BUILDING-STONES OF EAST TEXAS.

IT is generally supposed that building-stones are very rare in eastern Texas, and that nothing harder than a clay or sand bed is to be found. This is far from true, according to R. A. Penrose, jun., in the Texas *Geological and Scientific Bulletin* for March, as there are found in many of the eastern counties rocks which combine variety and beauty with strength and durability. The sandstones are the most important; the limestones, though equally serviceable, being less widely distributed.

The State Penitentiary, at Rusk, is built of a yellow sandstone composed of grains of silicious sand and altered greensand. It is of a yellow color, easily cut, and occurs near the penitentiary in a bed about twelve feet thick. This Claiborne greensand itself is also used extensively for building chimneys and foundations, and in many cases it might be used for more extensive structures. It is found in many places in the form of a yellow indurated mass, the color being due to the alteration of the greensand. It is also found of a green color and a compact clayey consistency. Both these varieties are found in many places of sufficient strength to prove of considerable value in building, though they are generally soft and crumbly.

Near Alto, in Cherokee County, and elsewhere, is found a white sandstone, very tough, hard, compact, and durable. It is in some places slightly colored by oxide of iron, but in others is of a pure snow-white. It occurs in a bed capping the Claiborne marls, and varies from one to three feet in thickness. This would prove a most serviceable rock for building-purposes; and where it preserves its white color, without blotches from iron, it is by far the most beautiful rock in eastern Texas. It has as yet been but little used, but, with the rapid start in the development of its resources that eastern Texas is taking, it is bound to find the place it deserves among the stones of the State. A variety of it from five miles west of Jacksonville is said to have been used with great success for mill-stones. It is also found in other places.

Brown sandstones of variable composition and hardness are found in many places, and are the most generally distributed, and consequently most important of the East Texas building-stones. They occur in many localities, and vary from a light brown, soft and easily cut rock, to a hard flinty variety of a dark-brown color. The beds are from one to over fifteen feet thick, lie horizontally, and are usually found capping knolls or hills. They are sometimes the result of induration by the agency of oxide of iron, of quaternary sands, and at others the result of a similar change in eocene sands. The source of the iron solutions which caused this cementing action has been the oxidation of pyrites in the bed, or of ferruginous solutions percolating through the bed and derived from the decomposed pyrites in associated beds, such as pyritiferous lignites, greensands, and clays.

The limestone of Scott's quarry, in Smith County, is a hard, tough, compact gray rock, excellently adapted for building-purposes, and of great durability.

TEXAS ASPHALTUM.

THE absolute need of material suited for serviceable pavements is well known and fully appreciated all over the State of Texas. In some of the principal cities there have been considerable bodies of pavements laid with asphaltum brought from Trinidad, by mixing it with a certain amount of calcareous matter, and heating it to such a point that it would harden on cooling. This is done to imitate the natural mixture of limestone and bitumen found in the deposit of Val-de-Travers, of which the best French pavements are made. Dr. Ure, speaking of these two materials, says: "Bitumen alone is not so well adapted for making a substantial mastic as the native compound of bitumen and calcareous earth, which has been properly called asphaltic rock, of which the richest and most extensive mine is that of Val-de-Travers. The calcareous matter is so intimately combined and penetrated with the bitumen as to resist the action of air and water for any length of time. It would indeed be a difficult matter to combine, by artificial methods, calcareous earth thus intimately with bitumen; and for this reason the mastics made in this way are found to be much more perishable." In these deductions he is fully borne out by the experience of those using the two materials throughout Europe, and even in this country.

Among the specimens collected by Col. J. L. Tait, on his trip to South-west Texas last November, was a small piece of a dark-blue limestone thoroughly impregnated with bitumen. The rains were so continuous, however, that no detailed examination could be made, but later it was found that the quantity is equal to all demands; and a somewhat larger specimen was obtained and subjected to analysis, with the result of proving it almost identical in composition with that of the Val-de-Travers, as will be seen by the following: — Val-de-Travers: bitumen, 20 per cent; limestone, 80 per cent. Uvalde County: bitumen, 20.35 per cent; limestone, 79.65 per cent.

This, E. T. Dumble, in a communication to the Texas *Geological and Scientific Bulletin*, thinks will prove to be of great and lasting benefit to the State. In addition to this, many deposits of bituminous sands or shales occur which yield ten per cent, and sometimes a larger amount, of bitumen.

EXPLORATION IN MEXICO.

IN the winter of 1887–88, Dr. Ed. Seler undertook a journey to Mexico to pursue archæological researches. A preliminary report of his expedition is given in the "Proceedings of the Royal Geographical Society," from which we learn that he devoted himself principally to researches in the country of the Huaxteca and Zapoteca. The important result of his journey is the demonstration of the fact that the apparent and supposed fundamental difference between the Aztec hieroglyphics and the Maya manuscripts does not exist. Dr. Seler, starting from the capital, first visited the Huaxteca Indians. Their territory is an extensive forest country. The fertile mountain slopes and river lowlands are everywhere clothed with luxuriant tropical forest, in which fig-trees, and, as underwood, bamboos, are conspicuous. The open valleys and the high ridges which extend between the river-courses are covered with either thin or thick forests of fan-palms. In the clearings, tall, many-colored grasses and mimosa-bushes cover the ground.

The principal villages are situated along the river-courses and upon the plateaus between the rivers. Numerous small ranches are scattered through the woods. The inhabitants are principally engaged in cattle-raising; horses, oxen, and mules living out in the forest, and being driven into the corrals only once a year. The capital draws its chief supply of meat from this province, the cattle being driven to Pachura, whence they are conveyed by rail to the city. Agriculture is carried on only to a very limited extent; and it is a significant fact that this country, which might supply half of the whole republic of Mexico with corn, imports this very article from the United States. There are no irrigation-works, by means of which the destructive effects of droughts might easily be obviated. The Indians grow corn, black beans, and pepper, and make brown sugar and smoked bananas. They manufacture mats from palm-leaves and agave fibre. Candles are made from the plentiful supply of tallow obtained from the cattle. The principal imports are coarse calicoes, ribbons, beads, cheap articles of finery, harnesses, hardware, liquor, and petroleum. There are only very few people who can read and write. Their amusements consist in fandango-like dances, cock-fighting, and horse-racing.

The roads are mere trails cut through the forests, which, in bottom-lands and at river-crossings, are often exceedingly difficult, and impassable to all but native horses. The customary house in the country is the *jacal*, or thatched house (from the Aztec *xacalli*), the walls of which are constructed of bamboo sticks tied together with *Ficus angelica*; while the roof is made of the leaves of the fan-palm neatly plaited, and is absolutely water-tight. In the larger villages there are also houses built of white bricks.

The principal articles of food are black beans, coffee, and cakes of ground corn without salt, — the so-called *tortillas*, which are always eaten hot and fresh. There are no inns, and the traveller has to rely on hospitality.

The antiquities of the country do not consist of such great pyramids as those of Xochicalco, or the palace of Palenque, but they possess a peculiar style of their own, and afford important material for reconstructing the ancient history of Mexico. They are difficult to find, for since the days of Cortes the primeval forest has completely covered and buried them. The houses of the ancient inhabitants stood upon raised foundations, consisting of small pyramids of regularly hewn stones. Among these heaps of stones the largest trees of the virgin forest have expanded, and separated the stones from one another. During the construction of railways, a large number of these pyramids were opened; and in this way a quantity of household furniture has been found, especially painted pottery, and statuettes of beautiful forms, and made of excellent material. The tropical rains also bring to light many objects of the same kind.

Dr. Seler then visited the territory of the Zapotecas, in the state of Oaxaca. The condition of this region is considerably more advanced than that of the country of the Huaxteca. The land is richer and better cultivated, the villages better built. Intellectually it is the most advanced state of the republic. The numerous valleys which cut into the high lands, and the numerous rivers which have to be crossed, present special difficulties to the development of trade and commerce. In many cases the river-bed itself forms the road; and in the rainy season, from August to October, intercourse is often interrupted for months at a time.

The territory of the Zapotecas is the land of mounds and bastions. These have partly served as fortifications, partly as tombs, many of which remain to be opened, for the law which prohibits the exportation of antiquities is only too well calculated to discourage explorers. Here Dr. Seler discovered numerous inscriptions and important paintings which had escaped the notice of former observers. The hieroglyphics discovered on the national sanctuaries of the Zapotecas may, should they be completely deciphered, afford a key to the proper understanding of the connection between the Maya and Aztec civilizations.

HEALTH MATTERS.

Baking-Powders.

PROFESSOR J. W. MALLETT of the University of Virginia has recently made a series of experiments with alum baking-powders, and studied effects upon digestion of the residues left therefrom in bread. A full report has been published in the *Chemical News*. He says that it has been almost universally conceded that alum itself, when added singly to bread or other food, is positively injurious to health; and that its use, even in the small proportion sometimes employed to improve the appearance of bread made from unsound or inferior flour, must be regarded as reprehensible. But since the extensive introduction, in the United States, of baking-powders made with alum and bicarbonate of soda, there has been much dispute as to the harmlessness or harmfulness of the substances which are left in bread made with such powders after the mutual re-action of their constituents and the completion of the baking process.

It has been claimed, by those who advocate the use of cheap baking-powders made with alum as one of the ingredients, that as soon as the mixture of alum (usually first deprived, by heating, of the whole or much the greater part of its water of crystallization, — so-called "burnt alum") and bicarbonate of soda is moistened, as in working it up with flour to form dough, the aluminum sulphate is decomposed, sodium sulphate being formed, with which there also remains sulphate of ammonium or potassium, as ammonia or potash alum has been used; and the aluminum assumes the form of aluminum hydroxide, insoluble in water, and therefore supposed to be inert and harmless in the stomach and alimentary canal. It has been noticed that the aluminum is also partly converted into phosphate in presence of the phosphates naturally occurring in flour, and this has been also taken to be insoluble and inert. It has been further claimed, that, at the temperature of the baking-oven, aluminum hydroxide is itself decomposed, water being given off, and the highly insoluble aluminum oxide, or alumina, left behind, to be discharged from the intestines as might be so much clay or other harmless and indifferent matter.

On the other hand, it has been asserted, by some of those who oppose the use of alum in baking-powders, that the decomposition is not, or may not be, complete, and in any case, that, as all of the constituents of the alum remain in the bread, the action upon the human system must be essentially the same as if the alum itself remained intact.

In the discussion of the effects on health of the residual substances left in bread made with alum baking-powders, there has been a good deal of loose argument, based upon data which were either merely assumed as probable, or were too imperfectly supported by actual experiment. In such experiments as have been hitherto recorded, bearing directly on the question, there are many points left in an indeterminate state, and calling for further investigation in order to clear them up and admit of an impartial conclusion being reached. The work undertaken by Professor Mallett was with a view to furnish some more exact and satisfactory evidence of the kind required for the purpose of reaching such a conclusion.

In the examination, twenty-seven samples, representing seventeen brands, were analyzed. Nearly all contained as their acid ingredient a mixture of alum and acid phosphate of calcium ("superphosphate"). All contained as the alkaline ingredient acid carbonate of sodium ("bicarbonate of soda"). After a most thorough and painstaking inquiry into the whole subject, he reached the following conclusions: 1. The greater part of the alum baking-powders in the American market are made with alum, the acid phosphate of calcium, bicarbonate of sodium, and starch; 2. These powders, as found in retail trade, give off very different proportions of carbonic-acid gas, and therefore require to be used in different proportion with the same quantity of flour, some of the inferior powders in largely increased amount to produce the requisite porosity in bread; 3. In these powders there is generally present an excess of the alkaline ingredient, but this excess varies in amount, and there is sometimes found, on the contrary, an excess of acid material; 4. On moistening with water, these powders, even when containing an excess of alkaline material, yield small quantities of aluminum and calcium in a soluble condition; 5. As a consequence of the common employment of calcium acid phosphate along with alum in the manufacture of baking-powders, these, after use in bread-making, leave, at any rate, most of their aluminum in the form of phosphate (when alum alone is used, the phosphate is replaced by hydroxide); 6. The temperature to which the interior of bread is exposed in baking does not exceed 212° F.; 7. At the temperature of 212° F., neither the "water of combination" of aluminum hydroxide, nor the whole of the associated water of either this or the phosphate, is removed in baking bread containing these substances as residues from baking-powder; 8. In doses not very greatly exceeding such quantities as may be derived from bread as commonly used, aluminum hydroxide and phosphate produce, or produced in experiments upon himself, an inhibitory effect upon gastric digestion; 9. This effect is probably a consequence of the fact that a part of the aluminum unites with the acid of the gastric juice, and is taken up into solution, while at the same time the remainder of the aluminum hydroxide or phosphate throws down in insoluble form the organic substance constituting the peptic ferment; 10. Partial precipitation in insoluble form, of some of the organic matter of food, may probably also be brought about by the presence of the aluminum compounds in question; 11. From the general nature of the results obtained, the conclusion may fairly be deduced, that not only alum itself, but the residues which its use in baking-powder leaves in bread, cannot be viewed as harmless, but must be ranked as objectionable, and should be avoided when the object aimed at is the production of wholesome bread.

QUARANTINE CONFERENCE. — The recent quarantine conference which convened at Montgomery, Ala., discussed most thoroughly the question of yellow-fever in all its aspects. As it was composed of the most experienced sanitarians of the country, many of whom have been repeatedly engaged in fighting yellow-fever epidemics, the conclusions of their deliberations are entitled to great respect and consideration. The method of disinfection as practised at the New Orleans station, by the use of superheated steam in steel cylinders under pressure, was indorsed as being the best