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NATURAL HISTORY
OF
GREAT YARMOUTH.

B. T. LOWNE.

A POPULAR

NATURAL HISTORY

OF

GREAT YARMOUTH

AND ITS NEIGHBOURHOOD,

INCLUDING A

Description of the District, its Geology, Flora, and Fauna,

By B. T. LOWNE, M.R.C.S., Lon.

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1863.

TO

FRANCIS WORSHIP, ESQ.

OF GREAT YARMOUTH,

THIS LITTLE WORK

IS RESPECTFULLY DEDICATED BY

THE AUTHOR.

PREFACE.

The idea of writing the present work was suggested to the Author by the "Sketch of the Natural History of Great Yarmouth and its Neighbourhood," published in 1834, and compiled by CHARLES & JAMES PAGET, two brothers born at Yarmouth—the former of whom, alas for early promise! is no more, while the latter has worthily risen to be Surgeon Extraordinary to H. M. the QUEEN, and one of the Surgeons of St. Bartholomew's Hospital. The description of the locality and its productions has been entirely re-written, but care has been taken to incorporate in this book all those portions of the original work which have any general interest.

BENJAMIN T. LOWNE,

GREAT YARMOUTH,

May 1st, 1863.

ERRATA.

Page 10, line 16—for *nabitation*, read *habitat.*
„ 17, „ 12—for which *is* always, read which *are* always.
„ 23, „ 8—for *corralines*, read *corallines*.
„ 27, „ 16—for *Ammophila* read *Ammophilus*.
„ 31, „ 12—for *Haliælus*, read *Haliœetus*.
„ 31, „ 23—for *hœliætus*, read *haliœetus*.
„ 33, „ 8—for *Cypsellus*, read *Cypselus*.
„ 34, „ 5—for *Cocothraustes*, read *Coccothraustes*.
„ 42, „ 23—for *Phocanœ*, read *Phocœna*.
„ 44, „ 8—for *Europeus*, read *Europœus*.

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NATURAL HISTORY.

CHAPTER I.

THE natural history of the neighbourhood of Great Yarmouth possesses many points of special interest; depending, partly on the recent changes the surface of the country has undergone, and partly on the position, soil, and surface of the locality, quite compensating for any appearance of monotony in the flat, treeless landscape, which at first strikes the eye of a stranger used to the woods and hills of Kent or Surrey. But it is not alone as an isolated locality that the neighbourhood is of interest, for it may be taken as a type of a great portion of our Eastern coasts. Nor could any better locality for this purpose be chosen, since it has at different times received much attention from eminent naturalists, and is convenient and easy of access to the stranger.

The country around Yarmouth is flat, in some places varied by gentle undulations, and consists principally of arable land occupying the higher, and marshes occupying the lower portions of the locality, with here and there deep rotten bogs, and a few heaths and commons, a belt of sand hills and cliffs forming the coast. There are few trees, and none of any magnitude; nor is there anything deserving the name of a wood within ten

miles of the town. Three rivers flow through the marshes and form at their junction a large salt lake called *Breydon*, connected with the sea by a portion of the river Yare about two miles in length. Several large fresh-water lakes or "Broads" occur in the marshes, which are connected with the rivers by small streams.

Formerly the rivers were much larger than they are at the present time, and most of the marsh land formed the bed of an estuary, upon the shore of which stood a fortified Roman camp (*Garianonum*), the walls of which still remain in excellent preservation, now well known as Burgh Castle, showing by their arrangement that the river, although separated by a wide strip of meadow land, originally flowed close by, the side of the camp nearest to it never having been defended by a wall. Anchor rings and parts of the ironwork of ships found on the marshes bear out old tradition, and it requires only a slight stretch of the imagination to transform the green marshes of to-day into the ancient estuary, with its stone-walled camp and gay, many-oared galleys. Hundreds of years passed away after the last galley left and the camp was deserted, when a sand bank appeared at the mouth of the estuary; a white line of breakers marked it out just as they now mark the line of sands beyond the roads; and at last, the sand bank becoming dry land about eight hundred years ago, a small fishing village was built: now Great Yarmouth. The rivers and the estuary, protected from the action of the sea by this bank, became silted up, and Breydon

would long since have disappeared if it had not been kept clear by art.

The tides, the currents of the sea, the unceasing waves and the winds, all play their parts in shifting the unstable sand, and thus an arm of the sea is frequently converted into dry land. We will examine the action of these agents in detail, and by observing phenomena occuring at the present time, we shall learn the origin of the bank on which Yarmouth stands.

Yarmouth Roadstead is of an average depth of about six fathoms (thirty-six feet), and has for the most part a sandy bottom. Ridges of sand surround this shallow water, which are continually shifting, through the action of storms and currents, sometimes appearing above water, and then being washed down again by a storm, or slowly disappearing by the action of various currents. In 1579 one appeared and remained above water for two years; grass grew, and the sea birds built their nests upon it; but whilst the town authorities disputed the right of the soil, it disappeared in a single night;—at least such is the story.

Such a bank as this appears to have formed at the mouth of the ancient estuary, and its northern extremity being sheltered by the projecting land at Caister, it was not again removed, but it continued to increase by the deposit of detritus, brought by the flood tides, whilst the ebb tides were unable to remove the increasing mass, since flowing from the South, and being delayed by the narrow Straits of Dover, the ebbing tide is, everywhere on our East

Coast, weaker than the flood tide; hence the mouths of all the rivers on this coast are shifting to the South, whilst the pebbles on the beach are of Northern origin: on the Yarmouth beach there is an abundance of rolled mica and granite pebbles from Scotland, and basalt from Yorkshire.

This bank, began by the waves and the tides, has been finished by the wind and the peculiar vegetation of the coast, the marram grass more especially; the wind heaping up the sand into hills, and the grass binding it together in a manner which will be presently explained. These sand hills protect the marshes in a great measure from inroads of the sea; indeed it would have overflown the marshes about ten miles to the north of Yarmouth several times, if the gaps which storms frequently make between the hills were not kept filled up artificially with sand, bound down by hurdles. For although the estuary has been reclaimed by the action of the tides, much land has been lost by advances of the sea, which yearly washes away large masses of the cliffs at Caister point. Several hundred feet of sand cliff have been washed away in the last few years.

Such have been the more recent changes which this part of the country has undergone. These we know with some degree of certainty; but of the many changes prior to the human period, when our island first became separated from the continent, and when elephants and other huge animals, whose bones remain as monuments of their existence, ranged over Europe, we know very little,

except that such things were, and at no very remote period, geologically speaking; we now only see the traces of rivers and forests long passed away. We cannot tell whether the remains we find are those of animals which lived on the coast where we now find them, or whether they have been borne to their present resting place, like the Mammoths of the Frozen ocean, by the currents of a great river. Since these remains are mixed with those of salt and fresh water shells, perhaps the latter hypothesis is the true one. They may, however, have been deposited on the shore, again washed up by the waves, and mingled with sand, shells, and the detritus of the chalk, and deposited within a few yards of their original resting place.

The only exposed strata here are sand, mammaliferous crag, and eocene clay, which are placed upon the chalk. The mammaliferous crag forms the cliffs to the south of the harbour; these are of an average height of thirty feet; they consist of sand and gravel, with here and there a thin stratum of tenacious clay. They contain detritus from the chalk, as fragments of chalk and shells, marine and fresh water deposits, rolled pellets of clay, such as may be observed on any beach where clay is found within reach of the waves, as well as the bones of mammals, as the ancient elephant *(Elephas primigenus)* and beaver: fossils are not, however, abundant in them; and mammalian remains are now rare in the district, although formerly, the bones and teeth of elephants and other large animals were dredged up in almost incredible

numbers from an oyster bed, at Hasbro', on this coast.

The surface of the cliffs exhibits distinctly both stratification and striation; the beds of gravel being laid over each other almost horizontally, although the striæ with which these beds are marked, are very irregular in their direction, and are probably to be accounted for by pressure, like the striation of glaciers and the vertical cleavage of slate, the strata of which are usually horizontal.

The upper chalk is remarkable everywhere for the number of flints which occur in it. These flints constitute most of the pebbles of our beach, and even the sand is derived from them; the flint pebbles by continued attrition becoming at last mere sand. This is effected partly by the breakers and partly by the tides and currents which in the shallow parts of the sea roll the stones over each other. The sand so formed is thrown upon the beach by the sea, and at low water a considerable tract of it is left dry; this is carried inland by the wind, which when it blows hard often raises the sand several feet in the air, until it meets some obstacle. It is thus the sand hills are formed, the sand being arrested by the grass on the coast, and bound down by its long roots. The hills often become very large; there are some a few miles north of Winterton, upwards of thirty feet high, which retreating as the sea advances, have buried the little village of Eccles, and have left only the top of the church tower visible.

Clay is found in various portions of the locality,

but possesses little interest. Some isolated masses have been exposed lately on the Caister beach, and more especially at Winterton. These masses are often worn away in a very peculiar manner by the breakers, which sometimes scoop out circular holes, to the depth of several inches; varying from a foot to a few inches in diameter, reminding us of the holes frequently occuring in the rocks in mountainous districts. Sometimes portions of the clay are rolled into small pellets, around pebbles; these when dry often exhibit concentric structure, and exactly resemble those described as occurring in some of the layers of sand in the crag cliffs.

The vegetable soil, or alluvium, passes gradually into the gravel and sand of the crag; it is mostly poor, from the great admixture of sand, but in many places it is remarkably fertile. In the marsh land it alternates with layers of silt and sand, which have been deposited from time to time by inundations of the sea, during the drying up of the estuary.

Such is the nature and probable history of our district: it only remains before we pass to the consideration of its present Natural History, to say a few words about its climate:

The popular opinion is that Yarmouth is a cold, bleak place, and it has been remarked that the cold affects animal more than vegetable life; yet the thermometer shows the mean temperature here to be very nearly if not exactly that observed at Greenwich. These apparently contradictory state-

ments may be reconciled so as to bear out each other. A current of air blowing over a heated body is well known to cool it more quickly than still air of the same temperature. In the case of a body which does not produce heat, to make up for the loss, when it is once cooled no further change takes place; but warm-blooded animals produce heat as quickly as it is abstracted, and hence a current of cold air affects a warm-blooded animal more than still air of the same temperature, although both affect plants alike. Yarmouth being exposed to the wind from all quarters, and nowhere protected by hills or woods, everything is cooled quickly by the winds, and warm-blooded animals suffer cold which does not affect plants or the inorganic world. The spring here is colder than in most places, and the summer, like the same season in Holland, is usually very late and cannot be said to commence until the middle or end of June. The climate, nevertheless, has its advantages, for the temperature is remarkable equable. The winters are not so cold or the summers so hot as in more inland places. Ice is seldom so early as at Norwich, and the harvest is considerably later; hence the climate is extremely pleasant during the months of July and August. This is all due to the prevalence of sea breezes, which are warm in winter and cool in summer; and this equality of temperature is considerably increased by the easterly and exposed position of the locality.

There are no observations sufficiently accurate

for any conclusions to be drawn respecting the amount of rain which falls annually. The quantity is probably very nearly that which falls in most low districts. Sea mists and marsh fogs are frequent in spring and autumn; the former are often confined to a very narrow strip of coast, appearing on a bright sunny day like a curtain hung over the sea; the latter generally rising about sunset, covering the marshes, and seldom extending beyond them, often not rising more than a few feet from the ground, and completely covering the lower part of every object, look in the twilight when seen from a distance, as if the rivers had overflown.

CHAPTER II.

The Flora of every country or district possesses certain characters by which it may be known. For instance, the Flora of Europe is characterized by a number of common plants, not occurring in other temperate climates, but universally distributed through Europe. The Daisy (*Bellis perennis*) is a well-known example of these Plants, which are said to constitute the European type, and are supposed to have originated in central Europe, and to have migrated in every direction to the adjoining countries, forming, as it were, the groundwork of the Flora of our island. That of France is characterised by other plants, as the Clematis (*Clematis Vitalba*) and the Bryony (*Bryonia dioica*), which also form part of the Flora of the south-eastern counties of England, but in our district

only occur as stragglers introduced by cultivation or accident. It is the characteristic Flora of Denmark and Holland which has the greatest interest for us, since it is also that characteristic of East Norfolk, and although many of the plants distinguishing it are lost in our neighbourhood, yet enough remains to show that in all probability there was once a connection between this part of our island and Holland, on which these plants flourished. The Grey Aira (*Aira canescens*), a bluish grass, which grows in little tufts, is found everywhere on the sand hills, and is a plant most distinctly belonging to this type. The Sea Heath (*Frankenia lævis*) is another, which formerly grew in abundance in the town, but which has been destroyed, its former habitation being built upon.

Indeed almost all the species which are found in our locality, and which may be estimated at 630, or about half the British flora, are found on the opposite coast of the North Sea, and few are absent from the Flora of Denmark. The remaining plants mostly belong to the French type, and their occurrence in the neighbourhood of Yarmouth may generally be accounted for by their introduction having been effected by the agency of man. The Bryony (*Bryonia dioica*) grows in two or three hedges in the vicinity of cottages, but its appearance is very uncertain, and on the South Denes several species have been introduced by means of the ballast of ships, which belong properly to the South of England.

The absence of woods excludes many plants from the Flora here. The Wood Anemone (*Anemone nemorosa*), so abundant in every wood, and the Wood Ranunculus (*Ranunculus auricomus*) are not found in the neighbourhood, nor are any other wood plants, except, perhaps, an accidental specimen now and then.

Those natural families, which require a marsh or sandy soil for their growth, are, as might be expected, best represented. All the Bullrush family, (*Typhaceæ*) and two-thirds of the Rushes and Sedges (*Junceæ and Cyperaceæ*) have been observed. The dry sand favours the growth of grasses (*Graminaceæ*), sedges, with long roots, Stonecrops, and succulent plants, which strange as it may appear, require but little water to nourish their fleshy leaves, reminding us of the Cacti and Agaves of Mexico, or the Water-melons of the desert. Few orchidaceous plants are found, since most either require woods or appear to be of French origin. The other great natural families are represented by about half the British species.

Of Ferns (*Filices*) there are but few species, since we have no rocks nor shady nooks in which such plants delight; nevertheless, several marsh species are abundant, the Great Flowering Fern (*Osmunda regalis*) is to be met with at Lound, near a small lake; its airy fronds overhanging the quiet water, and giving a charm to the landscape almost unknown in flat countries. Some of these fronds attain a length of five or six feet, although the fertile fronds, which terminate in a rich brown

mass of sporules, contrasting well with their bright green foliage, are seldom so large.

Seaweeds (*Algæ*) may be regarded in almost the same light as those birds which are only occasional visitants, none, except the commonest, amongst those found on the beach which comprise some of our rarest species, growing anywhere in the neighbourhood. The majority are probably natives of the cliffs of Cromer and the rocks of the north, but as the roots are not always washed ashore, and when they are, seldom have any soil attached to them, it is hardly possible to discover from whence they come. Their appearance is most irregular; in some years the beach is covered with them for miles along the water's edge, from two or three inches to nearly a foot deep, especially in summer, whilst at other times for several months scarcely a specimen can be found. The prevalence of easterly and north-easterly winds has a considerable influence in increasing the number cast up. The occurrence of unusually high tides and storms is sometimes followed by a great abundance, and the character of the beach itself has always more or less influence on the quantity left upon it, a steep surface not allowing those washed up to remain, but causing them to be carried back by the under current of the wave.

Brittle-worts (*Diatomaceæ*) have of late been especially studied. Many salt-water species abound in pools between the river and the river walls; beyond these, however, all the water is fresh, with

the exception of that in the ditches so near the river that the salt water percolates into it, making it brackish. Some of the most interesting marine species are found enclosed in the bodies of the Noctiluca, which abounds on the coast, and causes the phosphorescence of the sea, as well as in the pools left on the beach at low water. A new species has also been discovered at Ormesby Broad, belonging to a genus (*Triceratium*) hitherto found only in salt water. As this is smaller than the allied species, it may possibly be a degenerated marine species, as the broads were salt when the marshes formed the bed of the estuary.

Changes are continually taking place in the flora here, as in every other district. Perhaps the greatest of these have been caused by the destruction of the woods, the drainage of the marshes, and the cultivation of the land. Yet some cannot be traced to any of these causes; a few plants have become extinct without any apparent cause. The Henbane (*Hyoscyamus niger*) used to be abundant on the Denes, now it is lost, and the Great Horn Poppy (*Glaucium luteum*) and Roman Nettle (*Urtica pilulifera*) have shared the same fate. Other plants have made their appearance as mysteriously. Within the last few years the Gorleston hedgebanks have been covered with an exceedingly rare plant, known to botanists as the Claytonia perfoliata.

But to recur to the great changes which have taken place. It has been assumed that woods formerly existed; the following is the evidence

that such was the case: In Domesday book it is said that in the manor of Lound there was wood enough to feed a herd of fifty swine; in those days the land tax was levied according to the number of swine the woods would feed: and even at the present day there are numbers of stunted oaks in the hedges at Lound and Bradwell, probably the remains of woods. Norfolk possesses, however, more ancient chronicles than Domesday book; not of woods, but of forests; and of forests inhabited by wild deer and oxen. The roots and stumps of great trees now standing upright in peat, just as they grew formerly, with the horns and bones of wild animals scattered amongst them. The largest and most celebrated of the remains of these ancient forests is at Brancaster, beneath the waves; there is another in our locality, at Horsey, about twelve miles north of Yarmouth, which is often exposed by an unusually low tide; the stumps and trunks of which are frequently washed up upon the beach during a storm at Caister ten miles from Horsey, but they seldom drift further south. The wood is in such good preservation that it is often used for economical purposes, it is chiefly fir (*Coniferous*). Much peat is also thrown on shore in the same locality, in which twigs, leaves, and seeds may be distinctly recognized. Very beautiful pieces of mineralised wood are found upon the beach, especially at Horsey and Winterton: they are heavy, of a brown colour, exhibiting the grain distinctly, as well as the microscopic markings peculiar to the

wood of the fir tribe, and probably belong to a period long antecedent to that of the peat fossils.

As most of the marshes here are below the sea level, it has been necessary to wall out all the rivers, by banking with earth and stone. The marshes are kept dry by pumps worked by small wind mills, a process which has converted all the salt marshes into fresh ones; the salt marsh plants are now, therefore, confined to a narrow strip of land between the river and the river walls. Many species have not, however, taken their place in the fresh marshes, since the spring tides often destroy portions of the banks and inundate the country. Such an accident not only damages the cultivated species for several years, but effectually destroys all except the hardiest wild plants.

The cultivation of the land has of course a tendency to effect changes, but these differ in no respect from those produced by the same causes elsewhere. Several species have been introduced by cultivation, and but few have become extinct, since there are still plenty of heaths and bogs. If, however, the time should ever come when these shall all be reclaimed, then nearly all the interesting species of the locality will be lost; but that time, at least, is very far off. At present, in spite of change, the number of species appears to be as great as it was fifty years ago.

CHAPTER III.

Watson, in his Cybele Britannica, the grandest work on geographic botany ever produced, distinguishes between flora and vegetation. We have hitherto investigated only the flora of our district, let us now examine its vegetation. Vegetation is a term used to express the appearance produced by the aggregate of the species of any district. To study the flora it is necessary to search for the rarest as well as the commonest plants, but to study the vegetation we need not gather a single specimen. As the vegetation differs in various parts of the locality, we must examine each separately.

The vegetation along the coast consists of two distinct zones, one covering that portion nearest to the sea, and growing upon and between the sand hills, called the *Marrams*, and another further from the sea, on the more level parts of the sand, which contain a larger quantity of vegetable mould, called the *Denes*. The quantity of vegetable matter mixed with the sand and stones is very various, but in the most fertile parts of the denes it does not form more than five per cent. of the soil. The most fertile part is that south of the town, on which the race course is situated, where the ground, in spite of the small amount of organic matter in the soil, is covered by a compact turf, amongst which we find no less than eight species of trefoil (*Trifolium*), and a number of other plants, of these the bulbous Poa grass (*Poa bulbosa*) is the most remarkable. This curious grass has bulbs,

formed by the swollen base of the stem and leaves; it withers up soon after flowering, and nothing but the dry bulbs are left, and these are blown about on the sand, and take root and sprout again in another place.

The Marrams and Denes do not attain their most characteristic appearance anywhere together, the denes being broadest near Yarmouth, becoming narrower until they are lost at Caister, whilst the reverse is the case with the marrams, which are widest at Caister, and extend for miles further north. The vegetation of the marrams, which is always damp a few inches beneath the surface, even in the dryest weather, consists chiefly of plants, which have either long tap roots penetrating deeply into the sand, or which have very extensive creeping roots, both obtaining through their minute fibrils sufficient moisture for their growth, binding down the sand and so preventing its being blown over the country. Of these latter, the Marram Grass (*Ammophila arundinacea*) is best known; were it not for this plant, the country along the coast both here and in Holland would long since have been inundated, or buried by the irresistible march of the sand hills. The long creeping roots of this plant, in many instances twelve or fourteen feet long, crossing and matting with each other, bind down the sand not only on the surface, but sometimes in rapidly forming sand hills to a considerable depth; for these plants, by a provision of nature, rise, as it were, with the rising sand. Everyone knows the knots

or nodes, as they are called, in a straw; all grasses have similar joints: these knots in grasses are representatives of the nodes of other plants, that is the budding points, from which branches and leaves are properly developed, and under certain conditions, roots, for when these points are put underground, as in propagating by layers or cuttings, roots are formed from them. The marram grass, growing on rapidly forming sand hills, where it would otherwise be buried, throws out such roots from a joint of the stem, and the portion below dies, whilst that above continues to grow from its new roots.

It is a splendid sight, on a fine summer day, to look over the beautiful rounded undulations of the marrams, rising one behind the other, covered with the bluish marram grass, intermixed with the bright blue flowers of the Sea Eryngo, (*Eryngium maritimum*) Mountain Sheep's bit, (*Jasione montana*) and Harebell (*Campanula rotundifolia*). The great abundance of plants with glaucous leaves and blue flowers, characterizes the zone of vegetation called the marrams, whilst on the other hand the vegetation of the denes consists chiefly of small plants, forming a compact turf, and producing an abundance of golden, yellow, and white flowers, with numbers of furze bushes (*Ulex Europæus*) scattered over it. The tendency towards the production of white or yellow flowers seems great, as several plants ordinarily having blue or red ones produce here white varieties, as the Crane's-bill (*Erodium cicutarium*) and Eyebright, (*Euphrasia officinalis*) a circum-

stance not easily explained, since openness of situation generally gives an intensity to the colour of flowers, especially blue flowers: the flowers of the common Hyacinth, for instance, are always darkest when it grows in open places, and are often nearly white when it grows in the shady recesses of a wood. It must not be supposed, however, that there is any exact line of demarkation between these two very distinct zones; on the contrary, one passes by almost insensible gradations into the other. The marram grass getting more scanty, whilst the ground between its tufts becomes covered with small plants producing yellow flowers, or a solitary plant of the Ragwort (*Senecio Jacobæa*) may be seen raising its head of flowers high above the marram grass. The yellow Galium (*Galium verum*) also grows in some places on the marrams. On the other hand, the Violet grows on the denes in abundance, and little tufts of the gray Aira, a glaucous grass, grow all over the denes. The Cryptogamic plants of these zones are also characteristic. Lichens, with a dry branching thallus, are most frequent on the marrams; whilst Mosses (*chiefly Bryum and Polytrichum*) and Fungi, especially agarics and puff balls (*Lycoperdons*), which often attain a large size in a single night, after a few weeks rain, abound on the denes. There is, however, every gradation between the succulent fungi and bright green mosses of the damper portions of the denes and the dry lichens which grow on the sand of the marrams.

The causes which determine the distance from the sea at which the short turf of the denes replaces the long grass of the marrams, are at present but little if at all understood. The amount of saline matter in the soil may have some influence, but it appears that the growth of small plants is prevented rather by the shifting of the surface sand than by any difference in the soil, and hence no turf is formed. When once turf is formed, the marram grass soon dies. This seems the more probable since it takes a long time for a surface, from which the turf has once been removed, to become covered again, the shifting of the sand effectually prevents the growth of seedlings, and such spots generally become covered only by the extension of the vegetation around them. The turf commences at various distances from the beach, but generally grows nearest the sea in the most sheltered places.

The vegetation upon the cliffs is very scanty on their steep surfaces, owing to the circumstance of the soil being so frequently disturbed by the waves washing away the base, so that the rest falls upon the beach. A few patches, however, usually enliven them where a fragment from the top rests; these consist of plants found in gravelly fields and waste places, such as Poppies, Thistles, and tall slender grasses. Upon the top the soil is cultivated to their extreme edge, with the exception of a small tract of unploughed land here and there, covered by Brakes, Everlastings, Ragworts, and their usual allies: and corn grows on

the edge of the cliff within reach of the spray of the waves during heavy gales.

The tract of marsh land constituting so large a portion of our district, consists of fresh marshes, which have the appearance of one great meadow, bounded only by a long line of low hills, miles away, which formed the ancient coast line. Some portions of the marshes consist of deep spongy bogs, chiefly confined to the neighbourhood of the "Broads" and "Decoys," and in these in many places the turf, which consists chiefly of Bogmoss (*Sphagnum*), bound together by the perennial roots of Sedges, scarcely more than floats on the water. It is said a too venturous botanist once very nearly lost his life by falling into one of these bogs whilst endeavouring to reach a plant. The vegetation in them consists of Sedges, Rushes, Cotton Grass, Buck Wheat, and other plants with large showy flowers. The rushes in them often form large mounds, called tussocks, these are produced by the soil collecting between the stems and leaves of tufts of rushes and sedges, which, when they die, are succeeded by other tufts upon them, until at last they attain a considerable height.

The Broads are large fresh water lakes, with reedy land-locked margins, some of them extentensive, though none deep. These broads are very beautiful, although neither surrounded by mountains or hills; the gilded clouds of sunset taking their place in the horizon, and throwing their glorious reflected lights on the tranquil water. Whether

visited in summer or winter they have always fresh beauties. Sometimes the surface may be roughened by the wind, and hung over by dark storm-foreboding clouds; at others, not a breath stirs their mirror-like surface, which reflects every fleecy cloud that crosses the dark blue sky. The chief vegetation around the broads consists of Reeds (*Arundo phragmitis*) and Bull-rushes, (*Typha*) with the yellow Iris (*Iris pseudacorus*) and the purple Lythrum (*Lythrum salicaria*), whilst the surface is ornamented by the floating leaves and showy flowers of Water Lilies. Some of these lakes have Alder and Willow thickets on their banks, interspersed with the graceful Birch, under the shade of which aquatic Ferns abound.

The principal heaths are those at Rollesby, Fritton, Lound, and Belton. Their vegetable productions are in no respect different from those of similar localities elsewhere, consisting of little more than a continuous surface of furze and heath, whose interstices are filled up with Reindeer and foliaceous Lichens and various species of mosses. The soil on which they grow is generally found to repay the expense of cultivation after the shrubs are cut down.

It is needless to describe the rest of the locality, since it differs but little from the fields and hedgerows in other parts of England. The absence of large trees has already been noticed. There are a few fir plantations, and the vegetation of the salt marshes does not possess any marked characters distinct from their Flora.

CHAPTER IV.

From the description of the locality, it is evident that the district is not favourable for the lower forms of marine life, the absence of rocks, the shifting nature of the sand, and the slight growth of marine vegetation, combining to make the locality unfavourable to them; like the sea weeds, most of which are brought by the tide from the north. A few corralines are abundant on the beach,* the horny skeletons of compound polypes; but with the exception of these, the only representatives of the *Radiata* are one or two Star-fish, sea Anemonies, and Jelly-fish † including the Noctiluca, which is the chief cause of the luminosity of the sea; yet there is every reason to believe that many others would be discovered amongst the natorial tribes if they were searched for, as several interesting species have been observed at Lowestoft.

With regard to the Mollusca and Annelida, a few Welks and a little bivalve (*Tellina carnaria*) common in all our sandy bays and shallow seas, which buries itself about five inches below the surface, so that it is generally unaffected by the shifting of the sand, to which may be added small Muscles and Barnicles, found on the piles of the piers, and the too abundant Shipworms (*Teredo*), are probably all that the conchologist will meet with here; although on Winterton beach there is

* Sertularia, Antennularia, and Flustra.

† Uraster rubens, Solaster papposa, Actinia crassicornis, A. Mesembryanthemum, and various Medusæ.

often an abundance of Razor shells (*Solen siliqua*) and of the internal shells of the Cuttle fish, brought by the strong tides from northern parts of the coast. Cuttle fish are occasionally taken in the fishing nets, but must be regarded as visitants, and there are several small oyster beds near the harbour, from which the above-mentioned sea Anemones are obtained; and it is worthy of note, that the Strawberry Anemone (*A. Mesembryanthemum*) although it usually inhabits the beach between tide marks, has been dredged up from it.

The Shipworm is a mollusc in disguise, with two small hard valves, corresponding to those of the Oyster, but having a very different function, since a long calcareous tube is provided as a covering for the animal, whilst it probably uses its true shell as an instrument for boring to make its retreat, for these creatures do not, as was formerly supposed, feed on wood. Very much has been written on this destructive creature, but its economy is far from being well understood. A curious effect upon its growth, when meeting with an impediment to its boring has been lately observed, it is believed, for the first time. Although the worms often change the direction of their holes, so as to form tortuous tubes, it appears that they frequently cease to grow, and close the embedded extremity of their tubes, when they come in contact with a hard substance, as the tube of another worm, instead of changing their direction and working round it. *

* An observation made and communicated to the Author by Lieut. Col. Baddeley.

The Crustacea are more favoured than the lower forms of marine life, and amongst the swimming tribes several interesting species occur. A shrimp eaten here belongs to a species not used as food elsewhere (*Pandalus annulicornis*); but by far the most peculiar and interesting crustacean is the Opossum Shrimp (*Mysis Chamelion*). This Shrimp is very common in Breydon during the spring; it is rather smaller than the common Shrimp, and as its Latin name implies, is very various in colour; it is, however, generally brown, now and then approaching to black, but its chief peculiarity consists of a pouch formed of four scales, placed between the last pair of legs in the female. In this pouch she deposits her eggs, and the young are not extruded from it until almost like the parent. The little ones are closely packed in the pouch, with all their heads forward, and as they are apparently attached in no way to the mother, they either derive their nourishment from a fluid secreted into the pouch or from the water around them. Small specimens of the Great Crab (*Cancer pagurus*) are occasionally washed from the north, and the Shore Crab (*Carcinus menas*) is very common on the beach between tide marks, and also in the river and harbour.

Insects come next in our list, and the locality is favourable to great numbers. On the sea shore not only are rare migratory species sometimes met with, as *Calosoma sycophanta*, and the migratory Locust (*Locusta migratoria*), which in some summers is very abundant, but many species are frequently driven down in vast numbers by a continuous series

of westerly winds from more inland parts to perish in the sea, and are found along the high water mark. By this means, moreover, a most providential mode is supplied for the destruction of myriads of those insects which occur in peculiar abundance in some seasons, and which, if allowed to remain, would shortly produce material injury to the vegetation. In autumn, a line some inches in breadth, may sometimes be seen at high-water mark, composed of the bodies of a small black fly (*Bibio*), which only a day or two before were infesting almost every plant and blade of grass in the fields and hedges; at other times, numbers of the large common Crane-fly (*Tipula oleracea*), may be observed vainly struggling to fly up from the damp sand with which their long legs have become encumbered, till a higher wave comes up and puts an end to their existence. In addition to these there are many species whose home is close to the breakers on the beach; these feed on the animal and vegetable matter thrown up by the sea. It is most interesting to observe how these, formed in strict adaptation to the circumstances in which they are placed, avoid dangers to which other species fall easy victims. They may be observed flying and feeding within a few inches of the water's edge, and with most watchful alacrity starting up and retreating before the approach of a larger or more rapid wave. Others live on the beach further from the sea, as the Tiger Beetle (*Cicindela maritima*) which may be seen in abundance chasing its prey over the sand, alternately running and flying. This species is almost confined

to the east coast, that from the west of England being a distinct species (*C. hybrida*). Many beetles are abundant under stones at the base of the Gorleston cliffs and on the river banks. In early spring the large pools which remain from the inundations of the previous winter are filled with aquatic plants and insects, which also abound in the ditches and marshes. The Denes and Marrams have their peculiar insects, amongst which the most interesting are Leaf-cutting and Mason Bees, and several curious flies parasitic on them, so closely resembling the bees that they are easily mistaken for them; to which are added two or three species of Fritillaries *(Argynnis)* and rare Hawk Moths, *(Deilephila)*, whilst the sand hills and cliffs afford habitation for many fossorial insects, (*Ammophila, Carabidæ, &c.)* For further information on this subject the reader is referred to the list in the Appendix, which, as far as possible, completes this branch of our Natural History.

We now come to the Vertebrata, commencing with the fish. These have been scarcely studied at all, and a few remarks is all that can be offered on this head. Herrings, as is well known, form the principal fishery, and boats come from Holland in great numbers to assist in it. These boats are very picturesque; surely the most picturesque craft now upon the sea, when the boats of the Mediterranean are excepted, with their broad bows, yellow sails, and great painted lee-boards, in fact they are the realities of the boats we are accustomed to see in the Dutch sea pieces. This fishery lasts two

months, October and November, and the average number of fish taken by the Yarmouth and Lowestoft boats is about 25 million, though sometimes double that number are caught, giving us some idea of the prolific life of the ocean. The fishery commences much earlier in the north than it does here, not that the fish migrate as is often supposed, for they merely come from the depths of the sea to spawn ; but because winter sets in earlier there, and the fish are therefore obliged to spawn earlier. Pilchards *(Clupea Pilchardus)* are also taken with the herring. There is a less important fishery in July for Mackerel, the shoals of which are accompanied by Surmullets (*Mullus barbatus*) and occasionally by small Tunnies *(Scomber Thynnus)*. Lampreys occur in the harbour, and even Sturgeon of considerable size have been captured.

The Rivers and "Broads" are more interesting to the angler, especially the latter, where Pike are abundant, every little pool having its tyrant Jack, whilst there are plenty of Bream, Roach, and Rud, and no great scarcity of Carp and Perch. Tench are common too, and the manner in which these fish are taken is both curious and interesting, since their capture is accomplished without net or line in the shallow broads. These fish, which are very lazy, lay basking in the water on bright calm days in little shoals. The tench fisher steals up to them in his boat, and when they start follows one into the reeds, and putting his hand into the water draws out his fish. If he sees the fish, this is very easy, but often he has to feel for it : if he touches its head the creature is quite quiet, but if he touches

its tail it darts away and the fisher has to follow it. This fish seems to resemble certain insects which feign death when alarmed; although a sudden jerk or a light touch will cause it to dart away. A man's hand coming in contact with its head completely paralyses it. As may be supposed this kind of fishing requires considerable adroitness.

There are two very curious kinds of egg cases found on the beach which puzzle almost everyone. They are those of the Skate *(Raia batis)*, and those of the Welk *(Buccinum)* mentioned when speaking of the Mollusca. The egg cases of the skate are very abundant, they are square horny pouches, with each of the corners prolonged into a long pointed process placed parallel to each other. They are usually empty or filled with sand, although occasionally one may be found containing an embryo skate or even two little fish. Skates of various kinds are common, and so is the common Dog-fish Shark, which belongs to the same family. Other sharks are taken occasionally, but they are only visitants. The Porbeagle (*Squallus cornubicus*), Basking Shark *(S. maximus)*, and Hammer-headed Shark (*Zygæna malleus*) have all been captured here.

The egg cases of the welk occur in large masses, and each consists of a flattened scale-like pouch. These pouches are not analogous to the egg shells of birds, but are rather to their nests, each containing usually two or three eggs. When the young are hatched and want to escape, they make a hole in the inner side of the scale. The welk attaches these masses to rocks, stones, or shells, and it is only

when they become detached that they are washed ashore, when they are generally empty; but they sometimes contain young welks, which may easily be seen through the transparent walls of the capsule.

There are but few British reptiles, and we have our share of them; there are plenty of Snakes *(Natrix torquata)*, Frogs *(Rana temporaria)*, and Elfts *(Triton)* in the marshes, and of Vipers *(Pelias berus)*, and Lizards (*Zootoca vivipara*) on the coast, the former are, however, seldom seen except in spring, when they are collected most assiduously by the fishermen for the sake of their oil, which is believed to have great virtues; but the only reptile possessing any special interest is the Natterjack Toad *(Rana rubeta)*, which is very limited in its distribution, only occuring in a few localities in England. The Natterjack is called here the running toad, since it runs and never leaps like its congeners. These toads are of a dusky brown, speckled with red, and do not frequent the vicinity of water except for the purpose of breeding. All summer they may be found running about on the sand hills, often more than a mile from water. They seldom, however, come from their hiding places until evening.

CHAPTER V.

There is no branch of natural history which can be studied with such advantage near Yarmouth as Ornithology. This locality was formerly, and perhaps is even now the best in England for water-birds, although at the present time it is much less frequented than it used to be, since the drainage of the marshes has deprived them of a great part of

their food, which consists of molluscs and worms left on the damp mud at low tide. The easterly position and exposed nature of the locality, the large sheets of water and the extensive warrens on the coast afford unusual attractions to most birds, especially amongst the raptorial, wading, and aquatic families; and perching birds are plentiful, although they are not so especially favoured.

The exposed situation of this locality and its large warrens afford attractions for some of the larger birds of prey. The White-tailed Eagle (*Haliætus albicilla*) frequently visits this coast in autumn, especially in stormy weather; indeed three of these splendid birds which are scarcely, if at all, smaller than the golden eagle (*Aquila chrysäetos*), have been seen at one time on Horsey warren, and the golden eagle has been shot, but the specimens killed here of both these birds have all been immature; the older eagles never departing so far from their native rocks and mountains, though the young birds have a propensity to wander before they fix on a place for breeding. The Fishing Eagle (*Pandion hæliætus*) has been observed in the neighbourhood of the broads; the Rough-legged Hawk (*Buteo lagopus*) used to breed, and probably still breeds in the fens; and the Marsh and Hen Harrers (*Circus æruginosus and cyaneus*) are not uncommon in similar localities; the former was at one time especially abundant when the broads were surrounded by acres of impassable reeds, and were the resort of thousands of wild fowl, on the eggs and young of which this bird is said to feed; it is

now, however, becoming very rare, and the latter is by far the commoner.

The smaller birds of prey are not so abundant as in the western parts of Norfolk, where plantations and heaths are more extensive. A pair of Peregrine Falcons (*F. peregrinus*) used to have their nest in the steeple of Corton Church, and several have at different times taken up their abode in the spire of Norwich Cathedral, and as they affect lofty situations they would probably have done the same in our church spire, if there were more ornaments about it, affording ledges where they could lodge their nests; Kites and Merlins are rare, and the Kestril is the only hawk that can be called common.

The nocturnal birds of prey found here, are such as frequent fern and heath. The Barn Owl (*Strix flammea*) is very abundant, but the Screech Owl (*Syrnium stridula*), in spite of all that may be said to the contrary is probably uncommon, since the bird is a lover of dense woods; its being actually shot is the only proof of its occurrence, since the barn owl screeches; it however hunts over a great extent of ground, and is very fond of fish; it occurs sometimes undoubtedly. The Short-eared Owl (*Otus brachyotos*) appears in October about the same time as the Woodcock, but has been known to breed here; it is a native of the Orkneys, and frequents open places and heaths, it makes its nest on the ground and often hawks by daylight.

Amongst perching birds our locality affords a wide but little studied field of interest. The cliffs are an excellent locality for the nests of sand

Martins *(Hirundo riparia)* which are most abundant on the Gorleston beach. Martins (*Hirundo urbica*) and Swallows (*H. rustica)* may be seen in plenty, the former in the town, and in fine weather on the denes, although they never stray so far as the beach, whilst flocks of the latter frequent the beach, and almost every chimney in the country has its pair. Numbers of Swifts (*Cypsellus murarius*) too may be observed near the various church towers in rural districts, darting about after their prey.

The true perching birds found here are chiefly such as inhabit open places. Chats abound on the denes and marrams, one of which at least, the Wheat-ear *(Saxicola œnanthe*) builds its nest in rabbit burrows. Many Warblers and Finches live amongst the reeds, where the King-fisher may sometimes be seen on dull days watching the surface of some quiet pool for fish, now and then darting upon its prey with almost inconceivable rapidity: but wood birds are either rare or only occasionally seen in the district.

The rarest birds here are visitants. The Snow Bunting *(Plectrophanes nivalis)* arrives in flocks in winter from the snowy regions of the north, sometimes alighting on the beach and lingering for several hours as if to rest after a fatiguing flight. The same thing has been observed with regard to the Red-legged Partridge *(Perdix rufa)*, which is often found on the denes in such a fatigued state that it may easily be ran down and captured in the hand, indeed numbers are so taken by boys.

These birds probably arrive too tired to seek a safe retreat, and alight on the first place they can; they appear not to be uncommon on some estates here, but are not natives of Holland. The Pine Bullfinch (*Pyrrhula enucleator*), the Hawfinch (*Coccothraustes vulgaris*), and the Cross-bill (*Loxia curvirostria*), also pass through the district in winter, in search of the fir and larch, on the seeds of which they feed; they do not stay long, but probably seek the large fir plantations of western Norfolk. It is not, however, only from the north that rare birds visit us, the Hoopoe (*Upupa epops*), an inhabitant of North Africa, and the Rose-coloured Ousel (*Pastor roseus*), both come occasionally in summer, and although the latter is a rare bird belonging to the tropics, and only a occasional summer visitant in Europe, it has been shot here as early as April.

It is, however, amongst wading and aquatic birds that the greatest interest is found, and amongst these, changes in the nature of the country have acted most. Many species have become extinct, and much fewer visitant birds frequent the locality now than formerly. The largest birds we have, are the Heron and the Norfolk Plover (*Œdicnemus crepitans*), the latter a rare bird here, although it is common enough in west Norfolk; but in the end of the seventeenth century the Crane (*Grus cinerea*) used to visit us in hard winters: and both the great and little Bustards commonly bred here. The bustards have been seen in Norfolk several times during the present century, but never in our district.

Lapwings *(Vanellus cristatus)* and Golden Plovers (*Charadrius pluvialis*) frequent the marshes in great numbers; Sandpipers and Stints are plentiful on the beach, and Wild Fowl come in abundance in winter. A circumstance happened thirty years ago which shows how very numerous this class of birds were then. An old man named Thomas, on awaking in his boat on the flats, saw not far from him a number of wild fowl sitting in a crowd on the ice, from his boat being nearly covered with snow he had escaped observation while they were collecting in the night; he immediately fired, his gun carrying about a pound of shot, and with those killed, and the wounded which he and his dog caught before they could make their escape, he secured no less than thirty couple of wild fowl, chiefly widgeon and teal: but it must be remembered that it is a habit of these birds, when almost benumbed with cold, to sit on the ice closely crowded together for warmth. Such a circumstance as this shows how great the hardships of a fenman's life are, and how little chance there is for any collector or naturalist to obtain rare birds of this kind himself. Other birds used to be as abundant as the duck tribe. In the winter of 1829, a bird preserver had brought to him in one market day no less than four hundred wild fowl, five hundred snipes, and a hundred and fifty golden plovers; and at the same time six or seven hundred plovers' eggs were sent to London by one man every week during the season. Now very few birds, in proportion to this, visit our locality.

There is a method of obtaining wild fowl here by means of decoys, but the manner in which these are worked is jealously kept a secret by their owners. Decoys are small lakes offering attractions to the wild fowl, from whence sinuous ditches radiate, which are surrounded by reeds and covered by hoops and nets. The largest of these hoops is nearest the lake, and is generally about ten feet high and sixteen or eighteen across, and the smallest at the other end is about three feet high. A number of tame ducks are kept in the lake and these allure the wild birds into the net, when the fowler enters and kills the unlucky birds without mercy. It is worthy of remark that some of the wildest birds, as the Coot, and the Loon or Red-necked Diver (*Colymbus septentrionalis*), feed and live quietly in these lakes, disregarding the frequent scenes of bloodshed around them, and the Heron and Kingfisher sit in the reeds watching for fish. A dog is also used in the decoys; it is pretended for the purpose of enticing the ducks into the net, but it is more probable he is used to aid the decoy-man in driving the birds to the extremity of the net before slaughtering them. Some ducks, although they frequent the decoy, are too cunning to be taken, as the Pochard (*Fuligula ferina*), either shunning the nets altogether, or keeping near the entrance, and diving or flying back if the decoy-man attempts to drive them further in.

Several very rare ducks have been shot here, and of these the Oceanic species are especially interesting, since their being shot in England ex-

emplifies in a striking manner the great powers such birds possess of traversing immense tracts of our globe. Only three or four specimens of the Western Duck (*Somateria dispar*) have been shot in Europe: one at Caister next Yarmouth, another at Scarborough, two or three in Sweden, and one in Denmark. This bird is a native of the eastern coast of Asia, Kamschatka, and the western coast of America, where they live in great flocks, and probably when they appear in Europe, they skirt the Arctic Ocean and descend the coast: but of course this is merely conjectural. The Hooded Merganser (*Mergus cucullatus*), exclusively confined in its distribution to North America, and the King Eider (*Somateria spectabilis*), an arctic duck, have also been shot in our neighbourhood. The specimen of the Western Duck, shot here, is now in the collection of birds at the Norwich museum, with many other rare birds from our district. This collection is one of the finest in England, and no naturalist should visit the county without seeing it.

But perhaps the most characteristic feature of the ornithology of Great Yarmouth is formed by the five English species of Grebe or Dabchick, all of which are found in the broads; but it is to be regretted they are becoming rarer and rarer every day. The commonest of these is the Great or Crested Grebe (*Podiceps cristatus*), two or three pairs of which bird still frequent every piece of water of any magnitude in the district, which they never leave except in winter, when not waiting to be frozen out, they seek some arm of the sea. It is very difficult to shoot this

bird. During the breeding season it does not use its wings, but trusts to diving for preservation. The Divers are birds very nearly allied to the Grebes, but they are larger; the Great Northern Diver (*Colymbus glacialis*) is still occasionally seen, but two hundred years ago it used to breed here in abundance. The Red-necked Diver (*Colymbus septentrionalis*) seems not to be uncommon in the large broads, but it is very seldom shot, since the fenmen find it is but waste of shot to fire at them, as they are so shy and dive so expertly and rapidly, and only inhabit the most inaccessible parts of the broads. Coots (*Fulica atra*) are very abundant and breed with us, they remain on the broads in winter as long as possible; disliking migration to salt water, they crowd into the wake left by the swans. Three species of swans are common, but two, the Wild Swan (*Cygnus ferus*) and Bewick's Swan (*Cygnus Bewickii*) come in winter; the third, the Tame Swan (*Cygnus olor*) makes its large nest in the reeds on the banks of Breydon within a few yards of the Yarmouth and Norwich rail, where they may be seen from the windows of the railway carriage. These birds pay no attention to the continual traffic and noise of the trains.

The other species of water birds, consisting principally of terns and gulls, are chiefly seen on the beach or in the roads. The Caspian Tern, a rare bird both in England and Holland, visits us occasionally, and the Black Tern (*Sterna fissipes*) used to breed in abundance in our marshes, which it probably does not now. This bird, unlike

the other terns, does not frequent the sea shore, except for a short time after its arrival in spring, or before its departure in autumn. Flocks of these birds of about twenty or thirty individuals may still, however, be sometimes observed in autumn on our beach. Hundreds of Guillemots (*Uria troile*) may be seen all summer, either fishing in the roads or sitting on the beach, but they do not breed here. The Storm Petrel (*Thalassidroma pelagica*) although sometimes for many winters scarcely a specimen is seen, in some seasons occurs in such abundance that several hundreds are shot in a few weeks.

CHAPTER VI.

We now come to the Mammalia, which, after the birds, are very deficient in interest, since, with the exception of a few which it is a matter of profit to preserve, and those which are either too numerous or too cunning for man to destroy, they are almost all extinct. Time and civilization here have effected their greatest changes, for although, as we have seen, the Ancient Elephant (*Elephas primigenas*) probably never lived in our district, and it is quite uncertain whether the Beaver (*Castor fiber*) did, yet we can wander back in fancy to a time when the Wild Ox (*Bos urus*), the Stag (*Cervus elephas*), and the Roebuck (*Cervus capreolus*), inhabited Norfolk, and Wolves (*Canis lupus*) ranged through its dark fir woods; or to a more recent period when the Wild Cat (*Felis catus*), and the Pine Martin (*Viverra foina*),—now quite lost—the Squirrel (*Sciurus vulgaris*), and the Dormouse (*Myoxus muscardinus*), —now very rare— were common.

The Fox (*Canis vulpes*) has been exterminated by fox hunters, and with the destruction of the fox came that of the Badger (*Meles taxus*), allowed to exist only to make burrows for the fox, and although several attempts have been made to re-introduce these animals, they cannot be said to have been successful. The Seal, which is now seldom seen, seems to have been plentiful enough here formerly, since, according to Sir T. Browne, at the end of the seventeenth century, when fish were more abundant in the river, and salmon, the favourite food of the seal, frequented it, seals were often taken sleeping on its banks about six miles below the city of Norwich. These animals are now seldom seen of late years, only one or two have been occasionally observed in the roads or thrown up on the beach. One was killed in 1832 weighing fourteen stone, and another was driven up the river by a very high tide in October, 1834, and killed sleeping on the bank.

The Black or English Rat (*Mus rattus*) has been driven out by the more powerful Brown Rat (*Mus decumanus*) which appeared in England about the beginning of the eighteenth century, probably from the east. This animal, which is much larger than the English species, drove the black rat into the upper parts of buildings and underground arches in towns and cities; so that it is now quite extinct here, and probably in the greater part of England, except in London, where it is still very common in some places. The brown rat is now so abundant here that not only does it exist in prodigious

numbers in the fields and granaries, especially in the northern parts of the town, but it has become semi-aquatic, inhabiting the banks of ditches in the marshes. Rats under such circumstances often become very fierce, and feed almost exclusively on animal food, owing to the scarcity of their proper aliment. These rats, together with Moles, which are good swimmers, and Water Voles (*Arvicola amphibia*), or, as they are generally called, Water Rats, which are common in the marsh dykes, on the banks of which numbers may be seen sitting on fine summers' evenings, and which, unlike the rat, feed exclusively on vegetable matter and chiefly on the roots of water plants, are the only animals which are at all frequent in the marshy parts of the district.

Otters (*Lutra vulgaris*) are probably still not uncommon in the larger broads, but they are far too cunning to be trapped, and too shy to be seen; occasionally, however, one is taken in a pike net. It is not surprising that they are so seldom seen, even if tolerably abundant, in our large broads, as we know that an Otter will often evade a pack of trained dogs, and a number of men intent on its destruction in a narrow ditch for several hours. Stoats (*Mustela erminea*) are not uncommon in the extensive warrens on the coast, which are stocked with an abundance of Rabbits; and Weasels (*Mustella vulgaris*) occur occasionally in the neighbourhood.

The Yarmouth Water Dog is a variety of dog which is by no means confined to Yarmouth, or even at present common here. This dog is remarkable

for his wonderful sagacity in finding wild fowl and bringing them to his master. A story is told of one in the Rev. Richard Lubbock's Fauna of Norfolk, illustrating this trait. The dog was kept at the draining mill on Breydon, and in winter his favourite pursuit was to go out by himself and search in the rough stones which face Breydon wall for wounded wild fowl, which always, if possible, creep into some nook or corner. He often carried home eight or nine in one morning; after leaving one with his master, he returned of his own accord to the place where he found the duck, and, proceeding regularly with the search, recommenced exactly where he left off; when unloaded he would wag his tail and acknowledge the notice of any one who spoke to him, but when carrying a duck he seemed to think himself the guardian of a treasure and to distrust every one, and as soon as a man appeared coming towards him, left the wall and crossing a wide dyke took the longest way home.

Several species of the Whale tribe (*Cetacea*) have visited our locality at different times, but none are at all abundant, except the Porpoise (*Phocanæ communis*) which is very common in the roads, and may be seen from the beach rolling over on, and often half leaping from, the waves.

APPENDIX TO CHAPTER II.

LIST OF RARE AND INTERESTING PLANTS

Found in the neighbourhood of Great Yarmouth.

The following list contains all the plants which grow in this district, with the exception of the commonest and those found in every other locality.

Clematis vitalba	Linn.	accidental in
Thalictrum flavum	,,	rare [hedges
Myosurus minimus	,,	once found
Ranunculus aquaticus	,,	common
flammula	,,	,,
lingua	,,	,,
sceleratus	,,	,,
parviflorus	,,	rare
Nymphœa alba	,,	common
Nuphar lutea	Sm.	,,
Fumaria officinalis	Linn.	,,
Cheiranthus cheiri	,,	rare
Draba verna	,,	common
incana	,,	rare
Cochlearia anglica	Eng. bot.	
danica	,,	accidental
Tesdalia nudicaulis	Br.	common
Cakile maritima	Scop.	,, [ballast
Senebiera didyma	Pers.	accidental on
Lepidium ruderale	Linn.	common
campestre	Br.	frequent
Brassica tenuifolia	Boiss.	accidental on
Drosera rotundifolia	Linn.	common[walls
longifolia	,,	rare
anglica	Hud.	,,
Althea officinalis	Linn.	common
Hypericum quadrangulum	,,	,,
humifusum	,,	rare
pulcrum	,,	common
elodes	,,	,,
Saponaria officinalis	,,	accidental
Menchia erecta	Sm.	once found
Radiola millegrana	,,	frequent
Montia fontana	Linn.	common
Tillœa muscosa	,,	frequent

Sedum telephium	Linn.	frequent
anglicum	Hud.	common
acre	Linn.	,,
Parnassia palustris	,,	frequent
Saxifraga tridactytiles	,,	,,
Peplis portula	,,	common
Lythrum salicaria	,,	,,
Ulex Europeus	,,	,,
nanus	Forst.	rare
Genista anglica	Linn.	common
tinctoria	,,	frequent
Cytisus scoparius	,,	common
Anthyllis vulneraria	,,	found once
Ononis arvensis	,,	common
Trifolium suffocatum	,,	accidental on
subterraneum	,,	,, [ballast
arvense	,,	common
frangiferum	,,	frequent
procumbens	,,	accidental
striatum	,,	,,
Trigonella ornithopodioides	D.C.	frequent
Lathryus palustris	Linn.	,,
Ornithopus perpusillus	,,	common
Poterium sanguisorbia	,,	accidental
Rosa spinosissima	,,	common
Comarium palustre	,,	,,
Epilobium hirsutum	,,	,,
parviflorum	Schreb.	,,
montanum	Linn.	,,
tetragonum	,,	,,
palustre	,,	,,
Circœa luletiana	,,	seldom
Torilis infesta	Spreng	common
nodosa	Gœrt.	,,
Pencedanium palustre	Miench.	rare
Angelica sylvestris	Linn.	frequent
Silaus pratesis	Bess.	rare
Œnanthe phellandrium	Spreng.	,,
pimpelloides	Linn.	frequent
Pimpinella saxifraga	,,	rare
Bupleurum tenuissimum	,,	,,
Sium latifolium	,,	,,
angustifolium	,,	common
Apium graveolens	,,	,,
Cicuta virosa	,,	frequent
Smyrnium Olusatrum	,,	rare
Eryngium maritimum	,,	common

Galum verum	Linn.	common
palustre	,,	,,
uliginosum	,,	,,
Aparine	,,	,, [hedges
Bryonia dioica	Tacq.	accidental in
Jasione montana	Linn.	common
Fedia olitoria	Vahl.	,,
Valeriana dioica	Linn.	,,
officinalis	,,	,,
Eupatorium cannabinnm	,,	,,
Aster tripolium	,,	,,
Artemesia maritima	,,	,,
Carlina vulgaris	,,	rare
Carduus marianus	,,	accidental
tenniflorus	Curt.	common
Centaurea calcitrapa	Linn.	accidental
Cnicus pratensis	Wild	rare
Sonchus palustris	Linn.	,,
Helminthia echioides	Gœrt.	,,
Cichorium intybus	Linn.	common
Convolvulus soldanella	,,	,,
Cuscuta epithymum	,,	,,
Plantago maritima	,,	,,
media	,,	accidental
Littorella lacustris	,,	common
Erica tetralix	,,	,,
Erythea pulchella	Hook	very rare
Gentiana Pneumonanthe	Linn.	common
Verna	,,	,,
Menyanthes trifoliata	,,	frequent
Verbascum thapsus	,,	common
pulverulentum	Vill.	frequent[ized)
virgatum	With.	rare (natural-
Centunculus minimus	Linn.	very rare
Glaux maritima	,,	common
Lysimachia vulgaris	,,	,,
Hottonia palustris	,,	,,
Anagallis tenella	,,	,,
Utricularia vulgaris	,,	,,
minor	,,	,,
Veronica scutellata	,,	frequent
Pedicularis palustris	,,	common
sylvatica	,,	,, [walls
Linaria cymbalaria	Mill.	accidental on
elatine	Derf.	,,
Orobanche major	Linn.	rare
minor	Sm.	,,

Nepeta cataria	Linn.	rare
Hippophae rhamnoides	,,	common
Daphne Laureola	,,	in a plantation
Rumex maritimus	,,	rare
palustris	Sm.	,,
Polygonum minus	Huds.	frequent
Salsola kali	Linn.	common
Salicornia herbacea	,,	,,
Chenipodium maritimum	,,	frequent
ficifolium	,,	,,
olidum	Curt.	common
Beta maritima	Linn.	rare
Atriplex pedunculata	,,	,,
littoralis	,,	frequent
Ceratophyllum submersum	,,	,,
demersum	,,	,,
Salix. Various species not sufficiently known		
Myrica gale	Linn.	frequent
Acorus calamus	,,	rare
Typha augustifolia	,,	common
Sparganium simplex	Huds.	,,
ramosum	,,	,,
natans	Linn.	rare
Potamogeton pectinatus	,,	common
gramineus	,,	rare
Zostera marina	,,	,,
Ruppia maritima	,,	common
Zannichellia palustris	,,	,,
Triglochin palustre	,,	,,
maritimum	,,	,,
Alisma ranunculoides	,,	,,
plantago	,,	,,
Stratiotes aloides	,,	,,
Hydrocharis morsus ranæ	,,	,,
Neottia Spiralis	Rich.	rare
Epipactis palustris	Sw.	common
Gymnadenia conopsea	Br.	rare
Malaxis paludosa	Sw.	frequent
Orchis pyramidalis	Linn.	seldom
Narcissus pseudo narcissus	,,	,,
Allium ursinum	,,	rare
Tamus communis	,,	accidental
Butomus umbellatus	,,	frequent
Juncus maritimus	Sm.	common
Rhyncosphora alba	Vahl.	rare
Schenis nigricans	Linn.	,,
Eleocharis pauciflora	Link.	common

Scirpus maritimus	Linn.	common
Cladium mariscus	Br.	,,
Carex dioica	Linn.	rare
stellulata	Gooden	frequent
arenaria	Linn.	common
vulpina	,,	,,
limosa	,,	rare
flava	,,	common
præcox	Jacy.	,,
stricta	Gooden	rare
Nardus stricta	Linn	common
Triticum junceum	,,	,,
Alopecurus bulbosus	,,	frequent
fulvus	,,	,,
Phleum arenarium	,,	common
Ammophilla arundinacea	,,	,,
Aira canescens	,,	,,
Bromus gigantius	Vill.	rare
Festuca duriuscula	Linn.	common
rubra	,,	,,
Poa maritima	Huds.	,,
bulbosa	Linn.	,,
Osmunda regalis	,,	frequent
Ophioglossum vulgatum	,,	rare
Aspidium Thelypteris	Sw.	common

APPENDIX TO CHAPTER III.

A List of Conspicuous Plants, forming a considerable part of the Vegetation

In the neighbourhood of Great Yarmouth.

The following list contains only the English names of those plants which may be observed by everyone, whether a botanist or not, and is intended to give an idea of the botanical appearance of the district; the greater number are mentioned in the third chapter.

White water lilly	Broads
Yellow water lilly	Ditto
Sea scurvy grass	Salt marshes
Marsh mallow	Marshes
English stone crop	Denes
Yellow stone crop	,,

Furze	Denes
Broom	,,
Cranes bill	,,
Hares foot trefoil	Beach
Rest harrow	Denes
Willow herbs	Broads, &c.
Yellow bed straw	Denes
Mountain sheeps bit	Marrams
Hempweed	Broads, &c.
Star wort (Aster)	Salt marshes
Sea convolvulus	Beach
Purple loosestrife	Broads, &c.
Ash	
Heaths	
Buckbean	Marshes
Sea Glaux	Salt marshes
Yellow loosestrife	Broads
Sea buckthorn	Beach *
Birch	Carrs, &c.
Alder	,,
Willows	,,
White poplar	Hedge rows, &c.
Black poplar	,,
Oak	,,
Hazel	,,
Bulrush	Marsh, ditches
Water plantain	Ditches
Frogs bit	,,
Fleur de lis (Iris)	Marshes
Sand sedge	Marrams
Sea rushes	Salt marshes
Sedges	Marshes, &c.
Marram grass	Coast
Sea wheat	,,
Grey aira	,,
Reed	Marshes, &c.
Flowering fern	Some broads
Brake	Heaths
Urn moss (Bryum)	Heaths, Denes, &c.
Bog moss (Sphagnum)	Marshes and bogs

* Never found except beyond Caister.

APPENDIX TO CHAPTER IV.

LIST OF INSECTS.

The following is a list of rare and interesting insects found in this locality. In its compilation the author has been assisted by several eminent entomologists, more especially by Mr. F. Smith, of the British Museum, who supplied the entire list of Hymenoptera, chiefly from his own observations.

COLEOPTERA.

Cicindela maritima	Dej.	common
Notiophilus aquaticus	Linn.	,,
Elaphrus cupreus	Dufts.	,,
uliginosus	Fabr.	rare
Blethisa multipunctata	Linn.	frequent
Nebria livida	,,	rare
Calosoma sycophanta	,,	very rare
Carabus clathratus	,,	,,
Panagæus crux-major	,,	once taken
Calathus mollis	Marsh.	common
Pterostichus dimidiatus	Oliv.	frequent
Amara lucida	Dufts.	common
Ophonus cribellum	Steph.	,,
Harpalus servus	Dufts.	rare*
Dytiscus dimidiatus	Bergst.	once taken
Agabus uliginosus	Payk.	common
conspersus	Marsh	rare
Hydroporus parallelogrammus	Ahr.	common
Gyrinus bicolor	Payk.	,,
Hydræna atricapilla	Waterh.	frequent
Berosus æriceps	Curt.	common
Leistotrophus nebulosus	Fabr.	frequent
Staphylinus stercorarius	Oliv.	,,
Ocypus pedator	Grav.	rare
Encephalus complicans	Kirb.	,,
Necrophorus vestigator	Herschel	,,
Silpha opaca	Linn.	frequent
Atomaria atra	Herbst.	rare
Cephennium thoracicum	Müll.	,,
Anthrenus scrophulariæ	Linn.	common
Onthophagus nuchicornis	,,	rare
Anomala Frischii	Fabr.	common
Hoplia philanthus	Sulz.	rare

* Only taken at Deal hitherto.

Anthocomus sanguinolentus	Fabr.	rare
Hedobia imperalis	Linn.	,,
Helops cæruleus	,,	,,
Cteniopus sulphureus	,,	,,
Ischnomera melanura	,,	common
Orobitis cyaneus	,,	,,
Otiorhynchus Ligustici	,,	rare
Apion vernale	Fabr.	frequent
Orchestes scutellaris	,,	common
Orthochætes setiger	Germ.	frequent
Phytœcia cylindrica	Linn.	rare
Clytus arcuatus	,,	,,
Donacia nigra	Fabr.	,,
Menyanthidis	,.	frequent
Hippodamia 13-punctata	Linn.	common

ORTHOPTERA.

Gryllotalpa vulgaris	Latr.	rare
Acrida viridissima	Linn.	frequent
Gryllus migratorius		occasional vistant

HEMIPTERA.

Reduvius subapterus	Curt.	common
personatus	Fabr.	rare
Chorcsoma Arundinis	Curt.	common
miriformis	Fall	,,
Acanthosoma ferrugator	Fabr.	seldom
Pentatoma bidens	Latr.	common
lurida	Curt.	rare

HYMENOPTERA.

Formica cunicularia	Latr.	local
brunnea	,,	rare *
umbrata	Nyl.	common
Myrmica ruginodis	,,	,,
scabrinodis	,,	,,
lævinodis	,,	,,
lobicornis	,,	rare
acervorum	,,	local
Mutilla Europea	Linn.	frequent
ephippium	Fabr.	sandy slopes
Myrmosa melanocephala	Latr.	sandy spots
Tiphia femorata	Fabr.	sandy slopes †
Pompilus plumbeus	Dahlb.	common
rufipes	Fabr.	local
affinis	Van d. Lind	,,
Ammophila affinis	Kirby	common

* Formerly only taken at Deal. † On the Daucus carota.

Tachytes pompiliformis	Van d.Lind.	common
Astata boops	,,	local
Gorytes Fargeii	Shuck.	,,
Harpactus tumidus	,,	,,
Mellinus sabulosus	Fabr.	common
Crabro luteipalpis	Shuck	,,
varius	Smith	,,
Wesmaeli	Shuck	,,
obliquus	,,	,,
pallidipalpis	Smith	
scutatus	Fabr.	local
Panzeri	Shuck	,,
Odynerus trifasciatus	Fabr.	,,
Colletes Daviesana	Smith	common
succincta	,,	,,
Prosopis dilatata	Nyl.	local
Sphecodes gibbus	,,	common
Halictus 4-notatus	Smith	,,
Smeathmanellus	,,	local
Andrena Rosæ	Panz.	,,
thoracica	Fabr.	,,
simillima	Smith	,,
pilipes	Fabr.	,,
Epeolus variegatus	Latr.	common
Cœlioxys Vectis	Curt.	,,
Megachile maritima	Smith	,,
circumcincta	,,	,,
Anthophora furcata	St. Farg.	local
Bombus fragrans	Illig.	not abundant
Latreillellus	,,	common
subterraneus	Fabr.	,,
Apathus rupestris	,,	,,

NEUROPTERA.

Libellula conspurcata	Fabr.	rare
Cordulia ænea	Leach.	,,
Æshna grandis	Fabr.	,,
varia	Curt.	common

LEPIDOPTERA.

Papilio Machaon	Linn.	rare
Colias Edusa	Steph.	,,
Hyale	,,	,,
Pontia Cardamines	,,	common
Vanessa Antiopa	,,	once or twice
Argynnis Aglaia	,,	frequent
Paphia	,,	once or twice
Lathonia	,,	,,

Anthrocera Loniceræ	Steph.	common
Filipendulæ	,,	,,
†Chærocampa Porcellus	West	frequent
† Elpenor	,,	,,
†Deilephila Gallii	Fabr.	,,
†Sphinx Convolvuli	Linn.	,,
†Acherontia Atropos	Curt.	,,
Zeuzera Æsculi	,,	rare
Phæosia dictæa	Steph.	,,
Petasia Cassinea	,,	,,
Saturnia Pavonia-minor	,,	frequent
larvæ very common		
Gastropacha Quercifolia	,,	rare
Dasychira fascelina	,,	,,
Orgyia antiqua	,,	common
Eyprepia Russula	Curt.	frequent
Œnistis quadra	West	common
Triphæna Janthina	Steph.	,,
†Charæas Graminis	,,	,,
Agrotis valligera	,,	,,
pupillata	,,	,,
saucia	West	rare
Xylina rhizolitha	Steph.	frequent
Calocampa exoleta	,,	rare
Mamestra albicolon	,,	frequent
Miselia Aprilina	,,	rare
Acronycta Psi.	,,	common
Apatela Leporina	,,	rare
Polia flavicincta	,,	,,
Gortyna flavago	,,	,,
Nonagria Typhæ	Curt.	,,
larvæ common		
Leucania littoralis	Curt.	rare
Calamia Phragmitidis	Hüb.	,,
Heliothis marginata	Steph.	,,
dipsacea	,,	common
Catocala Fraxini	,,	once taken
Nupta	,,	rare
Biston prodromarius	,,	,,
Hipparchus papilionaria	,,	,,
Hemithea vernaria	,,	frequent
Ephyra omicronaria	,,	rare
Cabera rotundaria	,,	,,
Xerene albicillata	,,	,,
Carpocapsa pomonella	,,	frequent

† These Insects are very uncertain in their appearance, often not being seen for several years.

Argyrotoza Bergmanniana	Steph.	common
Pterophorus didactylus	Fabr.	,,
pentadactylus	,,	,,

DIPTERA.

Limnobia xanthoptera	Meig.	common
Pedicia rivosa	Latr.	rare
Tipula crocata	Linn.	common
Tabanus bovinus	,,	frequent
tropicus	,,	rare
Oxycera trilineata	Latr.	common
Odontomyia Hydroleon	Meig.	,,
Chrysotoxum bicinctum	Latr.	rare
Stratiomys Potamida	Meig.	common
Sericomyia borealis	,,	,,
Volucella bombylans		rare
plumata		common
pelucens		rare
Porphyrops diaphanus	Meig.	,,
Medeterus notatus	,,	,,
Tachina vulpina	Full.	,,
Actora æstuum	Meig.	common
Tetanocera marginata	,,	,,
Ochthera Mantis	Latr.	seldom
Oxypterum pallidum	Leach.	frequent *

LIST OF FISH.

The Fish which are specified in this list, have been taken in the sea off Yarmouth, and in the rivers and broads of the district. (C. means *common*, F. *frequent*, R. *rare*, A. *accidental*, and an asterisk, *only taken once or twice.)*

Perch	Perca fluviatilis	Linn.	C.
Basse	Labrax lupus	Cuv.	R.
Ruffe	Acerina vulgaris	,,	C.
Weever	Trachinus vipera	,,	F.
Great Weever	draco	Linn.	R.
Red Mullet	Mullus barbatus	,,	C.
Red Gurnard	Trigla cuculus	,,	R.
Grey Gurnard	gurnardus	,,	R.
Bullhead	Cottus gobio	,,	C.
Father-lasher	bubalis	Cuv.	C.
Armed Bullhead	Aspidophorus Europæus	,,	C.

* Found on the Swift.

Sticklebat	Gasterosteus aculeatus	Penn.	C.
15-spined Sticklebat	spinachia	Linn.	R.
Gilthead	Sparus aurita	,,	*
Mackerel	Scomber scomber	,,	C.
Tunny	Thynnus vulgaris	Cuv.	R.
Scad	Caranx trachurus	,,	R.
Dorée	Zeus faber	Linn.	R.
Opah	Lampris guttatus	Cuv.	*
Grey Mullet	Mugil capito	,,	C.
Blenny	Gunnellus vulgaris	,,	R.
Eelpout	Zoarcus viviparus	,,	F.
Wolf-fish	Anarrhichas lupus	Linn.	R.
Goby	Gobius minutus	Cuv.	F.
Dragonet	Callionymus lyra	Linn.	R.
Sordid Dragonet	dracunculus	,,	*
Carp	Cyprinus carpio	,,	C.
Gudgeon	Gobio fluviatilis	Cuv.	C.
Tench	Tinca vulgaris	,,	C.
Bream	Abramis brama	,,	C.
Rud	Leuciscus rutilus	,,	C.
Roach	vulgaris	,,	C.
Minnow	phoxinus	,,	C.
Pike	Esox lucius	Linn.	C.
Salmon	Salmo salar	,,	R.
Salmon Trout	trutta	,,	F.
Smelt	Osmerus eperlanus	Cuv.	C.
Herring	Clupea harengus	Linn.	C.
Pilchard	pilchardus	Penn.	C.
Sprat	sprattus	Linn.	C.
Shad	alosa	,,	C.
Anchovy	encrasicolus	,,	*
Cod	Morrhua vulgaris	,,	C.
Haddock	æglefinus	Cuv.	C.
Bib	Gadus luscus	Linn.	A.
Coal-fish	Merlangus carbonarius	Cuv.	C.
Whiting	vulgaris	,,	C.
Ling	Lota molva	,,	C.
5-bearded Cod	Motella mustela	Jenyns.	*
Sole	Solea vulgaris	Cuv.	C.
Plaice	Platessa vulgaris	,,	C.
Flounder	flesus	,,	C.
Dab	limanda	,,	C.
Holibut	Hippoglossus vulgaris	,,	C.
Turbot	Rhombus maximus	,,	C.
Brill	vulgaris	,,	C.
Lump-sucker	Cyclopterus lumpus	Linn.	*
Unctuous-sucker	Liparis vulgaris	Cuv.	*

Eel	Anguilla vulgaris	Linn.	C.
Sand-launce	Ammodytes Lancea	Cuv.	R.
Pipe-fish	Syngnathus Acus	Linn.	C.
Short Pipe-fish	Typhle	,,	R.
Sea-horse	Hippocampus brevirostris	Cuv.	A.
Short Sun-fish	Orthagoriscus mola	,,	*
Sturgeon	Acipenser Sturio	Linn.	R.
Spotted Dog-fish	Squalus canicula	,,	*
Dog-fish	catulus	,,	C.
Sea-fox	Carcharias vulpes	Cuv.	*
Blue Shark	glaucus	,,	R.
Hammer-headed Shark	Zygœna malleus	Val.	*
Basking Shark	Selachus maximus	Cuv.	R.
Angel Shark	Squatina angelus	,,	*
Skate	Raia batis	Linn.	C.
Thornback	clavata	,,	C.
Sting Ray	pastinaca	,,	*
Lamprey	Petromyzon marinus	,,	C.
Lampern	fluviatilis	,,	C.
Angler	Lophius piscatorius	,,	F.

LIST OF REPTILES.

Ringed Snake	Natrix torquata	Ray.
Viper	Pelias Berus	Morren
Slow-worm	Anguis fragilis	Linn.
Lizard	Zootoca vivipara	Bell
Frog	Rana temporaria	Linn.
Natter-Jack	Bufo calamita	Laurent
Toad	vulgaris	,,
Triton or Newt	Triton cristatus	,,
Spotted Newt	Lissotriton punctatus	Bell

APPENDIX TO CHAPTER V.

LIST OF BIRDS.

The following Birds have been shot in the Yarmouth district. (W.V. means *winter visitant*, S.V. *summer visitant*, R. *rare*, F. *frequent* C. *common*, A. *accidental*, R.W.V. *rare winter visitant*, &c., and an asterisk, *only taken once or twice.)*

RAPTORES:

Golden Eagle	Aquila chrysaetos	Penn.	* A.V.
White-tailed Eagle	Haliæetus albicilla	,,	A.W.V.
Fishing Eagle	Pandion haliæetus	,,	R.W.V.
Iceland Falcon	Falco Islandicus	Selby	* A.V.
Peregrine Falcon	peregrinus	Penn.	R.
Hobby	subbuteo	,	F. S.V.
Merlin	æsalon		R.
Kestril	tinnunculus	,,	C.
Red-legged Falcon	rufipes	Selby	*
Goshawk	Astur palumbarius	,,	R
Sparrow Hawk	Accipiter fringillarius	,,	C.
Kite	Milvus vulgaris	,,	R.
Buzzard	Buteo vulgaris	,,	F.
Rough-leg'dBuzzard	lagopus	,,	R.W.V.
Honey Buzzard	Pernis apivorus	,,	,,
Hen Harrier	Circus cyaneus	,,	F.
Marsh Harrier	æruginosus	,,	R.
Grey Harrier	cineraceus	,,	*
Short-eared Owl	Otus brachyotos	,,	W.V.
Long-eared Owl	vulgaris	,,	* A.V.
Barn Owl	Strix flammea	Penn.	F.
Brown Owl	Syrnium stridula	Tem.	R.
Little Owl	Noctua passerina	Selby	*

INSESSORES

Shrike	Lanius excubitor	Penn.	R.
Red-backed Shrike	collurio	,,	F.
Wood-chat Shrike	rutilus		*
Spotted Flycatcher	Muscicapa grisola	Penn.	F.
Pied Flycatcher	atricapilla	,,	R.
Dipper	Cinclus aquaticus	Selby	*
Missel Thrush	Turdus viscivorus	Penn.	C.
Fieldfare	pilaris	,,	C.
Thrush	musicus	,,	C.

Redwing	Turdus iliacus	Penn.	C.
Blackbird	merula	,,	C.
Ring Ouzel	torquatus	,,	R.
Hedge Sparrow	Accentor modularis	Selby	C.
Redbreast	Erythaca rubecula	,,	C.
Redstart	Phænicura ruticilla	,,	C.
Blue-throated Redstart	Suecica	Gould	*
Stone-chat	Saxicola rubicola	Selby	C.
Whin-chat	rubetra	,,	C.
Wheat-ear	ænanthe	,,	C.
GrasshopperWarbler	Salicaria locustella	,,	R.
Reed Warbler	phragmitis	,,	F.
Nightingale	Philomela luscinia	,,	R.
Black-cap	Curruca atricapilla	,,	C.
White-throat	cinerea	,,	C.
Lesser White-throat	sylviella	Flem.	C.
Pettychaps	Sylvia trochilus	Selby	C.
Yellow Wren	rufa	Tem.	C.
Golden-crestedWren	Regulus cristatus	Penn.	C.
Great Tit	Parus major	,,	C.
Blue Tit	cœruleus	,,	C.
Cole Tit	ater	,,	C.
Marsh Tit	palustris	,,	C.
Long-tailed Tit	caudatus	,,	F.
Bearded Tit	Calamophilus biarmicus	,,	C.
Waxwing	Bombycilla garrula	Selby	A.W.V.
Pied Wagtail	Motacilla alba	Penn.	C.
Grey Wagtail	boarula	,,	F.W.V.
Yellow Wagtail	flava	Tem.	C.S.V.
Pipit	Anthus arboreus	Selby	F.
Meadow Pipit	pratensis	,,	F.
Shore Pipit	petrosus	Flem.	R.
Skylark	Alauda arvensis	Penn.	C.
Woodlark	arborea	,,	R.
Snow Bunting	Plectrophanes nivalis	Selby	F.W.V.
Lapland Bunting	Lapponica	,,	W.V. *
Bunting	Emberiza miliaria	Penn.	C.
Reed Bunting	schæniculus	,,	C.
Yellow Bunting	citrinella	,,	C.
Chaffinch	Fringilla cælebs	,,	C.
Mountain-finch	montifringilla	,,	F.
Sparrow	Passer domesticus	,,	C.
Tree Sparrow	montanus	,,	C.
Greenfinch	Coccothraustes chloris	,,	C.
Hawfinch	vulgaris	,,	R.W.V.
Goldfinch	Carduelis elegans	Selby	C.

Siskin	Carduelis spinus	Penn.	F.
Linnet	Linaria cannabina	Selby	C.
Twite	montana	,,	R.
Lesser Redpole	minor	,,	R.
Bullfinch	Pyrrhula vulgaris	,,	F.
Pine Bulfinch	enucleator	,,	R.W.V.
Crossbill	Loxia curvirostra	Penn.	,,
Starling	Sturnus vulgaris	,,	C.
Rose-coloured Ouzel	Pastor roseus	Flem.	R. S.V.
Raven	Corvus corax	Penn.	R.
Crow	corone	,,	C.
Hooded Crow	cornix	,,	C.
Rook	frugilegus	,,	C.
Jackdaw	monedula	,,	C.
Magpie	Pica caudata	Flem.	F.
Jay	Garrulus glandarius	Penn.	F.
Green Woodpecker	Picus viridis	,,	R.
Great Woodpecker	major	,,	*
Lesser Woodpecker	minor	,,	*
Wryneck	Yunx torquilla	,,	F.
Creeper	Certhia familiaris	,,	R.
Wren	Troglodytes vulgaris	Flem.	C.
Hoopoe	Upupa epops	Penn.	R. S.V.
Nuthatch	Sitta Europæa	,,	R.
Cuckoo	Cuculus canoris	,,	C.
Bee-eater	Merops apiaster	,,	*
Roller	Coracias garrula	,,	*
Kingfisher	Alcedo hispida	,,	C.
Swallow	rustica	,,	C.
Martin	urbica	,,	C.
Bank Martin	Hirundo riparia	,,	C.
Swift	Cypselus murarius	Selby	C.
Goat-sucker	Caprimulgus Europæus	Penn.	F.

RASORES.

Dove	Columba palumbus	Penn.	C.
Stock-dove	ænas	,,	R.
Turtle-dove	turtur	,,	R.
Pheasant	Phasianus Colchicus	Mont.	C.
Partridge	Perdix cinerea	Penn.	C.
Red-leggedPartridge	rufa	,,	C.
Quail	Coturnix vulgaris	Flem.	F.

GRALLATORES.

Norfolk Plover	Œdicnemus crepitans	Selby	R.
Pratincole	Glareola torquata	,,	*
Golden Plover	Charadrius pluvialis	Penn.	C.

Dotterel	Charadrius morinellus	Penn.	R.
Ring Dotterel	hiaticula	,,	C.
Kentish Plover	cantianus	Bewk.	R.
Sanderling	Calidris arenaria	Penn.	C.
Grey Plover	Squatarola cinerea	Selby	F.
Lapwing	Vanellus cristatus	,,	C.
Turnstone	Strepselas interpres	,,	R.
Oyster-catcher	Hæmatopus ostralegus	,,	R.
Heron	Ardea cinerea	Penn.	C.
Purple Heron	purpurea	,,	*
Squacco Heron	comata	,,	*
Bittern	Botaurus stellaris	Selby	F.
Little Bittern	minutus	,,	*
Night Heron	Nycticorax Europæus	,,	R.
Stork	Ciconia alba	,,	*
Spoonbill	Platalea leucorodia	Penn.	R.
Ibis	Ibis falcinellus	Selby	*
Curlew	Numenius arquata	Penn.	C.
Whimbrel	phœopus	,,	C.
Dusky Sandpiper	Totanus fuscus	Selby	R.
Redshank	calidris	,,	C.
Green Sandpiper	ochropus	,,	F.
Long-leg'dSandpiper	glareola	,,	*
Sandpiper	hypoleucos	,,	C.
Green-shank	glottis	,,	C.
Avocet	Recurvirostra avocetta	Penn.	R.
Stilt	Himantopus melanopt-	Selby	*
Black-tailed Godwit	Limosa melanura [erus	,,	
Godwit	rufa	,,	C.
Ruff	Machetes pugnax	,,	C.
Snipe	Scolopax gallinago	Penn.	C.
Jack-snipe	gallinula	,,	C.
Wood-cock	rusticola	,,	C.
Little Curlew	Tringa subarquata	Selby	C.
Knot	Canutus	,,	C.
Stint	variabilis	,,	C.
Little Stint [per	minuta	,,	C.
Temminck's Sandpi-	Temminckii	,,	*
Phalarope	Phalaropus lobalus	Penn.	R.
Lobefoot	hyperboreus	,,	R.
Crake	Crex pratensis	,,	C.
Spotted Crake	porzana	Selby	F.
Water-rail	Rallus aquaticus	Penn.	C.
Water-hen	Gallinula chloropus	,,	C.
Coot	Fulica atra	,,	C.

NATATORES.

Wild Goose	Anser ferus	Jenyns	C.
Bean Goose	segetum	,,	F.
White-fronted Goose	albifrons	,,	R.
Barnacle Goose	leucopsis	,,	F.
Brent Goose	torquatus	,,	F.
Red-breasted Goose	ruficollis	,,	*
Wild Swan	Cygnus ferus	Selby	C.
Bewick's Swan	Bewickii	Bewk.	F.
Tame Swan	olor	Tem.	C.
Shieldrake	Tadorna vulpanser	Flem.	F.
Shoveler	Anas clypeata	Penn.	F.
Gadwall	strepera	Linn.	R.
Pintail	acuta	,,	F.
Wild Duck	boschas	Penn.	C.
Teal	crecca	Linn.	C.
Garganey	querquedula	,,	F.
Wigeon	Penelope	Penn.	C.
Western Duck	Somateria dispar	Yarrel	*
King-eider	spectabilis		A.V.
Scoter	Oidemia fusca	Flem.	R.W.V.
Black Scoter	nigra	,,	C.W.V.
Pochard	Fuligula ferina	Selby	C.
Nyroca Duck	Nyroca	,,	R.
Scaup	marila	,,	F.
Tufted Pochard	cristata	,,	F.
Hareld	glacialis	Yarrel	R.W.V.
Harlequin Duck	histrionica	,,	*
Golden-eye	clangula	,,	F.
White-nun	Mergus albellus	Penn.	F.W.V.
Hooded Merganser	cucullatus	Linn.	*
Red-breasted Merganser	serrator	Penn.	F. W.V
Merganser	merganser	,,	R.W.V.
Great Grebe	Podiceps cristatus	,,	F.
Red-necked Grebe	rubricollis	,,	R.
Horned Grebe	cornutus	,,	F.
Eared Grebe	auritus	,,	R.
Little Grebe	minor	,,	F.
Great Diver	Colymbus glacialis	,,	R.W.V.
Black-throatedDiver	arcticus	,,	R.W.V.
Red-throated Diver	septentrionalis	,,	F.
Guillemot	Uria troile	,,	C.
Rotch	Mergulus melanoleucos	Flem.	R.V.
Razor-bill	Alca torda	Penn.	R.V.
Cormorant	Phalacrocorax carbo	Flem.	F.

Crested Shag	Phalacrocorax cristatus	Penn.	R.
Gannet	Sula alba	Flem.	F.W.V.
Caspian Tern	Sterna Caspia	Selby	* A.V.
Sandwich Tern	Cantiaca	Jenys.	F.
Roseate Tern	Dougallii	Mont.	*
Common Tern	hirundo	Penn.	C.
Little Tern	minuta	,,	C.
Black Tern	fissipes	,,	F.
White-winged Tern	leucoptera	Gould	*
Little Gull	Larus minutus	Mont.	R.
Black-headed Gull	ridibundus	Penn.	C.
Kittiwake Gull	tridactylus	,,	F.
Gull	canus	,,	C.
Black-backed Gull	fuscus	Bewk.	R.
Herring Gull	argentatus	,,	F.
Great black-backed Gull	marinus	Penn.	C.
Skua	Lestris cataractes	Jenys.	* A.V.
Richardson's Skua	Richardsonii	,,	R
Fulmar Petrel	Procellaria glacialis	Penn.	R.
Manx Sheerwater	Puffinus Anglorum	Flem.	A.V.
Forked-tailed Petrel	Thalassidroma Leachii	Jenys.	*
Storm-petrel	pelagica	Selby	F.

APPENDIX TO CHAPTER VI.

LIST OF MAMMALIA.

The abreviations are the same as in the other lists.

Pipistrelle Bat	Vespertilio Pipistrellus	Geoff.	C.
Great Bat	noctula	Jenyns	R.
Long-eared Bat	Plecotus auritus	Geoff.	C.
Hedge-hog	Erinaceus Europæus	Linn.	F.
Mole	Talpa Europæa	,,	C.
Shrew	Sorex araneus	,,	C.
Water Shrew	fodiens	Pallas	R.
Otter	Lutra vulgaris	Jenyns	F.
Weasel	Mustella vulgaris	Linn.	C.
Stoat	erminea	,,	C.
Polecat	putorius	,,	C.
Seal	Phoca vitulina	,,	R.
Squirrel	Sciurus vulgaris	,,	R.
Dormouse	Myoxus avellanarius	Desm.	R.

Wood Mouse	Mus sylvaticus	Linn.	C.
Common Mouse	Musculus	„	C.
Brown Rat	decumanus	Pallas	C.
Water Vole	Arvicola amphibius	Desm.	C.
Meadow Vole	agrestis	Flem.	C.
Hare	Lepus timidus	Linn.	C.
Rabbit	Cuniculus	„	C.
Porpoise	Phocæna communis	Cuv.	C.
Grampus	Orca	„	* A.V.
Bottle-headed Whale	Hyperoodon bidens	Jenyns	* A.V.
Greenland Whale	Balæna mysticetus	Linn.	* A.V.
White-beaked bottle-nose	Lagenorhynchus albirostris	Grey	* A.V.

FINIS.

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