and the strata are estimated to end at 4,000 feet in depth. Even if they do extend deeper, mining would be impracticable because of the expense; and, besides, the temperature would be 116° F. The deepest coal-pit in England is 2,448 feet, but one in Belgium extends 3,490 feet.

In 1881, 154,000,000 tons were extracted, — enough to build fifty-five great pyramids, or rebuild the great wall of China and add one-quarter to its length. The total amount of coal mined since 1854, would build a column 9 feet 4 inches in diameter, a distance of 240,000 miles, i.e., to the moon. The output shows considerable fluctuation from year to year, — as might be expected from the variety of accidental circumstances, such as new inventions, the mean annual temperature, and the state of trade, — but, on the whole, a very rapid increase; the output for 1875 being double of that for 1854, and that for 1883 double of that for 1862; and, if the amount extracted increases at this rate (3,000,000 tons annually), the supply will be exhausted in the year 2145 A.D. The exhaustion will be theoretical only; for in a comparatively short time the price of coal will increase, and the demand necessarily lessen, so that coal will never be exhausted. One of four things must then happen, — either some new source of energy must be supplied, or a larger per cent of the coal must be utilized, or coal must be imported, or England must give up her manufactories. It is doubtful if any new source of energy on a large scale will be discovered, unless some explosive be used for the purpose. According to Sir William Thomson, energy in the form of electricity can be transferred three hundred miles through a copper rod, with a loss of only twenty per cent: so in this way waterfalls may be utilized in the future.

While it is hardly possible to use less coal, we may get more energy out of it; for at present, out of a theoretical 10,000,000 foot-pounds of work which one pound of coal can supply, we only get 1,000,000 foot-pounds. But instead of a decrease in the waste, there is likely, on the contrary, to be an increase; for each year faster speed is demanded by rail, and steamships are rapidly replacing sailing-vessels. It might be possible to prevent the annual exportation of 22,880,000 tons by export duties; but that does not seem expedient. The idea of importation is hardly practicable, for the nearest coal-mines of any extent are in Canada and the United States. The former are not easy of access, but are almost unlimited; and those in the United States contain at least thirty-eight times as much coal as those in England. To supply England with the necessary coal, 2,100 ships as large as the Faraday, each carrying 6,000 tons and making thirteen trips a year, would be required. The cost would be necessarily greatly increased. In former times, England produced its own breadstuffs: now the greater part is imported. If coal becomes scarce, there will be no way of paying for food, emigration will begin, the death-rate will increase, the birth-rate decrease, and England will change once more to an open, cultivated country, devoid of all other industries.

PREHISTORIC AMERICA.

THIS translation of Nadaillac's 'Prehistoric America,' we are told, is made with the author's sanction; and it is also by his permission that certain portions of the work have been so 'modified and revised' as to bring them "into harmony with the results of recent investigation, and the conclusions of the best authorities on the archaeology of the United States." Speaking in a general way, these changes and additions may be said to be confined almost entirely to the chapters that relate to North America, and to consist, not in the discovery of new truths, although some additional facts are offered, but in the adoption of certain theories, as positive conclusions, which, in the original publication, are given as explanations, more or less probable, of the points at issue. Thus, for instance, in that portion of the work which refers to the origin and antiquity of man in America, we are given to understand that he is probably of Asiatic descent, all other theories being practically ignored. To this explanation, considered simply as such, we do not object. Appearances certainly favor it; and as it is the most satisfactory way of accounting for his presence here, and for certain peculiar features in his civilization, we do not see any reason why it should not be accepted, at least until something better is offered. That his ancestors arrived here at a period so remote that it can only be measured by geological epochs and phases of civilization, is conclusively proved; and though it is not equally susceptible of demonstration, yet we think it highly probable that these immigrants may have started from different centres, and gradually pushing their way westward across Bering Strait, and by way of the Polynesian Islands, may have landed at different times, and at different places, on the shores of both North and South America. That they belonged to different races, and were in different stages of development, is possible; and whilst we are willing to admit that "the culture which can be traced from the shell-heap to the mound, from the mound to the pueblo, and from the pueblo to the structures of Mexico, Central America, and Peru, is distinctively American," we may be pardoned for suggesting that it is possible, in view of what is said of the facilities of intercourse, not only between our tribes but between the continents, that this culture may have been colored by Asiatic influences of a comparatively recent date.

Prehistoric America. By the MARQUIS DE NADAILLAC. Translated by N. D'Anvers. Edited by W. H. Dall. New York, *G. P. Putnam's sons*, 1884. 566 p., illustr. 8°.

In the chapters that relate to the archeology of the Mississippi valley we are fortunately on safer ground. The arts and industries of the recent Indians, as seen in their ornaments and implements, and as described by the early chroniclers, furnish a convenient standard by which to fix the place of the so-called mound-builders in the scale of civilization; and a comparison of these remains with the mounds and their contents enables us to say with certainty that these two peoples, admitting them to have been distinct, had attained to about the same stage of material development. Indeed, the two classes of remains are believed to agree in every essential particular. Not a single specimen has yet been taken from the mounds, that indicates a different phase of civilization from that which the Indian is known to have reached, — nothing which he could not have made, or might not have bought from his neighbors in Mexico or on the Atlantic seaboard. This is certainly an important link in the chain of evidence that points to the identity of the Indians with the mound-builders; and if we add to it the fact that the Indians are admitted to have built both mounds and embankments, and that "they are the only people except the whites, who, so far as we know, have ever held the region in which these remains are found," it will be seen that there is ample ground for the conclusion that the mounds and enclosures of the Mississippi valley, of every sort and size, "were the work of these same Indians, or of their immediate ancestors." All other inferences are denied to us until it can be shown, that, at some time in the past, there lived in this valley a people other than the Indian, who had reached the same or a higher stage of development. To say, as is sometimes done, that such a people may have lived here, — and, for that matter, it is as easy to *suppose* a dozen or two of them as one, — may be very true, but it does not meet the point. Suppositions are neither facts nor arguments; and, unfortunately for the advocates of this theory, the modern school of ethnologists has a decided preference for the last two. Until, then, it can be shown that there lived here, in prehistoric times, some other people, who chipped flints, wove cloth, hammered metals, worked in stone, manufactured pottery, built mounds and earthworks, and did all the other things that the 'red Indians of historic times' can be proved to have done, it will not be necessary to go any farther, or to waste any more time in search of a mound-builder.

In dealing with the architectural and other prehistoric remains of Arizona, Central America, and Peru, the same method of investigation is followed with equally satisfactory results. The cliff-dwellers, considered as a separate and distinct people, with a civilization different from that of the Pueblo Indians, are made to take a place by the side of the mound-builders, in the limbo of exploded theories; the deserted cities of Mexico and Central America are found to be nothing but the abandoned dwellings of a people whose mode of life, as Bandelier well says, "differed from the communal life of the Indians in other regions only by the exigencies of another climate and of varying natural resources;" and the ruined temples, palaces, and fortresses of Peru, stripped of all exaggeration, and measured by the same unfailing standard, are recognized as a striking but legitimate product of the civilization which was in existence there at the time of the conquest, and which, in many of its features, was but a counterpart of that which prevailed in Mexico, and, we may add, in the regions to the east of the Mississippi.

This is a brief summary of some of the conclusions reached in the present volume, or which may be deduced from the premises here laid down; and, to those of us who have watched the progress of anthropological studies in this country for the past few years, it is needless to say that they represent the current scientific opinion of the day. Indeed, it could not well be otherwise, since they are the logical results of the application to American archeology of the method of investigation which has been in use everywhere else, and which is the only one that promises to lead to any thing satisfactory. The old plan of inventing a new civilization, or resurrecting an extinct people by way of accounting for every differently shaped pot that happened to turn up, has been tried, and found wanting; and we have at last adopted a system of classification and comparison that enables us to connote the relations between people and things, to fix their several values, and assign them their relative places in the scale of progress. Squier began the good work many years ago, but failed to carry it to a logical conclusion. When the mantle fell from his shoulders, Morgan picked it up; and, though he sometimes swung the pendulum too far in his direction, yet there can be no doubt as to the tremendous impetus he gave to the study. Following him came the Bureau of ethnology at Washington, the Peabody museum at Cambridge, the Archaeological institute of America, and the Société des Américanistes in Europe; and it is to their systematic exertions in the collec-

tion of data, joined to the individual researches of a band of enthusiastic students abroad, as well as in our own country, that we owe this the best work on prehistoric America that has yet been published.

But whilst we thus gladly bear witness to the merits of this work, we must not forget the marks of carelessness which frequently disfigure its pages. Quotations and references are incorrectly given. Writers whose statements are more than doubtful, are given a prominence which they do not deserve; and there are assertions like the one (p. 82) as to the relative antiquity of the mounds in the Southern States, which needs proof, or that on p. 381, in regard to 'tempering' copper, which may or may not be true, depending on what is meant by the term. Finally, we must protest against the reference (p. 64) to the dogma of transubstantiation. Since that article of belief is held by rather more than half the Christian world, an offensive reference to it by the editor is not only uncalled for, but in excessively bad taste.

[The editor gladly inserts this review, written at his solicitation; but he does so without committing himself to the advocacy of the views therein expressed, which seem to maintain the identity of all peoples that ever inhabited the American continent up to the advent of Europeans. It seems to him that the progress of science demands that this should be looked upon as a question to which investigation may still be directed. While historical evidence, on which the reviewer lays such stress, undoubtedly gives the clew to recent peoples, we must certainly depend on archeological research for the data by which to decide all questions which concern the origin and relationship of those which preceded them.]

A HANDBOOK OF HEALTHY AND DISEASED MEAT.

In Germany there is no need that an official should be ignorant of the duties he has to perform; for, no matter in how restricted a sphere he has to work, there are extended treatises covering the exact points, with which he should be acquainted. In the volume which lies before us, the inspector of meat, or the veterinarian who may be called upon to decide upon the fitness of animal flesh for human food, would find a good practical guide to the work.

The first part of the volume is devoted to a consideration of the morphology and chemistry of meat, with remarks on its general physiology and pathology. Then follow a practical description of the different kinds of food animals, and the various methods of killing, and of cutting up and preserving the flesh. After this is a chapter chiefly devoted to healthy meats and the changes which the different sorts undergo in digestion.

The last half of the book treats of diseased meat and the dangers of its use. In this lies the value of the work; as the special appearances, and the methods for their detection, are given in connection with each disease, as well as the disorders which may arise in man following their use as food, together with the means of prevention. Finally there is appended a digest of the laws of Germany and Austria regulating inspection.

The book is one which can scarcely be said to be of general scientific interest; and, on account of the language in which it is written, it will probably not be widely read by the class of men in this country to whom it would be of the greatest value. From a pecuniary point of view, a translation of such a work would not pay here at present; but from the economic interests which are connected with the subject, and the great protective influence which a well-maintained inspection of meat through our country would exert upon the public health, an edition in English, translated and published under the auspices of the proper department of the national government, would be of great and peculiar interest in the hands of the proper officers of our local boards of health.

Handbuch der fleischkunde. Eine beurtheilungslehre des fleisches unserer schlachtthiere, mit besonderer rücksicht auf die gesundheits pflegedes menschen und die sanitätspolizei. Von Dr. Adolf Schmidt-Mülheim. Leipzig, *Vogel*, 1884. 8°.

THE AMERICAN SOCIETY OF MICROSCOPISTS.

The American society of microscopists has published the account of the meeting held last August at Rochester. The volume is a neat octavo of nearly three hundred pages, with a few plates, and appears in part as a memorial of the late R. B. Tolles, whose lithographic portrait is prefixed to the titlepage. The portrait is such that its total absence will appear desirable to many. The address of the president, J. D. Cox, is substantially a review of the arrogant and ignorant attacks which Wenham repeated during so many years against Tolles's wide-angle lenses; and the contrast between

Proceedings of the American society of microscopists. Seventh annual meeting. Buffalo, *Bigelow bros., pr.*, 1884. 4 + 300 p., [6] pl., illustr. 8°.