— Mr. R. M. Bache has been ordered by the coast survey to continue the topographical work on the south-east shore of Staten Island, and on the south side of Raritan Bay towards Sandy Hook ; Mr. F. W. Perkins is daily expected from his field-operations on the coast of Louisiana.

—Velhagen & Klasing (Leipzig) have begun the publication, in twelve monthly parts, of a new edition of Andree's 'Allgemeiner handatlas.' It will contain a hundred and twenty maps.

— The following works of interest to scientific readers have been lately announced : 'Earthquakes and other earth movements,' by John Milne (New York, *Appleton*) ; 'A manual of mechanics,' by T. M. Gordon (New York, *Appleton*) ; a work on the labor question in America, by Professor Ely (New York, *Crowell*) ; 'Photo-engraving processes,' by A. F. W. Leslie (New York, *Fuchs & Lang*) ; 'The flow of water through pipes and open conduits and from weirs and orifices,' by H. Smith, jun. (London, *Trübner*) ; 'The world as will and idea,' vols. ii. and iii., by A. Schopenhauer. tr. by R. B. Haldane and J. Kemp (London, *Trübner*) ; 'The Indian empire : its history, people, and products,' by W. W. Hunter (London, *Trübner*).

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.*

A national zoological garden.

IN 1870 an act of incorporation was passed, establishing a zoölogical society in Washington ; but during the last sixteen years little or nothing has been done towards carrying out what the charter of this society provides for, or taking any steps in the direction of putting into effect the chief objects such an organization would have in view.

We learn from *Science* (vii. No. 160) that the public-spirited and venerable exhibiter of animals, Mr. P. T. Barnum, now comes forward and says, that, if congress will grant him thirty acres of the reclaimed flats on the Washington side of the Potomac River, he will expend the generous sum of two hundred thousand dollars in starting a national zoölogical garden.

Now, the eastern extension of these flats is not far from the Smithsonian grounds, and, taking every thing else into consideration, there is probably not a better site in this country for this particular purpose. The incalculable advantages that would be the outcome of such an establishment can be easily appreciated ; and it is only to be hoped that at an early day congress will take Mr. Barnum's proposition into favorable consideration.

Few institutions in any country afford better educational advantages than a large, well-kept, and well-managed zoölogical garden. No better proof of this can be brought forward than the report of Mr. P. L. Sclater, F.R.S., secretary of the Zoölogical society of London, for the year ending 1885. Mr. Sclater tells us that during the year quoted, 659,896 persons visited the gardens, and that the receipts of the society amounted to the extraordinary sum of £25,809 10s 1d ; while during the previous year 745,460 persons visited the gardens, and the receipts were proportionately greater ; in fact, £3,129 more.

Many of the larger animals in this country are now rapidly disappearing from off the face of the earth, — notably the bison, the elk, and moose, —while numbers of the smaller representatives of our splendid mammalian and avi-fauna are unfamiliar to the eyes of the vast majority of the people of this country, from the simple fact that we are so poor in institutions where the living specimens can be put on exhibition.

Mr. F. W. True, curator of the department of mammals in the Smithsonian institution, points out in *Science* (vii. No. 171) another deplorable neglect, which unfortunately we are likewise guilty of, and which the establishment of a zoölogical society in Washington would do much towards rectifying. With the disappearance of our larger animals and other vertebrates, the opportunities are forever being placed beyond our reach, to intimately know about the anatomical structure of these very forms. In regard to this, anatomists are too apt to say something like this : "Oh, yes ! a prairie dog ; no doubt its organization is very much like the squirrel's, and will not repay exhaustive examination." Now, I say that these related and interrelated types are the very ones that will repay the most exhaustive research.

A competent prosector attached to our zoölogical garden — one who combined the qualities of an artist, an author, and a general anatomist — would soon demonstrate the high importance of his work, and contribute the most efficient aid to animal taxonomy. The brilliant productions of Garrod and Forbes, in the Proceedings of the Zoölogical society of London, speak volumes in favor of this advantage.

A share of the pecuniary receipts that would accrue from such an establishment could be set aside to meet the expenses following the publication of handsomely illustrated memoirs, giving large colored plates of the rarer acquisitions to the gardens, and the investigations of the prosector into the structure of such animals as died from time to time, and thus fell into his hands. We have long felt, in this country, the need of just some such standard publication as the excellently conducted Proceedings of the Zoölogical society of London ; and this would certainly be realized, and follow as one of the natural results pending the establishment of our national zoölogical garden. R. W. SHUFELDT.

Fort Wingate, N. Mex., May 26.

Scent-organs in some bombycid moths.

At intervals during the past year or two, isolated observations have been made of peculiar filamentary processes protruding from the abdomen of the male of some of our common bombycids, Leucarctia acraea and Scepsis fulvicollis being the observed species. Not long since, I described a peculiar abdominal character in the male of Cosmosoma omphale ; and the recent capture and examination of specimens of Leucarctia acraea has enabled me to add something to the knowledge of the structure in that species. Between the seventh and eighth ventral segments is a narrow opening, entirely invisible in the dried insect, but readily discerned on a

slight pressure of the abdomen in the fresh specimen. This opening extends back about an eighth of an inch, and, on being carefully pried open, shows two closely folded tufts of fine blackish hair. Pressure upon the abdomen will generally force out these tufts, and, if rightly applied, will result in the extension of two orange tentacle like structures, fully half an inch in length, united at the base, and spreading backward and outwardly in a gentle curve. The tufts of hair diminish as the tentacles are extended, the individual hairs occupying small but distinct papillae on the sides, until, when fully extended, they are evenly distributed around them, and no trace of the brush-like tuft remains. If the pressure be removed, the tentacles contract, the hairs again forming a tuft.

Specimens of Pyrrharctia isabella, when closely examined, showed a similar abdominal structure; but here there were four tufts extended instead of two, and in color they were snow-white. Properly applied pressure resulted in the inflation, first, of two basal sacs, which, when fully dilated, could be compared to nothing better than the ends of two thumbs pointing in opposite directions, the hairs of two of the tufts arranged rather densely on the convex outer surface. From the middle of the lower edge of these sacs there extended two tentacles similar to those in acraea, but not so long; and instead of being evenly clothed with hair, in this species the lower portion only has the papillae and hairy surface. The sacs and tentacles here are whitish, instead of orange, as in acraea. The processes of the latter species have a most remarkable resemblance to the tentacles of the larva of the common Papilio asterias, both in color and in shape. In both species an intense odor, somewhat like the smell of laudanum, is apparent when first the tentacles are exposed; and there is no reasonable doubt but that they are odor-glands, though exactly what purpose they serve is not so clear. In closely allied species no trace of this structure has been detected. Several fresh specimens of Arctia, Spilosoma virginica, and Hyphantria textor showed no trace of it; and no dry specimens of any other species thus far examined have a similar structure.

JOHN B. SMITH,
Assistant curator.

U. S. national museum.
Washington, D.C., May 28.

Muscles of the hind-limb of Cheiromeles torquatus.

I desire to place on record some observations I have recently made on the muscles of the hind-limb of Cheiromeles torquatus. This bat is one of the most interesting of the Cheiroptera. It is to a great extent arboreal in its habits. The wings are small, the body heavy and uncouth, and the wing-membranes are so arranged as to accommodate the young within a pouch on the back instead of on the front of the chest, as is the case in most of the bats. As a consequence, I expected to find in the musculature of the hind-limbs structures recalling those of other orders of mammals rather than those of the bats generally. In the main these anticipations have been met. It has always been supposed that the popliteus, the biceps, the soleus, and plantaris muscles are absent in the bats. It is true that Macalister finds in Vampyrops a few oblique fibres 'like a rudimental popliteus,' and Humphry identifies a small fascicle in Pteropus as biceps; but with these exceptions, as Macalister says, "there is no trace of biceps, popliteus, soleus, or plantaris in any." There is no doubt that the popliteus, the biceps, and the plantaris are present in Cheiromeles. The soleus is the only one of the absentees which is unaccounted for.

The maintenance of this group of muscles in a bat which is specialized for a tree-life, and scurries about the trunk after a fashion much like that of Pteromys, suggests the conclusion that the muscles named (excepting the soleus) are essential to the simplest expression of a true act of walking. They are absent in the volant bats, since they are of no use in flight; but they at once re-appear when the limbs are used for walking, or for the movements which are similar to this act. The assumption here taken that Cheiromeles is a true bat, which has been specially modified from the typical bat, is, I believe, tenable, and need not be here discussed. Occasion will be taken in due time to present arguments to sustain it. I will be content now to record the existence of the muscles named, and to give brief descriptions of them.

The popliteus is a well-defined muscle which slightly overlies the origin of the tibialis posticus. It does not create an oblique line on the tibia, which is so characteristic of the muscle in the mammals generally.

The plantaris is a conspicuous muscle, and is larger and heavier than is the gastrocnemius. It is distinct from the gastrocnemius its entire length. The muscle passes down to the sole of the foot, where it is continuous with the plantar fascia. Traction on the muscle flexes and abducts the foot.

A single muscular mass attached to the ischium represents the semi-membranosus and the biceps. The biceps becomes free at the upper fourth of the thigh, and is inserted into the head of the fibula.

The muscle which represents the tibialis posticus and flexor longus digitorum arises from the upper part of both the tibia and the fibula. It remains fleshy until it reaches the neighborhood of the tarsus, when two distinct tendons appear. One of these may be said to represent the flexor longus digitorum. It passes superficially over the ankle, and is lost on the plantar surface. Traction on the tendon abducts the foot, but does not flex the toes. The tendon of the tibialis anticus is lost on the tarsus. Traction on this muscle exerts no apparent influence on the movements of the tarsus.

HARRISON ALLEN.

Philadelphia, May 25.

Double vision.

In your issue of May 14, p. 440, Mr. Keller describes some phenomena of binocular vision, and asks an explanation. It would be impossible to do this in a short communication, but he will find the subject explained in any work on binocular vision. Perhaps the most accessible to him is my own little volume, entitled 'Sight' (International scientific series, vol. xxxi.). For explanation of phantom images, I would refer him to the chapters on 'Single and double images,' and on 'Superposition of external images,' and especially to the diagram on p. 116; and for explanation of inequalities of surface of such images, to p. 141 and preceding pages.

JOSEPH LECONTE.

Berkeley, Cal., May 24.