

drift of the glacial period did not once extend over the counties south of the Thames has yet to be demonstrated, and those geologists who hold that we have already discovered the original southern limits of the glacial clays and gravels in England, have yet to explain the condition of these deposits of the north brow of the Thames Valley, where they are as pelagic in character as they are a hundred miles farther north.

The dwellers in the south of England have thus been compensated for their distance from the bolder region of the old British glaciers, of perched blocks, and terminal moraines. The glacial period has now been brought home, as it were, to their own doors. By the classification of the glacial beds which we now possess, patches of clay and gravel which seemed to have a sporadic and insignificant character are seen to belong to a great and historical series. In the presence of such "diluvium" as that of Muswell Hill, with its astonishing medley of organic remains, it needs no longer to be asked,—

"What seas receding from what former world
Consigned these tribes to stony sepulchres?"

We know now that it was an icy sea.

HENRY WALKER

FLIGHT NOT AN ACQUISITION

A FEW weeks ago, when at Ravenscroft (the residence of Lord Amberley), I shut up five unfledged swallows in a small box not much larger than the nest from which they were taken. The little box, which had a wire front, was hung on the wall near the nest, and the young swallows were fed by their parents through the wires. In this confinement, where they could not even extend their wings, they were kept until after they were fully fledged. I was not at Ravenscroft when the birds were liberated, but the following observations were made by Lord and Lady Amberley, who have kindly communicated them to me. On going to set the prisoners free, one was found dead—they were all alive on the previous day. The remaining four were allowed to escape one at a time. Two of these were perceptibly wavering and unsteady in their flight. One of them after a flight of about 90 yards disappeared among some trees; the other, which flew more steadily, made a sweeping circuit in the air after the manner of its kind, and alighted, or attempted to alight, on a branchless stump of a beech; at least it was no more seen. I give the unabridged account of No. 3 and of No. 4 as it stands in the notes made at the time by Lady Amberley. "No. 3 (which was seen on the wing for about half-a-minute), flew near the ground first round Wellingtonia, over to the other side of kitchen garden, past beehouse, back to the lawn, round again, and into a beech tree. No. 4 flew well near the ground, over a hedge twelve feet high to the kitchen garden, through an opening into the beeches, and was last seen close to the ground." The following remarks were added subsequently: "The swallows never flew against anything, nor was there in their avoiding objects any appreciable difference between them and old birds. No. 3 swept round the Wellingtonia, and No. 4 rose over the hedge just as we see the old swallows doing every hour of the day." It remains to add that each of these birds was weighted with a small collar of coloured cloth, put on for the purpose of marking them; and that an old swallow on being set free encumbered by a similar adornment, exhibited the same unsteadiness in its flight.

There is little need to make any remark on the above facts. In proving the flight of birds, and their power of guiding their course through the air in accordance with their sensations of sight, not to be an acquisition, they support the general doctrine that all of what may be called the professional knowledge and skill of the various species of animals come to them by intuition, and not

as the results of their individual experiences. With wings there comes to the bird the power to use them. Why, then, should we believe that because the human infant is born without teeth, it should, when they do make their appearance, have to discover their use? The swallow, the first time it is in the air takes care, or rather does not need to take care, not to dash its brains out against a stone wall. Why, then, should we believe man to have no instinctive faculty of interpreting his visual sensations?

DOUGLAS A. SPALDING

BRITISH ARCHÆOLOGICAL INSTITUTE

THE annual meeting of this Institute commenced at Exeter on Tuesday, July 29, the President for the year being the Earl of Devon. Many valuable papers were read, and many interesting excursions made in the neighbourhood; the reception by the Mayor, the local authorities, and the inhabitants generally, has been most enthusiastic. The Congress was brought to a close on Tuesday last, and is declared to have been the most successful meeting of the kind ever held. Of the many valuable papers read we give the following by Dr. E. A. Freeman, on "The Place of Exeter in English History."

He remarked that it sometimes came into the mind of an English traveller in other lands that the cities of his own country must seem of small account in the eyes of a traveller from the land which he visited. He spoke of course as an antiquary and not of modern prosperity and splendour. As a rule an English town did not make the same impression as an artistic and antiquarian object as did towns of Italy, Germany, Burgundy, France, or Aquitaine. But whilst we had few cities as rich at once in history and art as many of those on the Continent, yet we need not grieve; for whatever was taken from particular districts was added to the general history of our country. Why was the history of Nuremberg greater than that of Exeter? Simply because the history of England was greater than that of Germany. The domestic history of an English town which had always been content to be a municipality, and had never aspired to be a sovereign commonwealth, seemed tame beside the stirring annals of the free cities of Italy and Germany. But for that especial reason it had a value of its own, it had not struggled for the greatness of its own, but it had done its work as part of a greater whole—it had played its part in building up a nation. And the comparison between the lowly English municipality and the proud Italian or German commonwealth had also an interest of another kind. The difference between the two was simply the difference implied in the absence of political independence in the one case and its presence in the other. The difference was purely external—the internal constitution—history and revolutions—often presenting the most striking analogies. In both might often be seen the change from democracy to oligarchy, and from oligarchy to democracy. In both they might see men who, in old Greece, would have taken their places as demagogues, perhaps tyrants. Exeter had something to tell of Earl and Countess of Devon; Bristol of its half-citizens, half tyrants, the Lords of Berkeley. In the free cities of the Continent we saw what English cities might have been if the royal power in England had been no stronger than that of the Emperors, and if England had therefore split up into separate states like Germany, Italy, and Gaul. In England the constant tendency had been to unity and to make every local power subordinate to that of the king, and it was this that had made the difference between a municipality like Exeter and a commonwealth like Florence. In Exeter reflections of this kind had a special fitness. No city in England had a history which came so near to that of the great conti-

mental cities; none could boast of a longer unbroken existence nor was so direct a link between the earliest and the latest days of the history of our island. None had in all ages more steadily kept the character of a local capital, the undisputed head and centre of a great district. And none had come so near to being something more than a local capital, none had had so fair a chance as Exeter of once becoming an independent commonwealth, the head of a confederation of smaller boroughs, perhaps the mistress of dependent towns and subject districts. It was not then with mere words of form that he might congratulate the Institute on finding themselves at last within the walls of the great city of Western England. They had been to many other places, to York, Lincoln, and Chester, and if Exeter must yield to these in the wealth of actually surviving monuments, it assuredly did not yield to any of them in the historic interest of its long annals. It had, in truth, peculiar interest of its own in which it stood alone amongst the cities of England; she was among cities what Glastonbury was among churches, it was one of the few ties which directly bound the Englishman to the Roman and the Briton. It was the great trophy of that stage of English conquest when our forefathers, weaned from the fierce creed of Woden and Thunder, deemed it enough to conquer and no longer sought to destroy.

Exeter, Isca, Caer Wisc was a city of the same class as Bourges and Chartres. Here was what was found commonly in Gaul but rarely in Britain—the Celtic hill-fort which had grown into the Roman city, which had lived on through Teutonic conquest, and which still, after all changes, kept its place as the undoubted head of its own district. In Wessex such a history was unique; in all Southern England London was the only—and that but an imperfect—parallel. The name carried on the same lesson which was taught by the site. Caer Wisc had never lost its name. It had been Latinised into Isca, Teutonised into Exancaster, and cut short into modern Exeter, but through all conquests, through all changes of language, it had proclaimed itself as the city by the Exe. In this respect the continuity of its being had been more perfect than that of most of the cities of Northern Gaul. The name and the site of Exeter at once distinguished it from most of the ordinary classes of English towns.

The first question which now suggests itself was one which he could not answer—when did the city first become a West Saxon possession? When did the British Caer-Wisca, the Roman Isca, pass into the English Exancaster? Of that he could find no date—no trustworthy mention. The first distinct and undoubted mention of the city he could find was in the days of Alfred, where it figured as an English fortress of great importance, more than once taken and retaken by the great king and his Danish enemies. He was as little able to fix the date of the English conquest of Isca as he was to fix that of its original foundation by the Britons. John Shillingford said that Exeter was a walled city before the incarnation of Christ, and though it was not likely to have been a walled city in any sense that would satisfy either a modern or Roman engineer, yet it was likely enough to have been already a fortified port before Cæsar landed in Britain. At all events the first definite mention of it was in the time of the wars of Alfred. But though it was English by allegiance, it was not until two centuries later that it became wholly English in blood and speech. In Athelstan's day the city was still partly Welsh, partly English, each forming a city within a city. To this state of things Athelstan deemed it right to put a stop and to put the supremacy in the chief city of the western peninsula beyond a doubt. Exeter was a port which needed to be strongly fortified, and to be in the hands of none but what were thoroughly trustworthy. The British inhabitants were driven out, and to the confusion of those who say Englishmen could not put stones and mortar together

until a hundred and forty years later, the city was encircled by a wall of square stones and strengthened by towers, marking a fourth stage in the history of English fortification. If anyone asked him where the wall of Ethelstan was now he could only say that a later visitor to Exeter took care that there should not be much of it left for them to see. Still there were some small fragments, but suppose not a stone was left, yet as he understood evidence, the fact that a thing was recorded to have been destroyed was one of the best proofs that it once existed. The distinguishing point in this stage of the history of Exeter was this, that it alone of the great cities of Britain did not fall into the hands of the English invaders till after the horrors of conquest had been softened by the influence of Christianity. When Caer Wisc became an English possession there was no fear that any West Saxon prince should deal with it as Ethelfrith had dealt by Deva. When Isca was taken the West Saxons had ceased to be destroyers, and deemed it enough to be conquerors. Thus it was that Exeter stood alone as the one great English city which had lived an unbroken life from pre-English and even from pre-Roman days.

Whatever was the exact date when it became an English possession, it was with the driving out of the Welsh inhabitants under Ethelstan that it became purely English. As such it filled during the whole of the tenth and eleventh centuries a prominent place among the cities of England and a place altogether without a rival among the cities of its own part of the country. Later in the century the fortress by the Exe was the chief bulwark of Western England during the renewed Danish invasions of the reign of Ethelred. It was a spirit-stirring tale to read how the second millennium of the Christian era was ushered in by the record which told how the heathen host sailed up the Exe and strove to break down the wall which guarded the city, how the burghers bore up against every onslaught, and how they withstood the invaders. Exeter was saved, but the unready King had no help or reward for the men who saved it, and the local force of Devon and Somerset had to strive how they could against the full might of the invader, and the devastation of the land around followed at once upon the successful defence of the city. In the next year Exeter became part of the "Morning gift" of the Norman Lady, and Hugh, "The French Churl," as our chroniclers call him, was sent by his foreign mistress to command in an English city, and through his cowardice or treason Sweyn was able to break down and spoil the city. It was not clear whether all the walls were broken down then, but it was quite certain that sixty years afterwards, Exeter was strongly fortified according to the best military art.

After the city's capture by Sweyn nothing more was heard of it during the Danish wars, and the only further knowledge of it between the Danish and Norman invasions consisted of the foundation of the bishopric, and this was accompanied by several circumstances which marked it as an event belonging to an age of transition. It was among the last instances of one set of tendencies, among the earliest instances of another. The reign of Edward the Confessor was the last time (excepting the reign of Edward the Sixth) when two English bishoprics were joined together without a new one being formed to keep up the number. It had happened more than once in earlier times; it happened twice under Edward when the bishoprics of Devonshire and Cornwall were united, and those of Dorset and Wiltshire. But this also was the first instance of a movement for bringing into England the continental rule that the bishopric should be placed in the greatest city of the diocese.

The great ecclesiastical change of the eleventh century had carried him on beyond the great time which

stood out above all others in the history of Exeter, when they might say that for eighteen days Exeter was England. The tale of the great siege he had told elsewhere in full detail, and he would not tell it again now, but the story of the resistance of the western lands and their capital to the full power of the Conqueror, was one that never ought to pass away from the memories of Englishmen. The bravery of the inhabitants formed a tale which, even in that stirring time, spoke more than any other—save the tale of the great battle itself—to the hearts of all who loved to bear in mind how long and hard a work it was to make England yield to her foreign master. But whilst our hearts beat with those of the defenders of Exeter, yet we saw none the less now that it was for the good of England that Exeter fell. A question was here decided, greater than that whether Harold, Edgar, or William should reign—the question whether England should be one. When Exeter stood forward for one moment to claim the rank of a free, imperial city, and her rulers expressed themselves willing to receive William as an external lord, but refused to admit him within her walls as her immediate sovereign, they saw that the tendency was at work in England by which the kingdom of the continent was split up into loose collections of independent cities and principalities, and the path was opening by which Exeter might have come to be another Lubeck, the head of a Damonian house, another Bern, the mistress of the subject lands of the Western Peninsula. Such a dream might sound wild in our ears, and we might be sure that no such ideas were present in any such definite shape to the minds of the defenders of Exeter. But any such designs were probably just as little known to the minds of those who in any German or Italian city took the first steps in the course by which from a municipality, or less, the city grew into a sovereign commonwealth. Historically, the separate defence of Exeter was simply an instance of the way in which, after Harold was gone, England was conquered bit by bit. York never dreamed of helping Exeter, and Exeter, if it had the wish, had not the power to help York. But it was none the less true when we saw a confederation of western towns, with the great city of the district at their head, suddenly starting into life to check the progress of the Conqueror—we saw that a spirit had been kindled which, had it not been checked at once, might have grown into something, of which those who manned the walls of Exeter assuredly never thought. We could hardly mourn that such a tendency was stopped even by the arm of a foreign conqueror. We could hardly mourn that the greatness of Exeter was not purchased at the cost of the greatness of England. But it was worth while to stop and think how near England once was to running the same course as other lands. From the sacrifice of the general welfare of the whole to the greater brilliance of particular members of the whole, we had been saved by a variety of causes, and not the least of them by the personal character of a series of great kings working in the cause of national unity, from West Saxon Egbert to Norman William. The tendency of the patriotic movements in William's reign was to division; the tendency of William's own rule was to union. The aims of the Exeter patricians could not have been long reconciled with the aims of the sons of Harold, nor could the aims of either have been reconciled for a moment with those of the partisans of the Etheling Edgar, or of the Danish Sweyn. We sympathised with the defenders of Exeter, York, Ely, and Durham, but from the moment England lost the one man of her own sons who was fit to guide her, her best fate in the long run was to pass as an individual kingdom into the hands of the victorious rival.

With the subjection of Exeter by William might fairly be ended the tale of the place of Exeter in English history. It was then settled for Exeter that she was to be an English city—no separate commonwealth—a

member of the individual English kingdom, but still a city that was to remain the undisputed head of its own district. Its history from this time was less the history of Exeter than the history of those events in English history that took place at Exeter. It still had its municipal, ecclesiastical, its commercial history, but no longer a separate political being of its own. It was no longer an object to be striven for by men of contending nations, nor something that might be cut off from the English realm either by the success of a foreign conqueror or the independence of its own citizens.

In the other sense of the word, as pointing out those events of English history of which Exeter was the scene, the place of Exeter in English history was one which yielded to that of no other city in the land save London itself. It was with a true instinct that the two men who open the two great eras in local history—English Ethelstan and Norman William—both gave such special heed to the military defences of the city. No city in England had stood more sieges. It stood one, and perhaps two more, before William's own reign was ended—indeed before William had brought the conquest of the whole land to an end by the taking of Chester. The men of Exeter had withstood William as long as he came before them as a foreign invader; when his power was once fully established, when the Castle on the Red Mount held down the city in fetters, they seemed to have had no inclination to join in hopeless insurrections against him. When, a year and a half after the great siege, the Castle was again besieged by West Saxon insurgents, the citizens seemed to have joined the Norman garrison in resisting the attack. According to one account they had already done the like to the sons of Harold and their Irish auxiliaries. The wars of Stephen did not pass without a siege of Exeter, in which king and citizens joined to besiege the rebellious lord of Rougemont, and at last to starve him within the towers of which legend was already beginning to speak as the work of the Cæsars.

To pass to later times, the Tudor era saw two sieges of the city, one at the hands of a pretender to the crown, and another at the hands of the religious insurgents of the further West. Twice again in the wars of the next century Exeter passed from the one side to the other by dint of siege, and at the last she received an invader at whose coming no siege was needed. The entry of William the Deliverer through the Western Gate formed the balance—the contrast—to the entry of William the Conqueror through the Eastern Gate. The city had resisted to the utmost when a foreign invader, under the guise of an English king, came to demand her obedience. But no eighteen days' siege, no blinded hostages, no undermined ramparts were needed when a kinsman and a deliverer came under the guise of a foreign invader. In the army of William of Normandy Englishmen were pressed to complete the conquest of England, but in the army of William of Orange, strangers came to awake her sons to begin the work of her deliverance. In the person of the earlier William the Crown of England passed away for the first time to a king wholly alien in speech and feeling; in the later William it in truth came back to one who was even in mere descent, and yet more fully in his native land and native speech, nearer than all that came between them to the old stock of Hengist and Cedric. The one was the first king who reigned over England purely by the edge of the sword, the other the last king who reigned over England purely, by the choice of the nation. The coming of each of the men who entered Exeter in such opposite characters marked an era in our history. The unwilling greeting which Exeter gave to the one William and the willing greeting which she gave to the other, marked the wide difference in the external aspect of the two revolutions. And yet both revolutions had worked for the same end; the great actors in both were, however unwittingly

fellow workers in the same cause. It was no small place in English history which belonged to the city whose name stood out in so marked a way in the tale alike of the revolution of the eleventh and the seventeenth centuries. It was no small matter, as we drew near by the western bridge or the eastern isthmus, as we passed where once stood the eastern and the western gates, as we trod the line of the old Roman streets, to think that we were following the march of the Conqueror and the Deliverer; it was no small matter, as we entered the minster of Leofric, Warlewast, and Grandison, to think that the *Te Deum* was there sung alike for the overthrow of English freedom and for its recovery. It was no mean lesson if we had to connect with the remembrances of this ancient city—among so many associations of British, Roman, and English days—the thought that rose above all the rest, the thought that there was no city in the land whose name marked a greater stage in the history of the Conquest of England, that there was none whose name marked a greater stage in the history of her deliverances.

NOTES

FOREIGN honours have been recently falling in showers on the heads of English scientific men. Not long ago the Emperor of Brazil nominated as Knights of the Imperial Order of the Rose, the following gentlemen:—Sir G. B. Airy, Dr. Warren De La Rue, Dr. Birch, Prof. Abel, Major Moncrieff, Capt. Andrew Noble, and Mr. J. Norman Lecky. The other day, King Oscar II. of Sweden, at his coronation at Stockholm, marked his appreciation of the services rendered by science by conferring distinctions on several men of learning, both Swedes and foreigners. Among the latter were the following eminent scientific men of this country:—Sir Charles Lyell and Sir George B. Airy, named Commanders of the First Class of the Order of the Polar Star; and Professor John Tyndal, Professor Thomas Henry Huxley, and the Director of the Botanical Gardens at Kew (Dr. Joseph Daiton Hooker), named Knights of the same Order.

WE understand that one of the evening discourses at the meeting of the British Association next month will be delivered by Prof. W. C. Williamson, of Manchester, on "Coal and Coal Plants." It is also hoped that Prof. Clerk-Maxwell will deliver a discourse on "Molecules." Several papers on subjects of local interest have also been promised. The following is a list of the vice-presidents and other officers of the Association, the president-elect, as we have already announced, being Prof. A. W. Williamson, F.R.S.:—Vice-Presidents elect: the Earl of Rosse, F.R.S.; Lord Houghton, F.R.S.; W. E. Forster, M.P.; the Mayor of Bradford; J. P. Gassiot, F.R.S.; Prof. Phillips, F.R.S.; John Hawkshaw, F.R.S. Local Secretaries for the meeting at Bradford: the Rev. J. R. Campbell, D.D.; Mr. R. Goddard; Mr. Piele Thompson. Local Treasurer for the meeting at Bradford: Mr. Alfred Harris, jun. General Secretaries: Capt. Douglas Galton, C.B. R.E. F.R.S., Dr. Michael Foster, F.R.S., Trinity College, Cambridge. Assistant General Secretary: George Griffiths, M.A. General Treasurer: William Spottiswoode, F.R.S. Auditors: John Ball, F.R.S.; J. Gwyn Jeffreys, F.R.S.; Colonel Lane Fox, F.G.S. The sections are the following:—A, Mathematical and Physical Science.—President: Prof. Henry J. Stephen Smith, F.R.S. Vice-Presidents: Prof. Balfour Stewart, F.R.S., and Prof. Henrici. Secretaries: Prof. W. K. Clifford, M.A.; J. W. L. Glaisher, Prof. A. S. Herschel, and Prof. Forbes. B, Chemical Science.—President: Dr. W. J. Russell, F.R.S. Vice-Presidents: Prof. Roscoe and I. Lowthian Bell. Secretaries: W. Chandler Roberts, F.C.S.; Dr. Armstrong; and Prof. Thorpe. C, Geology.—President: Prof. Phillips, D.C.L. Vice-President: W. Pengelly

Secretaries: Louis C. Miall; William Topley, F.G.S.; R. Tiddeman, D, Biology.—Vice-Presidents: Dr. Beddoe and Prof. Rutherford, M.D. Department of Zoology and Botany.—Secretaries: Prof. Thiselton-Dyer and Prof. Lawson. Department of Anatomy and Physiology.—Secretaries: E. Ray Lankester and Dr. Pye-Smith. Department of Anthropology.—Secretaries: F. W. Rudler, F.G.S., and J. H. Lamprey. E, Geography.—President: Sir Rutherford Alcock. Vice-Presidents: Major-Gen. Sir Henry Rawlinson and John Ball. Secretaries: H. W. Bates, F.R.G.S.; Keith Johnston, F.R.G.S.; and Clements R. Markham, C.B., F.R.S. F, Economic Science and Statistics.—President: Mr. W. E. Forster, M.P. Vice-Presidents: Dr. Farr; Lord Houghton, F.R.S.; E. Baines, M.P. Secretary: J. G. Fitch, M.A. G, Mechanical Science.—President: W. Froude, LL.D. Vice-President: A. Bessemer. Secretaries: H. M. Brunel; J. N. Shoolbred; H. Bauerman.

ON Tuesday the forty-first annual meeting of the British Medical Association was opened in King's College, London, the large hall of which was crowded on the occasion of the general assembly, at 3 o'clock. The General Meeting was presided over by Mr. A. Baker, surgeon to the General Hospital, Birmingham, and president of the Association. After the retiring president had addressed the meeting, Sir W. Fergusson took the chair as president of the Association for the coming year, and read an address of considerable length. It was difficult in the present time, he said, for a president of an association like that to find a suitable subject for an address, as, whatever topic he started with he was immediately surrounded with so many specialists, who of course knew everything better than himself, that he did not know where to stand. The president then entered at much length on the subject of the valley of the Thames and the importance of pure water in a hygienic sense. He suggested that, without having recourse to the expensive process of going to the lakes of Cumberland and Westmoreland for a supply of pure water, there were many streams and rivulets and water sheds where the waters could be confined in lake above lake, and utilised for the supply of London and the large towns. In the evening the Lord and Lady Mayoress held a reception at the Mansion House, which was attended principally by medical gentlemen and their wives and daughters. More than 3,000 were received during the evening.

AMONG the distinguished foreigners now attending the meeting of the British Medical Association in London, may be mentioned—Professors Virchow, Oscar Liebreich, and Baron von Langenbeck, of Berlin; Prof. Busch, of Bonn; Prof. Marey, of Paris; Prof. Chauveau, of Lyons; Prof. Spiegelberg, of Breslau; Prof. Lazarewitch, of Charkow; and Dr. Fordyce Barker, of New York.

ON Monday, the annual meeting of the Cambrian Archæological Association was opened at Knighton, Radnorshire. This Association was established some thirty years ago for the purpose of investigating and preserving the objects of antiquity which abound in the Principality. The first Congress was held at Aberystwith, and the present is the 28th of the series. The President for the past year was Sir J. Russell Bailey, M.P., and the President-elect is the Hon. A. Walsh. The week's programme opened on Tuesday night with the annual meeting and reception of report, after which the President for the year, Sir J. R. Bailey, was to resign the chair to his successor, the Hon. A. Walsh, who was to deliver the inaugural address. The rest of the week will be occupied with excursions, and meetings for the reading of papers.

MR. G. KITCHENER has been elected to the headmastership of the High School, Newcastle-under-Lyne, Staffordshire, in the middle of the Potteries. It is to be the first "First Grade" established as a semi-classical school (*i.e.* without Greek in the