The buildings were such as are to be found on ordinary Iowa farms, fairly comfortable and clean. I could find no clue in the quantity or quality of feed that promised to lead to a solution of the difficulty.

On investigation of the water supply, I found that most of the animals on the farm drank from a small creek that ran a zigzag course through the premises. The stream was in part supplied from a series of springs, and in ordinary seasons afforded a fair amount of water, which ran, at least for a portion of its course, over a gravelly bed. The dry summer of 1890, with several previous ones showing an abnormally light rain fall, had so reduced the amount of water that it had ceased to run. On making examination and conducting inquiries, I ascertained that it had been the custom on the farm to throw the carcasses of animals down the steep bluffs into the bed of the stream. I further learned that during the summer, chicken cholera had prevailed on the farm, and that a large number of chickens had died and been thrown over the bank. I was also informed that the hog-cholera had caused the death of a considerable number of swine, the carcasses having been treated in a similar manner. The several yards occupied by horses, cattle, pigs, and barn-yard fowls were on the hillside, with abrupt drainage into the creek. In addition to this, large heaps of fermenting manure were deposited about the foot of the hill, near the edge of the stream where the animals went to drink.

A few of the animals on the farm had not had access to the stream, but had been watered from a well. None of these had showed signs of sickness, though they had been in daily contact with those that had their water from the pools in the bed of the stream, and even with some of the sick. On looking up the local geography of the neighborhood, I found that a number of farmers had built their homes along the banks of this stream, and had been accustomed to make use of it in much the same way as the farmer above referred to. Inquiry elicited the fact that on no less than four farms situated on the banks of this stream, animals had died showing symptoms identical with those on the farm first investigated. I regarded the evidence as sufficient to make out a strong case against the impurity of the water, and gave an opinion accordingly.

The above is but a single instance out of many that have come under my observation. It is one of the most glaring, but by no means one attended with the greatest degree of loss On another occasion where a high rate of mortality had prevailed among the cattle running on the open prairie, I was able to trace the cause to contamination of surface water. An animal, dead from anthrax, had been drawn into a basin on the open prairie. Later the rains filled the basin with water, and about one thousand cattle on the range had access to the pond for water supply. The result was that about ten per cent of all the animals having access to the impure water died from anthrax. The teachings of these object lessons are sufficiently obvious. These animals are endowed with organizations not unlike our own, and the manifest laws of being and of health can no more be violated with impunity by them than by ourselves.

THE LAST ENGLISH HOME OF THE BEARDED TIT.[1]

IN the memoir of the Geological Survey of the country round Cromer [England], is a rough sketch-map of the outline of the north-west corner of Europe as in all probability it existed at the newer pliocene period, in the far-off days when the primitive vegetation and monstrous creatures of a still earlier world were slowly giving place to plants and animals of "more of the recent" types.

A great river, since dwindled to the insignificant Rhine, with its mushroom castles and ruins, swept through fir woods and swamps to an estuary hemmed in to the westward by a coast-line unbroken, excepting here and there by a tributary stream, to John o' Groat's, rolling down in its sluggish current stumps of trees, and bones of elephants and bears and beavers, to be washed long ages afterwards from the "forest-beds" of Sheringham and Runton. The swamps through which the old estuary once cut its way lie buried now in places a hundred feet or more deep, beneath Norfolk turnip fields and pheasant coverts.

The fens of the Great Level, which, before Dutch drainers and dyke-builders had reclaimed the second Holland, were perhaps their nearest counterpart in the England of human times, are scarcely less things of the past. The marsh devils, which, until St. Bartholomew interfered and drove them off with a cat-o'-nine-tails, held open court there, and, as Matthew of Paris tells in his "Greater Chronicle," came out in troops to maltreat the few hardy Christian settlers, who, like St. Guthlac, as penance for past wild lives, sought holy retirement there — dragging them, bound, from their cells, and ducking them mercilessly in the black mud, "*cœnosis in laticibus atræ paludis*" — now cower invisible in the ditches, or sneak out as agues, to be ignominiously exorcised with quinine. Hares and partridges have taken the place of spoonbills and bitterns, and ruffs and reves; and, where a few years ago wild geese swam, ponderous Shire cart-colts gallop, scarcely leaving in summer a hoof-mark on the solid ground.

The old order almost everywhere has changed and given place to new. But there is a corner left — the district of the Broads of Norfolk — where one may still see with natural eyes what the world in those parts must have looked like in days before the chalk dam which connected England once with the mainland was — happily for Englishmen of these days — broken through, snapped by a sudden earthquake, or slowly mined by countless generations of boring shellfish, until it gave way under the weight of the accumulating waters of the estuary, choked to the north by advancing ice, or tilted westward by some submarine upheaval. There, with a very small stretch of imagination, one may still hear mastodons crashing through the reed-beds, and British hippopotamuses splashing and blowing in the pools; and, as every now and then an incautious footstep breaks through the raft-like upper crust of soil, and imprisoned gases bubble up, one may, without any stretch of imagination, smell the foul stenches of pliocene days.

The climate in those days, geologists tell us, judging by the fossil plants of the time, must — before the country was wrapped in ice — have been much what it is in Norfolk now. "If the various sections of the upper fresh-water beds are examined, we find," writes Mr. Clement Reid, who surveyed the country round Cromer, where the forest-beds are most exposed, "that all appear to have been formed in large shallow lakes like the present broads, or in sluggish streams connected with them."

Three considerable rivers, the Bure, the Waveney, and the Yare, after meandering through level meadows and marshes, — none of the three, according to Sir John Hawkshaw's estimate, with a fall of more than two inches in the mile, — join and meet the full strength of the tide in Breydon Water. The outflow is checked, and the volume of the streams, finding no other way to dispose of itself, has spread out into side-waters and back-waters, wherever the law of levels, the only law to which it owns allegiance, has admitted the right of way.

The result is a triangle of some fifteen or twenty thousand acres or more in which — as in the abyss through which Satan winged his way in search of the newly created world,

> "Where hot, cold, moist, and dry, four champions fierce,
> Strove for the mast'ry"—

land and water hold divided empire. In places the water seems at the first glance to be carrying all before it. Broad sheets (some of them a hundred acres or more) spread almost unbroken surfaces over unfathomable depths of mud. But the encircling rings of rushes, dwarf alders, and other multitudinous marsh plants,

[1] T. Digby Pigott, in the Contemporary Review for July.

creep in insidiously, each generation growing rank and dying to make soil on which the next may find a footing for another step inwards.

The water revenges the encroachment by flooding the land wherever it finds a chance, and undermining when it cannot overflow, till it is impossible to say where the one begins and the other ends. One walks almost dry-shod across what had seemed a dangerous pool, and the next moment sinks over one's fishing stockings in what anywhere else would have been dry land. The confusion of ideas as to the relative solidity of earth and water which results from an hour or two spent in exploring a soft "broad" marsh is not lessened as one sees the huge brown sail of a "wherry"—the craft which is said to go closer to the wind than any other afloat — moving straight up to one, to pass by at eight or nine miles an hour, sailing to all appearances on dry ground. The navigable channels are most of them natural cuttings in the dead level of the marsh, invisible at a very few yards' distance.

The name of the long pole, which is one of the most important parts of the equipment of the Norfolk wherry, the "quant," is, by the bye, a memorial of the days of Roman occupation. It was with a quant, spelt a little differently in Virgil's day, that Sergestus, in the immortal boat race, tried to shove off his galley when he had cut his corner too finely and run aground; and with a quant that Charon ferried his passengers across the Styx: —

"Ipse ratem conto subigit velisque ministrat."

The entire district is unlike anything else in England, and, apart from its power of recalling the past, has an exceptional interest of its own for naturalists. It is the paradise of shy creatures of all sorts, birds especially, which love mud, or water, or reeds; and has been the last settled English home of more than one rare species. Their number, in spite of the keener interest taken of late years by land-owners in bird preservation, steadily decreases.

The avocet, with its spindle shanks, and beak turned up like a shoemaker's awl, which not very long ago bred so freely in the salt marshes that "poor people made puddings and pancakes" with their eggs, is now the rarest accidental visitor. The bittern, comparatively lately a regular breeder there, no longer "guards his nest" among the sedges and reeds; and ruffs and reeves are as rare as they once were common. But there is — or at least till last year was — one little bird, which, driven from every other part of England, has made the broads his own peculiar property, and himself thoroughly at home there. Hardy and modest in his wants, the bearded tit has been essentially a home-staying bird. His ancestors seem to have elected, generations ago, that, whatever the advantages of a winter in Algeria, the disadvantages were greater, and that, on the whole, it was better to face the evils that they knew than fly to others that they knew not of.

The "developments" of the family ever since the decision was made have been in a direction to fit them for a quiet life among the reed-beds. Other birds, smaller even than they, whose forefathers were of a different opinion, have wings now so perfected that, when soft animal food fails in England, they think nothing of a flight of a few hundred miles to a sunnier spot where fat insects may still be found.

The bearded tit, with his little round wings and the heavy canvas of his long tail, cannot do what they can. But he can do what they cannot, and make the most of what is to be got in the way of food at home. In the swampy grounds from which his reed beds grow are quantities of very small snails. Some early ancestor, feeling the pinch of hunger, ventured experimentally to pick one up and eat it, and finding out the sustaining qualities of the rich inside meat, brought up his young ones to eat them too, and make light of the aches which a sharp-edged, hard shell swallowed whole must have caused in a delicately-coated stomach.

They, in their turn, brought up their young on the same Spartan system, and now — unlike other tits, which have most, if not all, of them tender insides, suitable enough for digesting soft insects, but unfit to do justice to anything harder than a seed well steeped in gastric juice — the bearded tit finds himself the possessor of an honest, study gizzard, which can grind up, without the least inconvenience to the owner, any number of the shells of the snails which are its chief delicacy. As many as twenty little snail-shells have been taken from the crop of one bearded tit.

We wonder now why good people should have been so much alarmed as once they were at the doctrines of "development." It is the teaching of the Parable of the Talents extended from the spiritual to the physical world, — powers neglected or abused withdrawn, others well used increased.

The shape and color of the bearded tit are as specially adapted as is its stomach to the peculiarities of its surroundings. Visitors to the broads in midsummer who may have caught glimpses of the bird, showing itself for a minute or two at a time, a conspicuous object against the green of the young rushes, may find it difficult to realize that the bearded tit is, when invisibility is of most importance to it, protected by color and form scarcely less perfectly for all practical purposes than are leaf-insects, or stick-caterpillars, or the wonderful creatures described by Professor Drummond in his "Tropical Africa." But such is the case. The eggs are laid about the middle or end of April, when the tall reeds, among which the nest is built an inch or two from the ground, are ripe for cutting.

The prevailing tints of the entire district — land, water, and sky — are then the cinnamons, straw-colors, and pale blue greys, miraculously reproduced in the feathers of the bird, which might pass for the emancipated spirit of the dead reeds of last summer. The long tail, with its pointed end, hangs down as its owner comes in sight for a moment to look about him, the counterfeit presentment of a faded frond of the stalk he grips, one foot above the other.

The hoopoes, as the legend goes, wear their crown of feathers in memory of the day when their ancestors saw King Solomon almost fainting under a sudden burst of noonday sunshine, and sheltered his royal head with a parasol of overlapping wings. It may be as a mark of approval of the manliness with which he faces winter on the broads, when snipe and other birds have been driven off by the cold, that the bearded tit now wears the long silky black moustache — his own peculiar adornment — which hangs from each side of the beak. As in the nobler species, the moustache is noticed only in the males. There is a prolongation of the cheek feathers of the female also, but not the same contrast of colors.

For all ordinary winters the bearded tit is amply provided. But, unhappily, last winter — the longest on record since the days of Lorna Doone — was not an ordinary one. Fifty-nine days of consecutive, almost sunless, frost were recorded in London, and in parts of the broads the weather was even more severe. The snails for weeks and months must have been glued fast to the ground or rush-stalks, — tantalizingly in sight for much of the time, as there was no great quantity of snow, but as much out of reach of a small beak as flies in amber. The birds when most in need of a warming meat-diet were driven to depend almost entirely on such dry ship-biscuits as the seeds of reeds, without even water, except here and there in the running streams, to wash it down, and have suffered terribly in consequence.

It was on one of the bright mornings towards the end of April last, when, in spite of a wind still nailed in the east, a warm sun, and such spring sounds as the call of the nut-hatch, — a pair of whom had from daybreak been carrying on a lively conversation over an unfinished nest in a box in the garden, — encouraged the hope that the return of the glacial epoch might not after all be so near as for the last six months had seemed probable, we found ourselves, after an early breakfast and drive of fourteen miles, landing from a boat on the edge of a marsh skirting a broad. The marsh is strictly preserved, and on it, as lately as last summer, bearded tits were plentiful. We had come in the full expectation of seeing both birds and nests, and were, if anything, rather encouraged than otherwise when the keeper — in the pessimistic tone common to men of his order when conscious that there is an unusually good head of game in front of the guns — told us that, though there was a nice lot of reeds uncut, he "doubted" we should not find any tits, as to the best of his belief there was not one of them left in the place.

But before an enjoyable day was over his words had acquired a

different meaning. We tramped the marsh, which teemed with other bird life, backwards and forwards. Twice we flushed a mallard from a nest well filled with eggs. One nest, with a clutch of ten, was downed almost as thickly as an eider duck's, with a well-trampled path like a miniature sheep walk leading from it to the water's edge. From behind a stock of reed-sheafs we watched for ten minutes a pair of teal playing together — unobserved, as they supposed — in a rushy pond close by. Shovellers, with fantastic coloring and great flat beaks out of all proportion to the size of the bird, rose more than once within a few yards of us, and after circling once or twice, pitched again not far off. Tired-looking swallows sat disconsolately in parties of five or six on bushes, or rose to skim over the water in a half-hearted way, and light again.

A pair of redshanks crossed us once or twice, flying in line, one just behind the other, whistling loudly as they flew. Cuckoos called, and overhead snipe poised themselves, drumming and bleating and dropped like stones as they neared the ground. In the nest of one of them we say a beautiful instance of "protective coloring," the marvel of which never loses its freshness. The keeper the day before our visit, had found the nest, and for our benefit had marked the spot. It was in a line between two bushes, within half a dozen yards of one which stood alone and unmistakable on flat ground, with nothing on it bigger than a few short sprits which could hide the nest. As we neared the spot, the bird, to show there could be no mistake in the mark, rose close by us. For more than a quarter of an hour we looked, — three pairs of eyes, one pair the keeper's,—crossing and recrossing every foot of the ground, and were giving up the search as hopeless, thinking that a crow perhaps had hunted the marsh in the early morning before us, when in the middle of a tussock of sprits at our feet we saw a maltese cross of very green eggs, mottled irregularly with brownish-red, exactly imitating the bed of green moss from which the sprits grew. The color of snipes' and many other eggs is very volatile, and no one who has only seen them "blown" in a cabinet can quite realize their beauty when seen in the nest, fresh laid and untouched

At intervals of our tramp on shore we took the boat, rowing across corners of the broad, or pushing our way through ditches or narrow twisting channels. We saw coots' nests in plenty, and one unfinished nest of the great crested grebe, — the one rare bird which has made some return for the trouble taken of late years for its preservation by becoming more common. A floating mass of weeds, fished up, wringing wet, from the top of the water, looks a hopeless nest for a bird to hatch her eggs in; but, like a damp hay-stack, it generates very considerable heat. "In a grebe's nest," writes Mr. Southwell in the third volume of "Stevenson's Birds of Norfolk," just published, "in which were three eggs and a newly hatched young one, the thermometer rose to 73°, showing that the nest, so far from being the cold and uncomfortable structure by some supposed, was a real hotbed. On inserting the thermometer into a beautifully neat and dry coot's nest, which the bird had just left, I found the temperature to be 61°. The day was wet and cheerless, and the maximum reading of the thermometer in the shade was 58°."

We saw through our glasses several crested grebes playing on the broad. Oddly enough, the common little grebe — the "dabchick" — is less plentiful in Norfolk than it is in St. James's Park, where last year as many as six pairs, all wild birds, nested and brought off their broods.

For six or seven pleasant hours we hunted marsh and broad with eyes and ears open. But not once did we catch sight of a feather, nor once hear the silvery "ping" of the note, of the bearded tit.

It was, of course, one corner only of a wide district, over the whole of which the bird has been well known, that we had explored. There are other broads and marshes where local circumstances may have tempered the killing wind. There, while we looked for them in vain, busy parents may have been working hard from morning till night to cater for the wants of hungry families safely hidden in daily thickening growths of bog flowers and grasses, and another year the deserted reed-beds we visited may be repeopled.

But as we drove home the conviction forced itself more and more strongly upon us, that, from one at least of its most favored haunts, the bearded tit has disappeared, and that it is not improbable that very soon — perhaps before this year is over — naturalists may be telling the sad story of the extinction of one more English bird.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Atmospheric and Seismic Influences.

IN your issue of May 1, I had the honor of reporting a coincidence in time between two peculiar phenomena, the first the collapse of the fire-area of Halemaumau in the crater of Kilauea on March 5, and the second an unprecedented fall of the mercury in Honolulu to 48° F., on March 4. I remarked that this was perhaps not a mere coincidence. I now have the satisfaction of reporting a third phenomenon occurring at the same time, which is undoubtedly connected with the second, and which may aid in finding a connection with the first.

By the return from the Caroline Islands of the missionary barkentine "Morning Star," on the 19th of June, we get word of a severe hurricane on Strong's Island, or Kusaie, on the 3d, 4th, and 5th of March (or 2d, 3d, and 4th here). This island is in about 5° north latitude, and 162° east longitude, or about 3 400 miles west of Honolulu. Most of the breadfruit and cocoanut trees were uprooted, and a majority of the houses destroyed. The force of the waves threw up an islet, half a mile long and five feet high, on the outer edge of the fringing reef. The severity of the blow was from the north east. No barometer was observed there. No gale was experienced at other islands, so far as heard from. There was a sudden fall of the barometer at Honolulu on the 2d of March (3d at Kusaie).

The atmospheric change here is readily connected with the disturbance at Kusaie. To show a connection of the latter with a disturbance of the earth's crust on Hawaii is not quite so easy, although I believe that coincidences between hurricanes and earthquakes are common. What happened on Hawaii was a subterranean fracture in the lava duct of Kilauea, which let its contents escape and apparently become distributed under the Kau desert to the south-west, where lively earthquakes occurred. I suggest that a common cause of the atmospheric and the seizmic disturbances is to be sought for in astronomical conjunctions, possibly connected with sun-spots. Account should probably be taken of the severe blizzard of March 10, in England. SERENO E. BISHOP.

Honolulu, June 30.

The Collections of the Late Professor Parker, F.R.S.

IN a letter recently received by the undersigned from Professor W. Newton Parker, F.Z S., of the University College of Cardiff, Wales, a son of the late eminent Wm. Kitchen Parker, the vertebrate morphologist, I am informed by its writer that "My father's executors have decided to sell the greater part of his collection, which includes numerous skeletons (mainly of birds) and a large number of slides of *Foraminifera*, etc. Do you think that any of the public institutions in America would be likely to want any of these? . . . I hope you will forgive my troubling you about this matter, and I only venture to do so knowing you to have been a friend of my father's, who has an interest in him and his work."

The late Professor Parker's labors in comparative morphology for almost the last half century are so very widely known to science the world over that it is quite unnecessary for me to dwell upon them in the present connection. Their results, as published in the proceedings and transactions of the various learned societies of Europe since 1857, have long become in the highest degree classical, and they are as standard as they are imperishable.