watered. Annatto openly accomplishes the first, nature has no occasion to be ashamed of the second, nor an exhausted cow of the third.

There is reason to hope the time is not far off when it may be said of town milk-supplies that if we will only do our part in taking care of the pence, the pounds may safely be trusted to take care of themselves. And if we have no justification for the comparatively hard service still required of milk, we may at least allow it a precedent dating from a time even earlier than that at which any land can have "flowed with milk and honey."

ARTIFICIAL PRODUCTION OF DIAMONDS

GLASGOW seems determined to have the honour of producing the diamond artificially. In spite of Mr. Mactear's recent failure, Mr. J. B. Hannay, whose paper on the solubility of solids in gases we published not long ago, has been utilising the method indicated in that paper in experiments on the artificial production of the diamond. Mr. Hannay reads a paper on the subject at the Royal Society to-night, and any remarks on his work we shall postpone for the present. Meantime from the letters and articles that have appeared in the papers, we may form some idea of what has been done. Prof. Story Maskelyne, writing to the *Times*, says :—

writing to the *Times*, says :--"A few weeks since I had to proclaim the failure of one attempt to produce the diamond in a chemical laboratory. To-day I ask a little space in one of your columns in order to announce the entire success of such an attempt by another Glasgow gentleman. That gentleman is Mr. J. Ballantine Hannay, of Woodbourne, Helensburgh, and Sword Street, Glasgow, a Fellow of the Chemical Society of London, who has to day sent me some small crystallised particles presenting exactly the appearance of fragments of a broken diamond. In lustre, in a certain lamellar structure on the surfaces of cleavage, in refractive power, they accorded so closely with that mineral that it seemed hardly rash to proclaim them even at first sight to be diamond. And they satisfy the characteristic tests of that substance. Like the diamond, they are nearly inert in polarised light, and their hardness is such that they easily scored deep grooves in a polished surface of sapphire, which the diamond alone can do. I was able to measure the angle between the cleavage faces of one of them, notwithstanding that the image from one face was too incomplete for a very accurate result. But the mean of the angles so measured on the goniometer was 70 deg. 29 min., the correct angle on a crystal of the diamond being 70 deg. 31 7 min. Finally one of the particles, ignited on a foil of platinum, glowed and gradually disappeared exactly as mineral diamond would do. There is no doubt whatever that Mr. Hannay has succeeded in solving this problem and removing from the science of chemistry an opprobrium so long adhering to it; for, whereas the larger part of the great volume re-cording the triumphs of that science is occupied by the chemistry of carbon, this element has never been crystallised by man till Mr. Hannay achieved the triumph which I have the pleasure of recording to-day. His process for effecting this transmutation, hardly less momentous to the arts than to the possessors of a wealth of jewellery, is on the eve of being announced to the Royal Society."

The Glasgow Herald, in referring to Mr. Hannay's discovery, states in a general way that his process "involves the simultaneous application of enormous pressure—probably many tons on the square inch of surface within the apparatus—and a very high temperature, ranging up to a dull red heat. It may be said that the process is the outcome of a thoroughly scientific investigation into the subject of solution, and not a 'happy-go-lucky' hit. We understand that hydrocarbon compounds have been used in the process, but we have some hesitation in concluding that the crystalline carbon is of necessity obtained

by the dissociation of those compounds; by and by, however, that point will doubtless be satisfactorily established. So far as we can learn, Mr. Hannay's experiments were not all successful, there being, it is said, far more failures than successes; the latter, however, occurred near the end of the series, thus showing that the operator had become familiar with the conditions under which the dissociation of the carbon was effected, and its subsequent deposition in the crystalline form. It would seem that up to the present only very small crystalline particles have been obtained, and hence the process must be an exceedingly expensive one to produce a real gem; something like spending 52. to get 5s, to speak roughly."

thing like spending 5% to get 5%, to speak roughly." Prof. Roscoe, writing to the *Times*, states that the use of his name as having accepted Mr. Hannay's discovery as an accomplished fact has not been authorised by him, and that the evidence yet submitted to him by Mr. Hannay is insufficient, in his opinion, to establish so important a conclusion.

THE HISTORY OF WRITING¹

THE new alphabet eventually made its way from the Delta to the old home of the Phœnicians on the coast of Palestine. Already in the time of David the Syrians had their historians and state annals, and Hiram of Tyre, we are told, wrote letters to King Solomon. The Phœnician alphabet, as we may now call it, was communicated to the Israelites along with other elements of culture, and the neighbouring populations of Edom, of Ammon, and of Moab received it at the same time. Names had already been given to the letters, derived from Phœnician words which began with the several letters of the alphabet, a, for instance, being called aleph, "an ox," b, bêth, "a house," and so on. In this way the meaning of each letter was the more easily impressed upon the memory of the Phœnician schoolboy, just as in our own nurseries it used to be thought that we should have less difficulty in learning our alphabet if we were taught that "A was an archer who shot at a frog," than if we were simply told that A was A. Names and letters alike were imported into the countries that adjoined Phœnicia, and in course of time inscriptions in the new characters were engraved upon stone, as well as painted on the more perishable materials of papyrus or bark. The earliest monument of the Phœnician alphabet that has come down to us is the famous Moabite Stone, discovered a few years ago on the site of Dibon, which records the conquests and buildings of King Mesha, the contemporary of Ahab. The forms assumed by the characters upon this stone must have been the same as those employed by the Jewish prophets when writing down their prophecies or recording the history of their times.

Meanwhile the northern neighbours of the Phœnicians, who lived on the shores of the Gulf of Antioch, had been venturing on trading voyages into the far west and carrying with them a knowledge of the alphabet along with the wares and pottery of the East. They had found the inhabitants of Asia Minor and the adjacent islands in possession of a syllabary, the origin of which is still a puzzle, but as they pushed further westward into the islands of the Ægean and the harbours of Greece, they discovered a people wholly illiterate and unacquainted even with the rudiments of picture-writing. Amongst this people whom we now term Greeks, they soon established colonies, the most important being at Thebes, and in the islands of Melos and Thera. The island of Thera was probably the first spot on European soil where words were translated into written symbols. The earliest Greek inscriptions, it is believed by competent authorities, belong to Thera, and Leaves at the Leader Leavier to be Prof. A. H. Saves

Lecture at the London Institution, February 12, by Prof. A. H. Sayce. Continued from p. 380.

the alphabet of these inscriptions is the oldest alphabet of which we know. The forms of the characters in it bear so close a resemblance to those on the Moabite Stone as to justify us in concluding that the parent-alphabet from which those of Thera and of Moab were both derived, was the same, and that the date of the inscriptions of Thera was not far distant from that of the inscription of King Mesha. In this case the alphabet would have been introduced into Greece in the ninth century B.C.

The Greeks themselves believed that the old Phœnician colony in Bœotian Thebes was the source and centre from which the alphabet was spread throughout the country. Kadmus, "the Eastern," for such is the meaning of his name, was its mythical inventor, though later legends told how the crafty Palamedes and the poet Simonides subsequently added fresh letters. But these legends are all the fables of the literary age; the kernel of truth they contain is the fact that the Greek alphabet came from Phœnicia. It is a fact, indeed, to which the word *alphabet* itself still bears witness; *alphabet*, or *alpha*, *beta*, the two first letters of the alphabet, are both, as we have seen, Phœnician words. It would be tedious and unnecessary to follow out the

It would be tedious and unnecessary to follow out the fortunes of the alphabet when once it had made good its settlement on European soil. The forms, and in some cases the values, of the characters gradually changed, and many of them underwent particular modifications in different parts of the Greek world. A little practice enables us at once to determine, by merely looking at the forms of the letters, to what special branch of the Greek race an inscription belongs.

Like the Phœnicians before them, the Greeks repaid the benefit they had received by handing on their alphabet to nations still further west. The Greek colonies in Sicily and Southern Italy being mostly of Doric descent, brought with them the Doric alphabet, and accordingly the natives of Southern Italy, when they first began to write, used the Doric alphabet of their Greek neighbours. Hence it is that the Latins and ourselves after them attach a tail to the letter R, which was wanting in the old alphabet of Phœnicia; hence, too, we have inherited from the Romans the letter Q, which had been lost in all the Greek alphabets except that of Dorian origin. On the other hand, the Etruscans, that mysterious people of Northern Italy, who exercised so profound an influence upon the infant civilisation of Rome, learnt the art of moulding and decorating vases from the potters of Athens, and since the latter were in the habit of inscribing the names of the gods and heroes they depicted above the representations of them the Etruscans learnt at the same time the Old Attic or Ionic alphabet. We need only place the alphabets of Etruria and Athens side by side to be convinced of this fact. R, for instance, is represented in both by the tailless P, we look in vain in both for a Q, and the two distinct symbols that once stood for the gutturals c and k are amalgamated into one. Alphabets, like words, if rightly questioned, can be made to tell their own history as well as that of the people who employed them.

The alphabets of Western Europe are the lineal descendants of that of Rome. Our capital letters are identical with those inscribed on the monuments of the Eternal City, and we can trace by the help of contemporaneous documents the successive changes which have transformed these capitals into the smaller type of the printing-press or the letters of our running-hand. Thus A became A, A, a on the one side, and A, a on the other, while δ and b can be followed back to B through the intermediate stages B, B, b, δ , and δ .

But in borrowing or deriving an alphabet from another people one great difficulty has always to be encountered. The pronunciation of no two peoples is exactly the same, nay, generally speaking, it differs very widely. Consequently

the sounds attached by the one people to the letters of their alphabet will not in all cases agree with those attached to the same letters by the other. It will often happen, moreover, that sounds will be wanting in one language which are common in another. In borrowing an alphabet, therefore, it will be necessary to do more than simply transfer it; it must be adapted just as the pronunciation of French words like Paris or Marseilles has been adapted to the genius of English pronunciation. New sounds have to be given to the old letters, new letters have to be invented or formed out of old ones, while some of the old letters may be dropped altogether. It is not often, however, that an alphabet has been adopted and adapted in so scientific a manner as to make it express even approximately all the varieties of sound peculiar to the language of the borrowers. Generally speaking, the adaptation has been of a rough-and-ready kind, and those who use it have been contented if the words they utter are made fairly intelligible when written Often, too, the alphabet has not been consciously in it. and deliberately introduced among an illiterate people or a race which has hitherto employed a different mode of writing. Most of our West-European alphabets have gradually grown into what they are through the slowlyworking force of time and circumstances and the successive attempts of individuals to improve them. We cannot say, for instance, with any real truth, that our English alphabet has been borrowed and adapted in the same sense in which it has itself been borrowed and adapted for representing the sounds of a Polynesian dialect. From the time that it was first introduced into these islands under the form of the so-called Anglo-Saxon alphabet it has had a continuous history, a history of slow and sometimes almost imperceptible change and development, which, if allowed to have gone on without check and hindrance, would have resulted in a tolerably serviceable instrument for representing and recording our words. But unfortunately its natural development was suddenly checked nearly 400 years ago by the invention of printing. The necessities of the printing-press stereotyped the alphabet and spelling of the time with all their imperfections, and, what is more, stereotyped the pronunciation of words which that spelling endeavoured to symbolise. It was in vain that a healthy spirit of independence long continued to prevail among that large section of educated Englishmen who were neither printers, authors, nor schoolmasters, and that as late as the end of the last century it was considered no disgrace for a cultivated member of the aristocracy to spell in any way he might think fit. We have only to examine the original manuscripts left by some of the most distinguished Englishmen of the eighteenth century to discover that they were still able to assert the liberty of private spelling against the tyranny of the printing-press.

For a language and its pronunciation must change from generation to generation in spite of all the efforts of printers and pedants to put them into a straight waistcoat. We have only to use our ears to perceive that the pronunciation of cultivated English is even at the present moment slowly but surely undergoing alteration. I wonder how many here this evening still cling like myself to the old pronunciation of *either* and *neither*, and have not yet passed over to the ever-multiplying camp of those who change the pure vowel of the first syllable into a diphthong, or agree with the poet-laurate in accenting *con-template* and *retinue* after the fashion of our grandfathers? So long as a language lives it must grow and change like a living organism, and until this fact is recognised by our schoolmasters, our boys will never realise the true nature of the language they speak and the grammar they learn in childhood. The change that has passed over the pronunciation of English since the days of Shakspeare is greater than can be easily conceived. Were he to come to life again among us, the English that we speak would be almost as unintelligible to him as an Australian jargon, in spite of the fact that our vocabulary and grammar differ but slightly from his. But a familiar word sounds strangely when its pronunciation is altered ever so little, and when the outward form of a whole group of words is thus changed, the most skilled philologist would find himself at fault.

Can anything, therefore, be more absurd than an endeavour to mummify an extinct phase of pronunciation, especially when the mummy-shroud was at its best but a rude and inadequate covering which pourtrayed but faintly and distantly the features of the corpse beneath? English spelling has become a mere series of arbitrary enigmas, an enshrinement of the wild guesses and ety-mologies of a pre-scientific age and the hap-hazard caprice of ignorant printers. It is good for little else but to disguise our language, to hinder education, and to suggest false etymologies. We spell, we know not why, except that it is so ordained in dictionaries. When Voltaire was told that $a \cdot g \cdot u \cdot e$ was pronounced *ague*, and $p \cdot l \cdot a \cdot g \cdot u \cdot e p lague$, he said he wished the *ague* would take one-half the English language and the *plague* the other half; but the fault lay not with the English language, but with English spelling.

Ignorance is the cause of our bad spelling as it is the cause of most of the mischiefs which afflict the world. The brief sketch of the history of writing we have been studying to-night has shown us the goal at which writing should aim, the end in which the labours of previous generations should find their fulfilment. Writing should represent clearly, tersely, and as nearly as possible the individual sounds of words, and unless it does this it has not advanced much beyond those infantile stages of growth through which we have watched it struggling to pass. The principal sounds of a language should each have a special symbol set apart to denote them, and each symbol should denote one sound, and one sound only. We ought never to hesitate for a moment over the pronunciation of a proper name or a word we have never heard pronounced. Until we have an alphabet which fulfils these conditions, our system of writing is still imperfect and misleading, and our civilisation on this side is less advanced than that of the ancient Hindus. We may well envy the rude races of the Pacific or Southern America, for whom the missionaries have provided adequate and rational alphabets in which to write their first essays in literature. An alphabet which allows us to express the sound of e in thirteen different ways, which has no special symbols for such common sounds as th in then or a in man, and yet possesses otiose and needless letters like c and x is unworthy of its name, and still more of being the final result of all that toil and thought which first worked out the Phœnician alphabet and then fitted it to express the idioms of Athens and Rome. We are sometimes told that to reform our alphabet would destroy the etymologies of our words. Ignorance, again, is the cause of so rash a statement. The science of etymology deals with sounds, not with letters, and no true etymology is possible where we do not know the exact way in which words are pronounced. The whole science of comparative philology is based on the assumption that the ancient Hindus and Greeks and Romans and Goths spelt pretty nearly as they pronounced, in other words were the happy possessors of real alphabets. It lies with ourselves to determine whether we, too, shall be equally happy. The spread of education which we are witnessing, and the general interest taken in it, afford an exceptionally favourable opportunity for breaking the yoke of bondage in which the printers have kept us. If our board-schools are to be tied down to the particular mode of spelling advocated by Walker or some other maker of unscientific dictionaries, the opportunity will have been lost, and the yoke of bondage will be bound more tightly round the

necks of our children than it is even round our own. I know the practical difficulties that lie in the way of reform, but I know also that they are not insurmountable. Too often the difficulty is but an excuse for our own lazy disinclination to go to school again and learn to read English in a new way. But it is not by laziness, by shrinking from trouble and exertion, that England has gained the place it now holds among the nations of the world, and the value of a thing is measured by the labour it demands to achieve it. After all, the introduction of a new alphabet is not much to ask for. It is no more than was asked for and obtained by the old Phœnicians of the Delta, by the Greeks, by the Romans, nay, by our own ancestors also. And many of them, too, had to give up their cherished idols before they could accept it; I fancy it must have cost the Anglo-Saxon cutter of runes as hard a struggle to adopt the new-fangled alphabet of the Roman missionaries as it may cost some of us to give up the alphabet of the printers for one which would fitly express our own splendid inheritance of speech. But let there be no mistake upon the matter; it is not a reformed spelling, as is often erroneously and injudiciously said, but a reformed alphabet that is required. We cannot work to good purpose with imperfect and worn-out instruments. High farming needs steam-ploughs, and not the primitive instrument of the Egyptian peasant. If the history of writing has taught us anything, it is that writing is perfectible, and that what was done in old days by those whose civilisation we are apt to consider inferior to our own can be done also by ourselves.

NOTES

At the annivercary meeting of the Geological Society on Friday the Wollaston medal was assigned to M. A. Daubrée, of Paris, and the Wollaston fund to Mr. Thomas Davis, of the British Museum. The Murchison medal and fund were presented to Mr. R. Etheridge, F.R.S., Palæontologist to Her Majesty's Geological Survey and the School of Mines; the Lyell medal to Mr. J. Evans, LL.D., F.R.S.; and the Lyell fund to Prof. Quenstedt, of Tübingen, on whose behalf it was acknowledged by Prof. H. G. Seeley, F.R.S.

M. HERVÉ-MANGON has been appointed director of the Paris Conservatoire des Arts et Métiers, in succession to General Morin.

MM. ANTOINE BREGUET, son of the celebrated member of the Institute, and Richet have taken the joint direction of the *Revue Scientifique*, the largest and most influential French scientific reviolical. M. Antoine Breguet will write more specially on physics, and M. Richet on chemistry. It is understood that M. Alglave, the former editor, has resigned in order to devote himself more entirely to the propagation of Spencerism and Monism.

M. LŒWY, sub-director of the Observatory of Paris, is conducting very delicate researches for determining the different flexions arising from the weight of meridian instruments when they are pointed in any other position than the zenith. The study of these small differences is conducted on a new principle invented by M. Lœwy. A biconcave lens has been placed in the central part of the instrument, and arranged so that an image of the spider-thread can be placed in coincidence with the threads in a certain position. In moving the instrument the coincidence is destroyed, and can be re-established by the micrometer. The image of the threads can be seen (1) with the eyepiece reflected on the edges of the lens illuminated through the axis by a lamp placed as usual, (2) by the anterior part of the lens illuminated by a lamp placed in front of the eyepiece, (3) by a reflection on the object-glass. The sensibility of the process is so extraordinary that a difference was found when a weight of ten kilogs. was suspended at each end of the instru-