species. Everywhere we find the same variations at the same stages, differing only in size, never in position. We extend the comparison to a widely separate phylum, and find the same pattern in a similar process of evolution. Excepting in two or three side-lines, the teeth of all the *Mammalia* have passed through closely parallel early stages of evolution, enabling us to formulate a law: The new main elements of the crown make their appearance at the first points of contact and chief points of wear of the teeth in preceding periods. Whatever may be true of spontaneous variations in other parts of the organism, these new cusps arise in the perfectly definite lines of growth. Now, upon the hypothesis that the modifications induced in the organism by use and disuse have no directive influence upon variations, all these instances of sequence must be considered coincidences. If there is no causal relationship, what other meaning can this sequence have? Even if useful new adjustments of elements already existing may arise independently of use, why should the origin of new elements conform to this law? Granting the possibility that the struggle for existence is so intense that a minute new cusp will be selected if it happens to arise at the right point, where are the non-selected new elements, the experimental failures of nature? We do not find them. Paleontology has, indeed, nothing to say upon individual selection, but chapters upon unsuccessful species and genera. Here is a practical confirmation of many of the most forcible theoretical objections which have been urged against the selection theory.

Now, after observing these principles operating in the teeth, look at the question enlarged by the evolution of parallel species of the horse series in America and Europe, and add to the development of the teeth what is observed in progress in the feet. Here is the problem of correlation in a stronger form even than that presented by Spencer and Romanes. To vary the mode of statement, what must be assumed in the strict application of the selection theory? (*a*) That variations in the lower molars correlated with coincident variations of reversed patterns in the upper molars, these with metamorphoses in the premolars and pocketing of the incisor enamel; (*b*) all new elements and forms, at first so minute as to be barely visible, immediately selected and accumulated; (*c*) in the same individuals, favorable variations in the proportions of the digits, involving re-adjustments in the entire limbs and skeleton, all coincident with those in the teeth; (*d*) finally, all the above new variations, correlations, and re-adjustments not found in the hereditary germ-plasm of one period, but arising fortuitously by the union of different strains, observed to occur simultaneously and to be selected at the same rate in the species of the Rocky Mountains, the Thames valley, and Switzerland. These assumptions, if any thing, are understated. Any one of them seems to introduce the element of the inconstant; whereas in the marvellous parallelism, even to minute teeth-markings and osteological characters, in all the widely distributed forms between *Hyracotherium* and *Equus*, the most striking feature is the constant. Viewed as a whole, this evolution is one of uniform and uninterrupted progression, taking place simultaneously in all the details of structure over great areas. So nearly does race adaptation seem to conform to the laws of progressive adaptation in the individual, that, endowing the teeth with the power of immediate re-active growth like that of the skeleton, we can conceive the transformation of a single individual from the eocene five-toed bunodont into the modern horse.

The special application of the Lamarckian theory to the evolution of the teeth is not without its difficulties, some of which have been pointed out to me by Mr. E. B. Poulton. To the objection that the teeth are formed before piercing the gum, and the wear produces a loss of tissue, it may be replied that it is not the growth, but the re-action which produces it, which is supposed to be transmitted. Again, this is said to prove too much. Why is the growth of these cusps not continuous? This may be met in several ways: first, in the organism itself these re-actions are least in the best adapted structures, a proposition which is more readily demonstrated in the feet than in the teeth (moreover, since the resulting growth never exceeds the uses of the individual, there is a natural limit to its transmission); second, the growth of the molars is limited by the nutritive supply (we observe one tooth or part growing at the expense of another); third, in some phyla we do observe growth which appears to lead to inadaptation, and is followed by extinction. In one instance we observe the recession of one cusp taking place *pari passu* with the development of the one opposed to it. These and many more general objections may be removed later; but they are of such force, that, even granting our own premises, we cannot now claim to offer a perfectly satisfactory explanation of all the facts.

The evidence in this field for, is still much stronger than that against, this theory. To sum up: the new variations in the skeleton and teeth of the fossil series are observed to have a definite direction; in seeking an explanation of this direction, we observe that it universally conforms to the re-actions produced in the individual by the laws of growth; we infer that these re-actions are transmitted. If the individual is the mere pendant of a chain (Galton), or upshoot from the continuous root of ancestral plasm (Weismann), we are left at present with no explanation of this well-observed definite direction. But how can this transmission take place? If, from the evident necessity of a working theory of heredity, the *onus probandi* falls upon the Lamarckian,—if it be demonstrated that this transmission does not take place,—then we are driven to the necessity of postulating some as yet unknown factor in evolution to explain these purposive or directive laws in variation, for, in this field at least, the old view of the random introduction and selection of new characters must be abandoned, not only upon theoretical grounds, but upon actual observation.

Reading between the lines of Weismann's deeply interesting essays, it is evident that he himself is coming to this conclusion.

HENRY FAIRFIELD OSBORN.

AMERICAN ARCHIVES IN SEVILLE.[1]

IF I could meet the historical students of the Johns Hopkins University or the members of the Maryland Historical Society, I am quite sure, that with the aid of a few photographs which I can find here, and with the aid of a few books to which, as a hurried traveller, I cannot here find access, their interest would be quickly excited in an account of the celebrated collection of papers pertaining to early American history which I have just visited for the second time. I am not so sure that by means of a letter I can convey the same impression; nevertheless I will try.

The Alcazar, which is to be compared with, if it does not equal, the Alhambra as a Moorish palace; the Giralda, a magnificent bell-tower, noble in size, proportions, and details, and famous as an observatory in the days of Moorish supremacy; and the Cathedral, which contains a few of the most celebrated works of Murillo,—form a group of buildings which has given renown to Seville, and has drawn the admiring gaze of architects and poets and historians from every part of the civilized world.

Under the shadow of these world-famous monuments are two edifices which, in comparison with the three greater structures, hardly arrest the notice of the sight-seeker, though they are buildings which would be noteworthy for their age and dignity in any American city. One of these contains the Columbian Library, founded by Fernando Columbus, son of the great discoverer; and the other contains original papers which pertain to the Spanish discoveries in the New World. It is of the second of these remarkable and world-famous collections that I now propose to write.

Casa Lonja is the name of the building in which are kept "The Archives of the Indias," the title by which Spain has designated from the earliest days until now the papers pertaining to her American discoveries and possessions. For a long period the authorities of this country refused to accept the name "America," and "only yielded to the majority," as a Spanish writer informs us, "when resistance was useless."

[1] Letter from President D. C. Gilman, in the Baltimore Sun of Dec. 31, 1889, written from Seville, Spain, under date of Dec. 12.

The Lonja was built nearly three hundred years ago, as a sort of merchants' exchange; and there is a trace of its original purpose in the apartments now occupied by the Chamber of Commerce. It is a massive, simple, quadrangular building, the sides of which may be two hundred feet long, and it encloses a beautiful court, in which stands a. statue of Christopher Columbus. The stone of which it is partly built is of a dull-brown hue, but in other respects I was reminded of the Peabody Institute in Baltimore. There are two lofty stories, the upper one being devoted to the archives. Ascending a stately marble staircase, and passing the outer offices of the registers or secretaries, we entered a long gallery, which extends completely around three sides of the building, and must, therefore, be almost six hundred feet in length. It is not interrupted by partitions, is lofty, light, free from dust, and in excellent order.

Around the walls are cases open to the eye, in which are thousands upon thousands of packages containing original letters and reports from every part of the globe. Each package is carefully tied up, and it bears a conspicuous label, stating the district to which the papers belong and the dates to which they relate. They are separated in fourteen principal departments, corresponding with the fourteen *audiencias* into which the exterior possessions of Spain have been divided. Not yet placed upon the shelves, but stacked in the centre of the gallery, were a multitude of packages lately received from Havana.

To the casual visitor all this is impressive because of its voluminous extent. If he has any antiquarian taste, his appetite is whetted to know what these packages contain, and whether there are any papers of historical interest that have still escaped the keen eye of historical scholars. But the curiosity of the passing visitor is gratified, as it is in the British Museum, and as it is in the Lenox Library of New York, by the display under glass of some of the most interesting autographs and documents belonging to the collection. Here are papers bearing the signatures of Ferdinand and Isabella, Philip le Bel, Joanna or Crazy Jane, Charles V., and Philip II.; but to me the papers sent to these sovereigns from the New World by the great navigators and conquerors were of far more interest than royal autographs. Hanging upon the walls were portraits of many famous discoverers, doubtless authentic likenesses, though not original pictures. We seemed to be brought into the presence of these great men as we looked upon their faces and saw the lines which their pens had traced.

The newspapers of this week are filled with the splendid achievements of Stanley, whose arrival at Zanzibar is just reported, and with expressions of pity for Emin Bey, who has met with such an accident after escaping the dangers of the Mahdi, imprisonment, sickness, battle, and fatigue. These stories of the exploration of Africa are a fresh commentary on the privations and perils encountered when America was "the dark continent." In parallel columns we are reading of the exile of Dom Pedro II. and of the substitution of a republican for a monarchical government in the great territory of Brazil, last of all the countries in Spanish America to renounce the authority of a king. How obvious it is that the "archives" of to-day are books and newspapers. The telegraph in a moment reports from the lands beyond the seas events which three or four hundred years ago would not have been made known for months and years.

Here, for example, is one of the first letters which attracted our attention, from Fernando Cortez to Charles V., dated May 15, 1522, and complaining that he has had no answer to the despatches he had sent during the three years he has been in New Spain. He announces that he has discovered the South Sea, the coast of which is inhabited, and that he has begun to build ships. He begs the King to listen to the messengers whom he sends, assuring him that this business is far more important than all that pertains to the rest of the Indies. Contrast this delay in the exchange of correspondence with the telegrams which have been passed within the last week between Stanley and the King of the Belgians and the Emperor of Germany.

Another letter which interested me particularly was that of Juan Ponce de Leon, dated Feb. 10, 1521, announcing the discovery of *la isla florida*, and expressing his intention to go again and find out whether this is really an island or a part of the mainland of Velasquez.

Here was a letter from Francisco Pizarro, dated at Cuzco in 1535, in the handwriting of a secretary, who attaches the signature of the conqueror. Pizarro makes his mark on the right and left of the signature, as Spaniards now are wonted to subscribe a flourish or dash of the pen to their signatures.

I paused with special attention before the portrait of Fr. Bartol. de las Casas, in his clerical garb, and read his letter to Charles V., explaining to the Emperor, that, in addition to saving many souls, he might obtain the best income in the world from the rich lands beyond the seas if he would only adopt the measures which Las Casas proposed.

Here, too, we saw an autograph of Amerigo Vespucci, another of Bernal Diaz, one of Magellan, one of Balboa, one of Velasquez. There was also displayed in one of the cases the treaty (June 5, 1494) between Ferdinand and Isabella and the King of Portugal with regard to their respective possessions in the seas. We were also shown the bull of May 3, 1493, delivered by Pope Alexander VI.

The autograph of Christopher Columbus is not here to be seen. In the Columbian Library, near by, are some of his books, with annotations in his own handwriting, — books that have often been mentioned by the travellers who have seen them. Before leaving Baltimore, I read with great interest the account of this library given by Mr. S. Teackle Wallis in his recollections of Spain, and I will not attempt to redescribe that which he described so well. Indeed, his books ought to be reprinted, and made accessible to a new generation of readers, for they are just as good now as when they were written. Can copies be found in the New Mercantile Library or in the Hopkins Historical Rooms? If not, let some one give his copies, to be made accessible to the public.

The consul of the United States, Mr. Caldwell, introduced us to the chief of the archives, Ilmo. Sr. D. Carlos Jimenez-Placer; and this distinguished gentleman accompanied us through the halls and answered all our inquiries in the most obliging way; and, although our knowledge of Spanish was not much better than his knowledge of English, we were able through an intelligent interpreter to obtain a great deal of information.

It appears that the collection of these historical papers at Seville is due to one of the most enlightened of the modern kings of Spain, Charles III., who in 1781 issued a decree establishing in the Casa Lonja *el real archivo de Indias*. Most of the Spanish archives are still at Samancas, north of Madrid, including, doubtless, many of those which have been so serviceable to Mr. S. R. Gardiner in the preparation of his admirable history of England in the reigns of James I. and Charles I., to Froude and other recent historians.

I asked the head of the archives, Sig. D. Jimenez-Placer, whether a young man from the Johns Hopkins University, properly accredited and having a definite historical purpose, might be allowed to prosecute his inquiries in the Indian archives. He replied that such authority could only be given in Madrid, and that application should be made to the ministry of foreign affairs, properly, of course, through the American minister. In the two visits which I made to the archives I saw no signs of an investigator. I also asked for an authentic account of the archives, printed in Spanish or any other language; but I could learn of nothing more satisfactory than that which is given in the local histories and guides to Seville.

In one of the book-stores I found a copy of the "Cartas de Indias," published at Madrid in 1877 by the minister of Fomento, — a magnificent quarto volume, containing facsimiles of two letters of Columbus, and of many other imporant papers, illustrated with notes and essays. I looked upon the book with the envious eye of a librarian and the economical eye of a college president; but whether I shall buy it for the university or not, to-morrow will decide.