

on divorces and divorce laws, for which a special appropriation was made by Congress. The records of 2,700 courts have been examined; and the volume will give, in classified form, the number of divorces, with causes, number of children, when divorced, and other accessible information. The agents of the Department of Labor are now at work on the fifth annual report, which will not be ready for a year yet, on the wages of railroad-men.

—“Mr. B. F. Stevens, 4 Trafalgar Square, London, has been for some years at work on indexes to the manuscripts relating to American affairs between 1763 and 1783 preserved in European archives. The United States Government urged the purchase of these indexes, and also the obtaining of transcripts of the documents themselves. Congress has, however, made no grant for the purpose, and Mr. Stevens therefore boldly proposes to publish photographic facsimiles of the documents, provided he can obtain a hundred subscribers to begin with. Each document will be accompanied by a statement of its *provenance*, and of any variations to be found in other copies, if such exist; and a translation will be added when the original is not in English. Mr. Stevens calculates that when he has once fairly started he will be able to publish monthly two volumes of some 500 pages each, and he asks \$100 for every five volumes. A copious index will be published to every twenty-four volumes, and the price of it will be \$20. Mr. Stevens thinks that this valuable series of facsimiles will ultimately fill 100 volumes.”

—Columbian University has announced a unique course of lectures for the coming months, on “The Human Emotions from an Anthropological and Psychological Point of View.”

—At the meeting of the Philosophical Society on Jan. 5, obituary notices were made of Peter Parker, E. B. Elliott, F. V. Hayden, Roland D. Irving, Thomas Hampson, and Emil Bessels; and Mr. Bailey Willis read a paper on “The Mechanism of the Overthrust Fault.”

#### LETTERS TO THE EDITOR.

\* \* \*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

#### Two Discoveries in Human Osteology by the Hemenway Expedition.

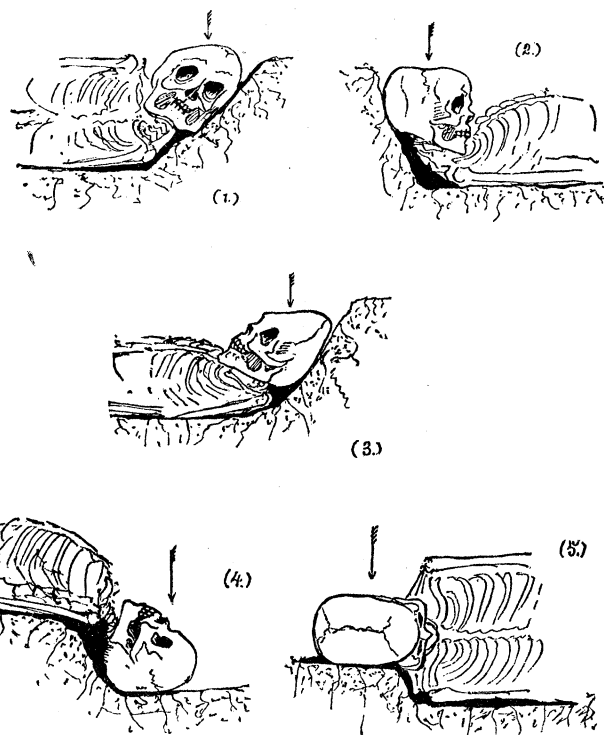
I HAVE the honor of enclosing to you a letter handed me by my friend Professor Edward S. Morse, who deems the matter therein discussed by Mr. Cushing of such importance as to merit prompt announcement in your journal.

First, however, I will ask leave to mention briefly another important discovery made during the researches of the Hemenway Expedition in the Salado and Gila valleys in southern Arizona last winter and spring. In the summer of 1887 Mr. Cushing, the director of the expedition, was dangerously ill at Camp Hemenway, on the site of the prehistoric city of Los Muertos. Through the kindness of Secretary Endicott and Surgeon J. S. Billings (the director of the Army Medical Museum at Washington), Surgeon Washington Matthews (the curator of the museum and an intimate friend of Mr. Cushing) was ordered to Arizona to his relief and assistance. Dr. Matthews, whose arrival at Camp Hemenway was just in time to save Mr. Cushing's life, was so much impressed with the character of the ancient skeletons there exhumed, that, as an anthropologist, he perceived that it would be of immense scientific value to have them preserved in the most careful manner possible. On his return to Washington, he represented the matter to Dr. Billings, who at once detailed Dr. J. L. Wortman, the talented comparative anatomist of the museum, to assist the expedition in properly exhuming and preserving the skeletons. It is a notable fact, that, with few exceptions, the skeletons in the various museums of the world have been carelessly collected, and are therefore worthless in the study of certain features: therefore the importance of having this work proceed under the supervision of two such men as Drs. Wortman and ten Kate, the latter the anthropologist of the expedition, may be perceived. Fortunately the expedition had also three or four Mexican workmen of such native intelligence, that, under the training of the two doctors, they became highly expert in the recovery of the skeletons, complete in every detail; the great

age of the remains rendering them very fragile, and demanding, therefore, extremely careful manipulation.

Early in the course of the work, Dr. Wortman observed indications of a remarkable anatomical peculiarity in the remains. Calling the attention of Dr. ten Kate to the fact, together the two pursued the investigation of the same, and all subsequent observations thoroughly confirmed their first inference. This fact was, that in this race the hyoid arch, or basi-hyoid, which together with the stylo-hyoid forms the bony structure at the base of the tongue, was not in the adult co-ossified, the three small bones forming the arch remaining free through life; the only exception being in the case of skeletons bearing marks of bone-disease, exhibited in the co-ossification of various articulations, in which cases the bones of the basi-hyoid were apt to be ankylosed, though occasionally on one side only. The strongest evidence was that exhibited by the skeletons of old persons, which proved no exception to the general rule of this observation.

This peculiarity was contrary to all the former experience and studies of the two observers, and it indicated the discovery of a pronounced racial character; for, according to what they had hitherto learned concerning this feature, the ankylosis of the basi-hyoid took place either at or before middle life.



Consulting the literature of the subject, it was found that both the English and French anatomical authorities concurred in this view, while the German authorities held that the several bones of the arch remained free, ankylosis taking place only exceptionally or in extreme age. It was inferred that the German view was either based upon insufficient evidence, the conclusion being drawn perhaps only from the anatomy of young persons, or that the anatomy of the German race differed in this respect from that of the English and French.

These observations were embodied in a brief preliminary paper by Drs. Wortman and ten Kate, and communicated to the International Congress of Americanists held in Berlin last October, at which Professor Morse and I had the honor of representing the Hemenway Expedition. The paper was read to the congress by Professor Morse, who illustrated it with blackboard-drawings. The subject occasioned much interest, for it was felt that it would prove to be of extreme importance should it turn out to be a peculiar feature of the aboriginal race of the American continent, as was indicated. Subsequent examinations of a large number of skeletons exhumed from ancient ruins during the excavations of the Hemenway Expedition at Zúñi, where it is now at work, have uniformly supported this view; and while we were in Berlin a Pe-

ruvian mummy was placed at the disposal of Professor Morse by Dr. Wilhelm Reiss, the learned president of the congress, and the discoverer, in association with Dr. Stübel, of the famous Ancon antiquities. An examination of this mummy, which was that of an elderly person, showed that the elements of the hyoid arch were free.

When the attention of Professor Virchow was called to the subject by Professor Morse, that eminent anatomist said that the question had apparently been entirely neglected. He was inclined, however, to support the correctness of the view advanced by the German authorities, and regard the co-ossification of the hyoid arch as occurring only under abnormal or pathological conditions.

Returning home by way of London, while visiting the British Museum of Natural History, we had the good fortune to meet the eminent mammalogist, Professor Flower. When we called his attention to the subject, he expressed the liveliest interest, saying that the observation was entirely new, the separation of the bones of the basi-hyoid being wholly contrary to any thing observed in his own large experience. He had taken the pains of making careful observations of this feature, and had made preparations of full sets of the *os hyoides* both in man and the lower mammalia. In man he had found that co-ossification took place at maturity, and in proof he called attention to a complete series of British hyoids which he had prepared for the College of Physicians and Surgeons. Therefore he would regard this observation of Drs. Wortman and ten Kate as indicating a very important discovery. The collection of human hyoids at the College of Physicians and Surgeons was inspected by Professor Morse, who found it prepared with the skill and knowledge for which Professor Flower is famous. Every specimen, when after maturity, was co-ossified.

Under a co-operative agreement made at the time between the Army Medical Museum and the Hemenway Expedition, the skeletons exhumed from the ancient cities in southern Arizona have been deposited with the former institution; and Dr. Billings is so impressed with the importance of the question, that Drs. Matthews and Wortman have been requested to make it the subject of an exhaustive research. In this work they, with their assistants, are now engaged, and have been supplied with an abundance of material from various races, in order to make the needed comparative observations. A full report thereon will be forthcoming in due time, but it may already be stated that the investigations have been advanced to a stage that fully confirms the opinion originally formed by the observers, — that in the peculiarities of the *os hyoides* is to be found the most distinctive racial character yet observed in human osseous anatomy. Its value in the determination of vexed questions can hardly yet be estimated, but it will undoubtedly prove of great anthropological service.

Dr. Wortman inclines to the view that it will be found that language plays a leading part in determining the form of this feature. The language of the American Indians is such that it requires but slight effort in utterance. An Indian can talk for hours at a stretch with little fatigue, and even a superficial observer will notice the restrained quality of the voice, the tones not being projected as with us. Now, the development of ankylosis being held to proceed from exercise, or irritation of the bone, from muscular action or otherwise, it is evident that in a language like that of the Indians there would be less muscular action exerted upon the hyoid arch than in one like ours, where more force is used, and therefore the co-ossification of the parts would be less encouraged. This view of Dr. Wortman's obtains support in observations made by Mr. Cushing at Zuñi, where he finds that the voices of those who are afflicted with bone-disease differ in quality from those of the tribe at large, and infers that their difference may be due to co-ossification of the hyoid brought about by the disease.

With the foregoing remarks, I hereby submit Mr. Cushing's letter concerning the other important osteological observation mentioned in the beginning.

SYLVESTER BAXTER,  
*Sec'y Hemenway Expedition.*

OLD FARM, MILTON, MASS.,  
Nov. 9, 1888.

*My dear Morse,* — Last evening I chanced to tell Mrs. Hemenway something about the observations we made on the distorted skulls of

Los Muertos and Halonawan. She was greatly interested, especially in what Baxter had to say relative to Dr. Virchow's paper before the recent congress, on, I think, deformed American crania. She wished me to write a brief statement of the case and send it to you, as of possible use to Drs. Virchow and Bastian.

While our excavations were in progress, I observed, by keeping close watch over the disinterments, that all, or nearly all, skulls occurring in earth sepulchres, were apparently deformed by artificial means. From the fact, however, that skulls taken from stone graves or cists, or from other sorts of tombs wherein they had been fairly protected, were uniformly and regularly brachycephalic, and showed no other sign of distortion than the occipital flattening from the cradle-board, I was led to infer that those from the earth sepulchres had been deformed by accident; that is, by post-mortem influences.

Subsequent observations, in all of which I was confirmed by Dr. ten Kate, indicated the entire correctness of this inference. For example: no general rule of cranial disfiguration (always with the above instanced exception) was found to prevail. On the contrary, the disfigurations seemed to depend largely, if not wholly, on the positions of the skulls. When the latter were lying on their sides in the graves, at an angle of, say, forty-five degrees, one side of the coronal region would be depressed, and sometimes the face, even, would be obliquely distorted, as in Fig. 1 of the accompanying slips. Again, when the skeleton was lying on its back, with head elevated, the crown would be greatly depressed, as in Fig. 2; or, if the head happened to be less elevated, face partially upturned, the frontal region was invariably more or less flattened and broadened, as in Fig. 3; or if, finally, the head chanced (face still upward) to be greatly depressed, the parietal region was flattened, throwing the frontal forward sometimes to an extraordinary degree, as in Fig. 4.

Perhaps the most extreme of these cases of post-mortem distortions of skulls were those which, belonging to skeletons of persons who had been buried on their sides, were so regularly flattened laterally that they seemed unmistakably to belong to the dolichocephalic class, as in Fig. 5. In fact, the only examples of "long-headed" skulls found during our researches, in either the north or the south (among the ancient ruins, that is), were so plainly distorted by this post-mortem pressure, that they made no exception to the rule established by Dr. ten Kate, that the Pueblo or Aridian was a short-headed race.

All this is simply due to the practice of blanket-burial. The skulls, being unprotected during the earlier years of burial, are, by the pressure of the earth, gradually deformed, — so gradually, indeed, that they neither crack, nor do the sutures part. The deformities are therefore in no wise distinguishable, after the specimen is removed from its original resting-place, from those produced by art. We are now, therefore, forced to note, in collecting our crania, their relative positions in the earth sepulchres very carefully.

I sincerely hope this may prove useful to Drs. Bastian and Virchow, or at least of some interest to them and the many other gentlemen who were so courteous to you and Mr. Baxter.

Faithfully yours,  
FRANK HAMILTON CUSHING.

#### The Julien Electric Traction System.

IN the opening pages of your journal of Dec. 21, 1888, a description is given of the Hauss Electric Railway, and comparisons are made between that system and other systems of electric traction. A paragraph is devoted to pointing out what the writer claims to be the defects of the storage-battery system.

It is very much to be deplored that some electrical railway companies attempt to raise their own systems in the public estimation by crying down other systems. What is still more deplorable is, that, in attempting to do this, they are not always friends to truth. There could be no better proof of this than the paragraph I have above referred to on the storage-battery system.

The writer admits that the storage-battery plan "would seem to be the ideal system," for the reason, among others, that "it dispenses with the necessity of a continuous conductor, the electrical generator and motive power are all contained within the car, and there is apparently an entire absence of any possibility of danger to the passengers." The writer goes on to say that "these favorable anticipations would be justified were it once demonstrated that a storage-battery had been devised that was economical of power, of reasonable weight, and durable in service." The writer