable amount of Lower Greensand Chert from the Wealden area to the south of the Thames. Some of the gravel had been consolidated into a hard ferruginous conglomerate. If the hypothesis that these outlying patches of gravel were formed by former streams from the Wealden Area were correct, it showed that since the gravels were deposited the lower part of the Thames Valley, as we know it, had been initiated.

In comparing this deposit with that seen at Beggar Hill earlier in the year<sup>1</sup> it was pointed out that the Bunter débris and Igneous rocks present at the latter were absent in the former. Also nothing derived from Jurassic strata or Basalt was observed at either of them.

Dr. Salter also remarked that Eoliths were likely to occur here, and that he had obtained one which had satisfied Mr. A. S. Kennard, F.G.S., who also expressed the opinion that the gravel was a likely one for their occurrence.

The remarkably fine view from this point was greatly admired, the Langdon Hills standing out well to the east.<sup>1</sup>

A few days before the meeting some Essex papers stated that discoveries of flint implements had been made at Thundersley, and also that a band of marine shells had been found there. Some members investigated these reports, and found that a few well-worked neolithic flakes had been found by Mr. Mabey in his garden,<sup>2</sup> and the Director was able subsequently to examine the "marine shells," which proved to be ferruginous concretions from the Bagshot strata.

Proceeding to Dawes Heath, the party were shown a section in what is known as the Bramble Hill Pit, which from the Director had recently obtained a fair-sized boulder of green Oldbury Chert. The gravel was similar to that already seen, and rested on Bagshot Sand.

Another section close by was visited, and then a sharp walk through the woods brought the party to the "Crown" at Hadleigh, where tea was obtained.

Some few members found time to examine Hadleigh Church, into the wall of which a large sarsen has been built, and to visit the ruins of Hadleigh Castle.

In replying to the vote of thanks proposed by the President the Director

<sup>1</sup> *Proceedings Geol. Association*, Vol. xix., p. 317.

<sup>2</sup> These Flints were subsequently exhibited at the meeting of the Club on November 7th.

stated that he hoped, in spite of the unfortunate delay, he had been able to bring out the following points :

1. That the Rayleigh Hills owe their existence as such to the occurrence of porous gravel and sandy patches which have resisted denudation.

2. That the presence of Lower Greensand Chert in the gravels points to former fluvial connection with the Wealden Area.

3. That large boulders (sarsens) occur in these gravels at 250ft. O.D., which are rarely if ever found in the much more extensive gravels at lower levels (70ft.—80ft. O.D.), *e.g.*, at Southend (in Southchurch Road) and at Westcliff, etc.

4. That flints showing Eolithic chipping, similar to those on the Plateau south of the Thames, probably occur on the Rayleigh Hills in beds of stratified gravel.

The party returned to London by the 7.20 p.m. train.

#### REFERENCES.

Geological Survey Map, No. 1, S.E. and N.E.

Ordnance Survey Maps, Nos. 258 and 259.

1889. WHITAKER, W.—“Geology of London,” vol. i.

1905. SALTER, A. E.—“On the Superficial Deposits of Central and Parts of Southern England.” *Proc. Geol. Assoc.*, vol. xix, p. 1. *et seq.*

## FIRST FUNGUS FORAY IN CONJUNCTION WITH THE BRITISH MYCOLOGICAL SOCIETY.

WEDNESDAY, OCTOBER 3RD, 1906.

During the week from the 1st to the 6th of October, the British Mycological Society held its annual Fungus Foray in Epping Forest, under the Presidency of our esteemed member, Mr. Arthur Lister, F.R.S., F.L.S. The members of the Essex Field Club were cordially invited to join in the Foray, and especially on the Wednesday. The management of the meetings was in the hands of the courteous Hon. Secretary to the Society, Mr. Carleton Rea, B.C.L., M.A., etc., who was formerly a member of the Club, previously to his removal to Worcester.

The Mycological Society established their headquarters at the Forest Hotel, Chingford, where a room was reserved for exhibition and examination of specimens. Many expert members of the Society attended, and having the whole week to explore the Forest, it was not surprising that many interesting species were found, and a grand addition made to our mycological flora. On Tuesday, October 2nd, the members drove to Piercing Hill, and that portion of the Forest to the “Wake Arms” was searched. On Thursday Loughton Camp and ground, thence to the “King’s Oak,” was taken; next day Honey Lane Quarters was the scene of the hunt. The meeting with the Essex on the Wednesday was occupied with Great Monk Wood, thence to Little Monk Wood and High Beach.

As the result of the work Mr. Rea was enabled to report an addition of no less than 52 species to the list as published in the *ESSEX NATURALIST*, Vol. III. pp 248-71. Mr. Rea wrote “there is one *Hypochmus* that I have not yet run down, and other members of the Society may furnish me with results that may

add to this list of Hymenonycetals, and they will certainly add greatly to the number of recognised species in other branches of the subject. Miss A. L. Smith has, I believe, a Mould new to Britain. I can report that we collected over 250 species of Hymenomyces during the week's foray, and 16 species of Mycetozoa were identified. We passed a great number of *Russulae*, in review, finding altogether some 25 species, but *Clitocybe* and *Clavaria* were almost absent from the woods during our visit. . . . We shall always have a very pleasant remembrance of the enjoyable time we all spent in Epping Forest, and of your kindness to us at the Foray."

The additions made will be incorporated in the revised "List of the Hymenomycetals Fungi of Essex" by Dr. M. C. Cooke and Mr. Massee, F.L.S., now being prepared for publication.

In the evening the members dined together at the Royal Forest Hotel, when in addition to the ladies and gentlemen connected with both societies, Mr. Christy, Mr. Andrew Johnston, and Mr. W. Cole represented the Essex Field Club. During the evening Mr Arthur Lister, F.R.S., gave an address on the study of the Mycetozoa, illustrated by living specimens and by a long series of beautiful coloured drawings from the pencil of Miss G. Lister, F.L.S.

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### ANNUAL FUNGUS FORAY.

SATURDAY, OCTOBER 20TH, 1906.

Inasmuch as the British Mycological Society had fully explored some of the ground near Loughton, it was thought best to take the more northerly parts of the Forest as the scene of our own collecting. The headquarters were, therefore, fixed at "Ye Olde Thatched House" in Epping. The first party drove from Loughton Station at about 11 o'clock to the "Clay-ride," and rambled thence to Amesbury Banks, filling their baskets on the way. Fungi were fairly abundant, and a very striking sight was the magnificent groups of the handsome scarlet *Agaricus muscarius* which were encountered. The carriages were then resumed to Epping, where the afternoon party was met, and then the northern parts of the Forest, Wintry Wood, etc., were explored. Mr. George Massee, F.L.S., and Mr. E. M. Holmes, F.L.S., with many other botanists, acted as referees. A most enjoyable day was spent, and all assembled at the headquarters for tea. The vast numbers of specimens obtained (comprising about 150 species) were exhibited on tables in a room as usual at these meetings, and were carefully examined, identified and labelled by Mr. Massee and the other experts present.

It should be mentioned that, as in several former years, many members of the Solborne Society joined in the foray.

During the evening a meeting was held, Mr. Miller Christy, F.L.S., President, in the chair.

The President announced with deep regret the death of Prof. Marshall Ward, F.R.S., one of the honorary members of the Club. Sympathetic speeches were made by Mr. E. M. Holmes, Prof. Silvanus Thompson, F.R.S., and Prof. R. Meldola, F.R.S., and a vote of condolence with Mrs. Ward and family was passed.

Mr. Massee delivered a most interesting address on the "Ecology of Fungi," dealing with some of the most recent advances in this fascinating subject. It is impossible to give even the heads of his remarks. The President proposed a

very cordial vote of thanks to the lecturer, which was heartily supported by Dr. Robert Jones and others.

The new species obtained will be incorporated in the list now being prepared, as mentioned above.

Great regret was expressed at the absence of Dr. Cooke, who though happily quite well, felt himself unable to bear the fatigue of a whole-day meeting.

### THE 250th ORDINARY MEETING.

SATURDAY, OCTOBER 27<sup>TH</sup>, 1906.

This meeting took place at the Technical Institute, Stratford, as usual, at 6.30 p.m., Mr. Miller Christy, F.L.S., *President*, in the chair.

**New Members.**—The following were elected members of the Club :—

Mrs. M. B. Edwards, "*Graham House*," *Cephas Street, Mile End*.

Mr. C. F. Fitch, "*Elmhurst*," *Romford*.

Mr. J. H. Knight, *Loughton Lodge, York Hill, Loughton*.

Mr. Percy Miller, *Traps Hill, Loughton*.

Mr. and Mrs. Octavius F. Peall, "*Elmfield*," 143, *Upper Clapton Road*.

Mr. H. Wilmer, C.E., *St. Albans Crescent, Woodford Green*.

Mr. Walter Young, "*Manor House*," *Squirrels Heath, near Romford*.

The President made some remarks upon methods of procedure at meetings of the Club. He thought that it would be well if new members, present for the first time, were introduced to the President and Officers. As the Club was hoping to increase its membership, this little innovation would be very pleasing, and would doubtless be welcomed by new members. He thought also that care should be taken to write down the names of Visitors, together with those members introducing them. This was the custom with most societies. A book was provided for this purpose.

**Donations to the Library.**—Mr. T. W. Reader reported on the additions recently made to the library. A very large number of the Transactions of local societies had been received in "exchange." The list of Corresponding Societies was now nearly completed, and their publications collated and arranged. The Royal Society had presented very many parts of their *Proceedings*, so as to render the Club's set almost perfect, and had also presented Dr. Lendenfeld's *Monograph of the Horny Sponges*. Mr. Reader said that the problem of properly binding up the great number of books in the library was becoming a "burning question"—there were probably over 1,000 volumes awaiting binding.

**Yellow-necked Mouse.**—The Secretary exhibited three specimens of *Mus sylvaticus-wintoni* from Stanway, Essex, presented by Dr. Henry Laver, F.L.S. Mr. Cole remarked that this species was apparently not uncommon in Essex, although it had been so long overlooked. He was very much indebted to Dr. Laver for his continued kindness in procuring interesting specimens for the Museum.

**Great Grey Shrike.**—Mr. Cole also exhibited two specimens of *Lanius excubitor* from Colchester, which had recently been purchased for the Museum from Mr. Ambrose.



**Razor-blade in a Tree.**—Also on behalf of Mr. P. Gearing, a curious specimen showing a razor-blade deeply imbedded in the branch of a hornbeam; the wood had grown around the blade and covered it in. It was from Epping Forest.

**Portrait of Dr. H. C. Sorby.**—Dr. Sorby presented a photogravure portrait of himself, from the oil painting by Mrs. M. L. Waller, paid for by public subscriptions and placed in the Sheffield University, of which institution Dr. Sorby was one of the Founders.

**Lower Jurassic Fossils from Finchingfield.**—Mr. Percy Thompson exhibited and presented to the Museum a few specimens of Lower Jurassic fossils extracted from a small boulder from mid-glacial gravel, near Finchingfield, on the occasion of the Club's visit on July 28th last.

**Fasciated Branch of Holly.**—Mr. Thompson also exhibited a fasciated branch of Holly, found on a bush near the "Robin Hood," Epping Forest. Mr. Cole remarked that this kind of growth was not very uncommon in the forest. There was a specimen in the Forest Museum.

Thanks were voted to donors and exhibitors of specimens.

**Paper Read.**—The Secretary read on behalf of the author, a paper entitled "On the Salinity of the Sea-water along the Coast of Essex," by Dr. H. C. Sorby, F.R.S. (printed *ante*, pp. 235-36.)

Considerable discussion took place on the paper, carried on by the President, Mr. John Spiller, F.I.C., F.C.S., Mr. W. Cole and others, and a vote of thanks was accorded to Dr. Sorby.

**Lecture.**—Mr. Yeatman Woolf then gave a lecture on "Sponges: Their Life History and Development." The lecture was illustrated by a large number of slides, shown by the electric lantern, and by a series of specimens from Mr. Woolf's own collection.

A discussion on points raised by the lecture was carried on by the President, Mr. Scourfield, Mr. Crouch, the Lecturer and others, and a cordial vote of thanks was given to Mr. Woolf.

### The 251st ORDINARY MEETING.

SATURDAY, NOVEMBER 24TH, 1905.

The meeting was held as usual at the Technical Institute, Stratford, at 6.30 p.m., Mr. Miller Christy, F.L.S., President, in the chair.

**New Members.**—The following were elected:—

Mrs. A. F. Hogg, 81, *Claremont Road, Forest Gate.*

Mr. A. Clifton Kelway, *Corringham Rectory, Stanford-le-Hope.*

Mr. Herbert Playne, M.A., *Head Master, Bancroft School, Woodford.*

Miss F. A. Randell, 33, *Bulwer Road, Leytonstone.*

**Recruiting Members.**—The President alluded to a project which had been under consideration by the Council for some time. An abstract of the work of the Club, and what it wished to do, had been prepared in pamphlet form (and christened the "Red-book"), and an introductory letter had been signed by members of the Council to accompany the pamphlet. Yesterday (Friday, November 23rd), a first dispatch of 450 of these communications had been

posted to prominent inhabitants of Essex, asking them to join the Club as an encouragement of the work proposed to be carried on. The President had some hope that this action would result in an important addition to the list of members.

**Pelvis of Mammoth.**—Mr. W. Cole exhibited a portion of the pelvis of a species of *Elephas*, probably *E. primigenius*, which had been dug up in the "Kennedy Estate" on the outskirts of Barking (details of this specimen will be given in a "Museum Note" in the *ESSEX NATURALIST*).

Considerable discussion took place on this exhibit. Mr. Walter Crouch, F.L.S., who had visited the spot where the bone was found, gave some topographical details. Mr. E. T. Newton, F.R.S., said that it was impossible practically to decide whether the pelvis had belonged to the true mammoth or to the Southern straight-tusked elephant (*Elephas antiquus*). The probabilities were in favour of the bone being from a mammoth. Mr. Newton congratulated Mr. Whitehead, the assistant in the Museum, on the way in which the bone had been put together and imbedded in a slab for preservation.

**Serotine Bat in Essex.**—The Rev. A. B. Hutton exhibited a specimen of *Vesperugo serotinus*, from Pitsea, Essex. He had previously secured another. Mr. Miller Christy had previously recorded two specimens from Essex<sup>1</sup> (one of which was in the Club's collection), so that in all four Essex Serotines were known.

**Rose-coloured Pastor in Essex.**—Mr. Hutton also exhibited a specimen of the very rare bird, *Pastor roseus*, taken at Pitsea this autumn. Very few specimens were known from the county, not more than three or four at the most (see Christy's *Birds of Essex*, page 130).

[The bird was first noticed as a British "visitor" by George Edwards (the Stratford Naturalist whose portrait is in E.N., vol. xiii., plate 13) who, in 1742 figured a specimen killed at Norwood, and which was then preserved in a coffee-house at Chelsea.—ED.]

Mr. Hutton also exhibited a female Hobby, but this was from the Kentish shore of the Thames.

Mr. Christy made some remarks upon these very interesting specimens.

**Worked Flints from Thundersley.**—Mr. F. T. Mapey exhibited some worked flint "flakes" found in his garden near Thundersley Lodge, Essex. Mr. Francis W. Reader remarked that these specimens indicated the existence of flint-working in Neolithic times on the spot, and he recommended Mr. Mapey to keep a look-out for other specimens.

**Reputed Meteorite.**—Mr. Miller Christy exhibited the reputed meteorite reported in the newspapers as having fallen at Braintree on October 9th. On examination by Dr. Fletcher, of the British Museum, the supposed meteorite was found to be a mass of smelted iron, so that the mystery of the reported "fall" remained unexplained.

In connection with this subject Mr. F. W. Rudler, F.G.S., gave some very interesting details of the fall of the largest meteorite in this country, which happened near Wold Cottage, Thwing, a few miles from Scarborough,

<sup>1</sup> PROC. : ESSEX FIELD CLUB, vol. iv., p. iv., and Laver, *The Mammals, &c., of Essex*, page 33.

Yorkshire. To commemorate this fall an obelisk was put up on the spot, with the following inscription :—

“ Here, on this spot, December 13th, 1795, fell from the atmosphere an extraordinary stone, in breadth 28 inches, in length 30 inches, and whose weight was 56 pounds. This column in memory of it was erected by Edward Topham, 1799.”<sup>1</sup>

**Plusia Moneta in Essex.**—Mr. W. Cole exhibited a series of this beautiful moth from his garden at Buckhurst Hill. The moth first appeared in England in 1890, and it was one of the most remarkable instances of a species spreading across Europe on a southern migration. In about 50 years it has spread from Russia across Central Europe to Holland, and then to England. It bids fair to become common in south-eastern Britain.

**Neolith from Pleshey.**—Mr. Miller Christy exhibited, on behalf of Alderman R. W. Christy, an exceptionally fine polished Neolithic Celt, found by a shepherd boy at Pleshey. This implement will be described and figured in the next part of the *ESSEX NATURALIST*.

**Fire-steel.**—Mr. Mothersole sent up for exhibition a “steel” of the “flint and steel” period, of unusual shape, and noteworthy in the peculiar way in which it had been worn from use. Mr. Christy made some remarks on this specimen.

**Wooden “Smoother.”**—Mr. Mothersole also sent a curious wooden object, concerning the nature and use of which some discussion arose. Mr. Walter Crouch suggested that it was an implement formerly used in smoothing down the flanges of lead in the old-fashioned leaden window-casements after insertion of the quaries of glass. Mr. Hogb thought that it was either Scottish or Scandinavian in origin, and that it was used by glovers and other leather-workers for smoothing down the joints of the leathers after they had been sown together. He put the date at the end of the 17th or beginning of the 18th century.

**Human Skin on Church Door.**—Mr. Guy Maynard exhibited a portion of human skin taken from the door of Hadstock Church in 1791, and made some remarks thereon.<sup>2</sup>

**Object of Sandstone.**—Mr. Guy Maynard also exhibited a curiously grooved object of sandstone found with an urn, apparently of the Bronze Age, at Wendon, Essex, the purpose and use of which was very obscure. Several suggestions were made, but none seemed in any way satisfactory. The specimen is in the Saffron Walden Museum.

**Paper Read.**—Mr. F. W. Rudler, F.G.S., read his report as delegate at the meeting of the British, at York, (*ante*, p. 237-8).

A vote of thanks was passed to Mr. Rudler for his services in representing the Club at the Conference and for his report. The meeting then closed.

<sup>1</sup> This meteorite is in the collection of the British Museum, No. 179 (Pane 4b. of Case).—ED.

<sup>2</sup> A paper by the late Mr. G. N. Maynard giving some very curious details of this gruesome subject will be found in the *ESSEX NATURALIST*, Vol. III., pp. 292-95, under the title of “Human Skin Nailed upon Church Doors at Hadstock, Copford, and elsewhere.” See also *ESSEX NATURALIST*, Vol. II., p. 124.—ED.

## ON SOME GEOLOGICAL SECTIONS AT WITHAM, ESSEX.

By J. FRENCH.

**I**N making the new railway station at Witham some Glacial beds have been exposed, which possess rather more than ordinary interest, as I shall endeavour to show.

The first section to which I would direct attention is that made on the west side of the cutting by the cross-over bridge at the station. This section, which I roughly estimate at 18 feet, shows at the basement about 3 feet of Westleton Sand and Gravel, succeeded by about 13 feet of Glacial-gravel, and this is overlaid by about 2 feet of Boulder-clay remainæ and surface soil. The quality of the members is very pronounced. The Westleton-sand is unmistakeable. The Middle-glacial Gravel is also a typical specimen and the Boulder-clay remainæ, although its calcareous elements have been extracted, is also an unmistakeable element. In a long search for a section showing these three members in juxtaposition I have hitherto been unsuccessful. When the railway was made from Witham to Braintree in 1849, Professor Prestwich saw and figured such an exposure<sup>1</sup>, but all his exposures have long since been covered up. His section compares very well with the one above described. In both the Boulder-clay is indented into the Glacial-gravel, whilst the Glacial-gravel below is very much mixed up with the Westleton-bed. The exact line of demarcation cannot be made out. Beyond a certain place we can safely assign all to the "Middle-glacial," and below another certain place we can assign all to the "Westleton."

The other exposure is on the east side of the railway cutting opposite to the other. It is interesting as showing a rather considerable quantity of Post-glacial Gravel resting on Middle-glacial Gravel, and with no trace of intervening Boulder-clay. There is a very large funnel-shaped depression in the lower member, say, 20 feet wide by 15 feet deep, filled with the Post-glacial Gravel and loose earth. This shades off on either side into a uniform covering of about three feet of the same material which, so far as it is exposed, shows minor kind of "pot-holes" at intervals. This points to a denudation of the Boulder-clay, probably of the River-drift period. I find by reference to the

<sup>1</sup> "On the relation of the Westleton-Beds, etc." *Quar. Journ. Geol. Soc.*, February, 1908.

Geological Survey Memoir<sup>1</sup> that this Post-deposit continues to be developed both east and west of the above sections, and a figure there shown represents it as deeply indented into the underlying bed. I may mention that the Boulder-clay is well developed on the Braintree line at about a quarter of a mile from the Witham sections, and still further on it is found resting on Westleton-gravel and sand.

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## NOTES—ORIGINAL AND SELECTED.

### BIRDS.

**Brambling in Essex.**—This bird (*Fringilla montifringilla*) is commonly esteemed a very irregular visitor, but is often seen in winter in Epping Forest. On March 28th, 1906, Mr. Robert Eve, of Maldon, sent two specimens to the museum, with a note calling attention to the very unusual numbers of the bird then in various parts of the county. Mr. Eve continued, "the two specimens I send were killed yesterday at Witham out of a flock of fully fifty birds. Besides the great numbers of these somewhat uncommon birds, it is very curious that they should be staying with us so late."

### FISHES.

**The Fishes of the Thames in 1746.**—I have lately come across a curious and interesting old book, by one Roger Griffith, "Water-bailiff" to the Lord Mayor of London, which was published in 1746 with the object of proving that the Conservancy of the Thames is in the hands of the Corporation of the City of London.<sup>2</sup> With the greater part of the arguments advanced by the author the members of the Essex Field Club have no concern, but his remarks on the various kinds of fish met with in the river in his day are, I think, worth reprinting. Discussing the river, he exclaims :

How remarkably good is its salmon ! What fine large flounders, smelts, shads, trout, graylin, perch, carp, barbell, chub, roach, dace, gudgeon, pike, and other fish, as eels, lamprey, bleak, ruffe are caught above London Bridge ; and many other kinds of salt-water fish, as bass, mullet, turbot, soles, maids, place, dabs, skates, thornbacks, halybuts, pearl, whiting, haddock, &c.,

<sup>1</sup> "The Geology of the N.W. part of Essex, etc., being explanation of Sheet 47 (one-inch) map of the Geological Survey.

<sup>2</sup> "An Essay to prove that the Jurisdiction and Conservancy of the River Thames is committed to the Lord Mayor and City of London (London, 80., 1746). The passage quoted occurs on p. 21.

with several sorts of shell-fish, as oysters, mussels, cockles, buntins, crabs, prawns, red and white shrimps, craw-fish, &c., are there to be caught below bridge in the river of Thames.

To-day, of course, Thames salmon and oysters have long been, to a large extent, things of the past.—W. W. GLENNY, *Barking*.

#### BOTANY.

**Ricciella fluitans in Epping Forest.**—This interesting little Liverwort was growing luxuriantly last autumn in one of the ponds on Golding's Hill, Epping Forest. The fronds are dichotomous, narrow, strap-shaped, and from half to two inches in length. The allies of this genus are usually found on damp soil or stones, though some species are able to withstand drought. The terrestrial species have numerous air spaces on the upper surface of the fronds, and bear root-hairs and thin green scales on the lower surface. *Ricciella fluitans* is usually submerged in water, though some individuals are to be found growing on the mud around the margin of the pond. The air spaces are completely roofed over in the aquatic form, but in the case of plants growing on land, the air spaces are not completely closed and communicate with the external atmosphere by means of a small pore. There are no root hairs, and only very small scales in the aquatic forms, but these structures are developed considerably when the plants are transferred to a solid substratum. The fronds also become broader and shorter. The floating plants are sterile.

I am indebted to Mr. W. H. Pearson for confirming the name of the species.—HENRY WHITEHEAD, *Essex Museum of Natural History*.

**Birch-tree Disease.**—The disease, which destroyed so many birch-trees, and was so prevalent during the years 1899-1902, has almost entirely disappeared in the forest area. One now very rarely meets with a dead birch. The decline was almost as sudden as the outbreak, for although during the last three years some few trees were attacked, the injury done was not great and the trees slowly recovered.

As far as I have been able to observe these remarks apply equally to the other localities mentioned in the report in the disease affecting the birch trees in Epping Forest and elsewhere (ESSEX NATURALIST XI., 273).—ROBERT PAULSON.

**Hops in Essex.**—Mr. J. Holden MacMichael contributed the following extracts from *The St. James's Evening Post* of September 26, 1738, to a recent number of *Notes and Queries* :—

This is to give Notice,

As there is a Fair annually kept at Halstead in Essex, on the 18th Day of October, and the principal part of the Hops in Essex growing in and near the said Place, it is thought Convenient by the Planters and Dealers in Hops, that the same should be used as an Hop-Fair : This is therefore to acquaint the Publick, that for the future it will be kept as an Hop-Fair ; and to encourage the Planters, the Lord of the Manor has consented that Groundage shall be gratis the first Year ; and as the Town is now clear from the Small-Pox, it is hoped that there will be a considerable many Chapmen.

N.B. Also Butter and Cheese.

It seems worth while to place this on permanent local record in these pages.

Possibly some of our members may meet with further references to hop-growing in the county—another lost industry of Essex.—I. CHALKLEY GOULD, Loughton, October 5th, 1906.

#### INSECTS.

**The Felted Beech Coccus (*Cryptococcus fagi*) in Epping Forest.**—Evidence of the presence of this insect pest on some of the beech trees near the "Wake Arms," Epping Forest, was noted during the present summer (1906). The bark of the infected trees has a felted white substance on it, which, if seen during the winter, might be mistaken for snow. An examination of a small flake under the microscope shows it to consist of filaments of a waxy substance, in which may be found yellowish hemispherical masses about one twenty-fifth of an inch in diameter. These are the bodies of adult females of the Beech Coccus—a member of the family of Scale-insects (Coccidæ). The female surrounds herself with filaments of waxy material, which serve as a protective covering. The insect obtains food by sucking juices from the tree through a long tube. The males have not yet been discovered—the mode of reproduction being parthenogenetic. The adult insect is incapable of locomotion, possessing neither legs nor wings, but the tiny larvæ, which are furnished with three pairs of legs, are very active. They crawl over the tree trunk, usually settling down near the bodies of their parents, and adding to the mass of secretion. They are sometimes blown away by the wind or

carried by insects and birds, finally alighting on other beech trees, where they re-commence their work of destruction.

These insects do much damage in some districts. Some of the beech trees on Wimbledon Common had their stems thickly covered with the secretion last autumn. It is probable that the wounds made in the bark enable the spores of fungi and bacteria to enter the delicate tissues of the plant.

A good account of the life-history of this insect is given in leaflet 140 of the Board of Agriculture and Fisheries.—HENRY WHITEHEAD, *The Essex Museum of Natural History*.

#### MISCELLANEA.

**Pottery Mounds in India.**—Having lately read Mr. W. Cole's interesting article in the *ESSEX NATURALIST* on the "Exploration of some Red-Hills in Essex" (*ante*. pp. 170-183), and having also visited some of them situated near Salcot, the following remarks as regards somewhat similar mounds which I have seen in India may be of interest, and perhaps tend to elucidate their origin.

Readers are doubtless aware that in the plains and villages of India, where all the water required for domestic use has often to be carried for considerable distances from the wells, a large number of earthen pots or "gurraks" are always required, so that the village potters are most important members of the community, and as many breakages of course take place, they are always kept busy.

Whilst serving in Rajputana and the Punjaub I often had occasion to encamp near or pass through these villages, and I well remember having noticed the potters at work amongst the numerous mounds of red earth found in the neighbourhood. As far as I recollect, the method of burning the pots was to place them in a rough kind of kiln, and simply to heap up cakes of cow-dung or other fuel round about them, and then to fire the heaps. This procedure supplied sufficiently well-burnt vessels, but naturally a great many got broken, and their *debris* formed considerable mounds in the vicinity of the villages, which I think sometimes reached 10 or 15 feet in height.

On seeing the "Red-hill" mounds of Salcot I was naturally much struck by their general resemblance to those so common about the villages of Rajputana and the Punjaub, and I venture



to suggest that possibly these observations may tend to strengthen the idea that probably the red-hills of Essex may have been formed in somewhat the same manner.—E. McARTHUR MOIR (*Indian Forest Service*), *Deoban, Colchester*, October 22nd, 1906.

**Making of Marine Salt in China.**—The following extracts from Macartney's *Embassy to China* (London, 1797) may be interesting in connection with Mr. Christy's paper (*ante* p. 193), and possibly also with reference to the problem of the Red-hills (*ante* pp. 180-2). Writing of the progress of the Embassy along the Pei-ho, and of the character of the villages on the banks of the river, the narrative continues (Vol. II., pp. 177-182):

“ Near some of the towns and villages were pyramids about 15 feet high, but of different dimensions as to length and thickness. They consisted of bags of salt heaped together in that form as peat is preserved in some parts of Europe, These bags were covered merely with common matting; which was, however, found sufficient shelter against the dissolution of the contents by rain. The showers which fell in this part of the country were indeed slight, and seldom happened, . . . . The opposite bank of the river for a considerable way was crowded with pyramids or stacks of salt of the height of those already mentioned. The quantity of that article necessary to fill such heaps appeared to be so enormous that Mr. Barrow was induced to ascertain it by some sort of calculation. ‘ The number of entire stacks was 222, besides several others that were incomplete. A transverse section of each stack was found to contain seventy bags. None of these stacks were less in length than 200ft. Some extended to 600. Supposing the mean or average length of these stacks to be 400 feet, of which each bag occupied a space of two feet, there would then be, in each stack, 200 sections, or 14,000 bags, and in the 222 stacks, upwards of 3,000,000 bags of salt. Every bag contained about 200 lbs. of salt, and consequently, altogether six hundred million of pounds weight of that article.’ . . . . Most of the marine salt imported into the Pei-ho is brought from the sea-coasts of the two southern provinces of Fo-chien and Quantung, where it is prepared from sea-water. Large fields being made perfectly smooth and flat, with margins elevated about six inches, sea-water is let in upon a clayey surface, either through sluices, or pumped up at high water by chain-pumps. The water is suffered to lie on these fields to a depth of two or three inches. The heat of the sun in the summer season is sufficiently strong to evaporate the water. The evaporation, carried on slowly and uniformly, leaves behind large cubic crystals, and forms that species usually known by the name of Bay-salt in England. There are similar works near the mouth of the Pei-ho river, but to no considerable extent. Its more northern situation is certainly not so favourable for the process by solar heat. Artificial heat is found necessary to complete the process in England, and even in some of the southern parts of France. The salt brought from Quantung and Fo-chien into the Pei-ho is sufficient to load annually nearly two thousand vessels of 200 tons burden each.”

The Earl of Macartney's account gives a vivid idea of the

quantities of salt required for domestic use before the employment of it in manufactures, and may serve to show that in England the making of salt from sea-water must have been a great industry prior to the discovery of rock-salt.—ED.

**Water Power from the Thames.**—"Mr. T. B. Stoney, M.Inst.C.E.I. (Raphoe, co. Donegal), in an interesting letter on the question of power for the metropolis, draws attention again to the water power in the estuary of the Thames, which could probably, he states, be made available in large quantities for industrial purposes by simple and inexpensive works. He instances those reaches of the river in which there is a mean tidal rise of  $16\frac{1}{2}$  feet. In the Essex marshes bordering the Thames, he remarks that there are extensive tracts of land at a level of several feet below high water mark. In these marsh basins reservoirs could be constructed, which would be filled by the tide every twelve hours to a depth of (say) five feet at mean high water. When the tide falls, he proceeds, the outflow from these reservoirs into the sea could be used to drive pumps, which would raise water out of the reservoirs to a height of 6 feet above mean high water to feed turbines. These turbines, fixed at low water, would be driven under an average head of  $16\frac{1}{2}$  feet. When the tide rises within 4 feet of high water, the discharge of the turbines into the sea would be stopped and diverted into the now empty reservoirs. By this arrangement, our correspondent concludes, the turbines would produce energy for commercial use for 24 hours continuously."—*The Times*, Feb. 14, 1906, *Engineering Supplement*.

[End of Volume XIV.]

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The assistance of all interested in Essex is solicited for this work, which is not only fascinating in itself, but as years go on will become of considerable historical and scientific importance. A complete set of the 6-inch Ordnance Survey Maps of Essex have been obtained to aid in the localisation and registration of the pictures.

The *Hon. Secretary*, Mr. Victor Taylor, *Hurstleigh, Buckhurst Hill, Essex*, will gladly correspond on the matter, and will give full information on the objects and work of the Survey.

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## The Fauna and Flora of Essex,

*As Illustrated in the*

ESSEX MUSEUM OF NATURAL HISTORY.

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I need not point out to my fellow Members and friends the great difficulty often experienced in obtaining authentic specimens from a limited district. I should highly esteem any aid that County and London Collectors could afford. Localised specimens of Essex Birds, Fish and Mammals, Insects of all orders, Land and Freshwater and Marine Shells, Plants, etc., if in good condition, will be of the greatest assistance, and donors will have the satisfaction of knowing that their specimens will be properly preserved, and will be available for study in the future.

In particular I am desirous of obtaining scarce British Mammalia ("varieties" and "races") for this collection, now approaching completion.

Birds, Fish and Mammals in the flesh may be forwarded direct to the Taxidermists, Messrs. Sherrin Bros., 38, Fielding Road, Chiswick, London, W. A post card should precede the specimens. Carriage may be charged forward.

WILLIAM COLE,

*Hon. Secretary and Curator.*

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