seilles, where cholera was then prevalent, for the purpose of investigating the results obtained by Dr. R. Koch and the other members of the German cholera commission in Egypt and India; and he arrived at the conclusion, which is now widely accepted, that the selection of the comma-shaped bacilli as the *materies morbi* of cholera appears to be entirely arbitrary, for he found that these comma-shaped bacilli are ordinarily present in the mouths of perfectly healthy persons.

The value of Professor Lewis's biological work was recognized by the council of the Royal society when they selected him, in April last, as one of the fifteen candidates to be recommended to the society for election in June; and his death thus leaves a vacancy in the list, which it is said the council will now fill up by the selection of Mr. A. Sedgwick, M.A., of Trinity college, Cambridge.

Mr. W. H. Caldwell of Cambridge, who has spent some time in Australia for the purpose of obtaining the material required for investigating the embryology of marsupials, monotremes, and Ceratodus, exhibited some of the results of his work at the recent Royal society *soirée*. It will be remembered that a telegram was sent to the Montreal meeting of the British association to announce his discovery of the fact that the eggs laid by the monotreme mammals developed in a manner closely similar to those of the Reptilia. Series of these mammalian eggs were exhibited by Mr. Caldwell, some taken a few hours after fertilization, with others at various stages up to hatching, and likewise different stages of the young after hatching, up to five inches long. He also showed a complete series of eggs of Ceratodus, the air-breathing fish of Queensland, from the unsegmented egg up to hatching, together with stages of the young fish after hatching. All this material is of the highest value, and Mr. Caldwell's researches are sure to throw much light upon many obscure problems of vertebrate morphology. He will also be able to supply Prof. W. K. Parker with the specimens necessary for investigating the development of the skull in Ceratodus, Echidna, and many marsupials. W.

London, May 30.

NOTES AND NEWS.

THE first circular of the local committee at Buffalo, of the American asscciation, announces that the meetings will be held in the recently enlarged high-school building. Reduced rates have been obtained over many of the railroads, most of which will allow a return ticket at one-third of the usual fare, upon certificate from the local secretary at Buffalo. The Chicago and north-western railway system will return members attending the Buffalo meeting, from Chicago, at one-third of the regular fare, upon presenting at the Chicago ticket-office a certificate from the local secretary at Buffalo: hence members residing in the north-west must see that they are in possession of two certificates when the meeting adjourns, — one to be used in Buffalo, and the other in Chicago. The Western union telegraph company, with its usual courtesy, will place its lines and district telegraph system at the service of members. The Botanical club of Buffalo is arranging an excursion and reception for the Botanical club of the association, as is also the Entomological club of that city for the Entomological club of the association. The address of the local secretary is Dr. Julius Pohlman, Buffalo, N.Y.

— The Appalachian mountain club propose issuing advance sheets of the forthcoming White Mountain map on a scale of 1:50000 by tracing the work now done, lettering the tracing roughly, adding the streams approximately, and copying by the 'blue print' process. Two sheets, a northern and a southern, will together cover the most important areas. It is hoped to have them ready by the first of July, and the cost is not likely to exceed seventy-five cents per sheet. Members may thus obtain maps of the accurately located points (including nearly all marked summits), on which they may fill in the lesser details, and mark corrections of the streams. Artistic appearance will not be attempted for these sheets; but their practical value will lie in the large scale, which is twice (linear) that on which the finished map is to be published. A field-meeting will be held on the summit of Mount Washington from July 1 to 8. Papers may be expected from Profs. E. C. Pickering and N. S. Shaler, Dr. W. G. Farlow, Messrs. J. Rayner Edmands, Rosewell B Lawrence, and others. The papers will be arranged for stormy weather and the evenings.

— Yale college, induced by the success of the Columbia college school of political science, and by the work in progress at Johns Hopkins, Cornell, and the University of Michigan, is making special arrangements for courses in political and social science, to begin in the autumn. Professor Sumner is announced to lecture on finance and the science and art of politics in the history of the United States; Professor Farnam, on the principles of public finance; Professor Hadley, on railroad administration; Mr. Wheeler, on Roman law; Mr. Terry, on the doctrine of rights; Mr. Raynolds, on comparative constitutional law; Mr. H. C. White, on local government in the United States; and Mr.

E. G. Bourne, on a view of trade and industry in Europe in the middle ages.

— On Aug. 25 next, Prof. Edward Zeller of Berlin will celebrate the fiftieth anniversary of the attainment of his doctorate. The many old pupils and friends of the learned historian and philosopher intend to present him on this occasion with his picture or bust, as a slight mark of their appreciation of his services to the cause of human knowledge. The movement was started in Berlin by some of Professor Zeller's associates, and the original announcement of their intention is signed by Bonitz, Dilthey, Eucken, Erdmann, Kuno Fischer, Helmholtz, Kronecker, Mommsen, Max Müller, Von Sybel, and many others. The names of all those who contribute to the fund will be communicated to Professor Zeller, and it is hoped that America will be well represented. Contributions may be sent to Prof. T. G. Schurmann, 15 West 57th Street, New York City, or to Prof. Nicholas Murray Butler, Columbia college.

— M. Ch. Bouchard has recently supplemented his observations on the toxicity of urine by the following ones. The increase in the production and elimination of the poison begins immediately after rising, and commences to diminish at about the middle of the waking period. Abstinence from liquids increases the toxicity, owing to the superabundance of incompletely oxidized matters excreted. Severe muscular labor notably, sometimes to the extent of nearly one-half, diminishes the toxicity, not only in the waking state, but also in the succeeding period of sleep. Compressed air diminishes immediately and markedly the toxicity, to be more largely increased afterward.

— Recent examinations of the bottom of the Lake of Constance and of Lake Geneva by Hörnlimann have brought out the interesting fact that the Rhine and Rhone rivers have excavated deep channels for long distances. The current of the Rhine can be followed for two kilometres, at a depth of one hundred and twenty-five metres below the surface of the water; while that of the Rhone has been traced more than six kilometres from the mouth, at a depth of between two hundred and two hundred and fifty metres.

— The production of gold in the gold-fields of the Australian colonies during 1885 reached in value £5,831,468. The total amount from the year of its discovery to 1886 is 79,194,094 ounces, valued at £310,865,718. There has been a considerable decrease in production during late years.

— The natural-history section of the Imperial Russian geographical society has decided to send an expedition, during the present year, into central Asia, to explore the region of Khan Tengri, which has never been visited by European travellers.

— The statement in *Science* (vii. No. 174) that Prof. C. U. Shepard presented his cabinets to Amherst college was not strictly accurate. In accordance with an agreement of long standing, the college purchased his collections, and paid forty thousand dollars for them.

— Lieutenant Greely, the arctic explorer, who is entitled to his promotion to a captaincy in the U. S. cavalry in consequence of the retirement of General Sturgis, is not likely to be appointed to the vacancy in the adjutant-general's department, and it is possible he will not be promoted at all on the active list, for the reason that he has declared himself, undoubtedly with justification, unable to render active service. The generous thing for congress to do is to provide a place on the retired list, with ample rank, for Lieutenant Greely, in honor of his services and sufferings in the arctic regions.

— The new scientific building of Smith college, Northampton, Mass., will be dedicated Tuesday, June 22. The address will be by Prof. J. Peter Lesley.

— The extreme delicacy of the sense of smell in man has been shown by a series of experiments by Messrs. Fischer and Penzoldt. In an empty room of 230 cubic metres capacity, and tightly closed, a small quantity of the substance to be detected was thoroughly mixed with the air, and the observer then admitted. Among different substances it was found that the smallest amount recognizable was .01 of a milligram of mercaptan. This quantity diffused through the room sufficed to make its distinctive character appreciable in the small volume of air coming in contact with the nerves of the nose, from which it was estimated that the 1 : 460,000,000 part of a milligram of this substance was recognizable. Hitherto the spectroscope has been considered the most delicate of all means of analysis, indicating less than the millionth part of a milligram of sodium; but the sense of smell, in the case of mercaptan at least, is seen to be at least two hundred times more delicate.

— Prof. S. F. Baird, U.S. commissioner of fish and fisheries, has recently received from the Department of fish-culture of the lower Seine, France, a gold medal as an acknowledgment for some valuable sendings of fish ova. The medal was designed by Oudine. On the obverse is represented a female head bound with a chaplet of cereals. Legend: 'Republique française.' On

the reverse is inscribed "M. Spencer F. Baird, United States commissioner of fish and fisheries," and the legend "Department de la Seine-Inferieure. La commission de pisciculture. 30 Novembre, 1885." The medal is about the size of a double eagle. It will be placed on exhibition in the north hall of the national museum.

— M. Charpentier, in a late session of the French academy, called attention to the following visual illusion: after a small, feebly illuminated object has been attentively viewed for some time in complete darkness, it will often appear to move in some determined direction in the field of vision, at a speed varying from two to three degrees per second, and sometimes through a distance subtended by an angle of thirty degrees or more. M. Charpentier states that this illusion occurs in the fixed eye observing a fixed point, but it is doubtful whether he is correct. Muscae volitantes, or floating spots due to impoverished blood or disease, have a like tendency in the closed eye, when attention is directed to them, of moving off in some determined direction, apparently as if floating upon the vision; but a finger placed upon the eyeball will at once detect that the spots are fixed upon the retina, while it is the eye itself that moves.

— A recent examination of the employees of certain French railroads for color-blindness, made in compliance with the instructions of the minister of public works, resulted in the detection of only two persons who were totally color-blind among 11,173. Three could not distinguish red, six green; eighteen showed a confusion in distinguishing between green and red, fifteen a like confusion between blue and gray; and fifty-two had a feeble sense of colors in general. These results show that the danger arising from color-blindness, on the French railroads at least, is almost *nil*. As is seen, not more than two per cent of the employees had imperfect sight, so far as colors in general were concerned, and not more than a half of one per cent were troubled with color-blindness in any way.

— During the year 1885 there were 155,177 German emigrants from the ports of Hamburg, Bremen, and Stettin, a decrease of over 40,000 from the preceding year. Of this number, 148,839 were immigrants to the United States.

— The coast-survey changes since our last issue are as follows: the party in charge of Assistant F. W. Perkins has returned from the south coast of Louisiana. The latter has gone to his home to work up the results of the trip; Captain Vinal has finished the gap on the west coast of Florida in Hernando county (this completes the ocean shore-line of that coast, except a small strip near the Thousand Islands); Assistant Pratt, who is on the north-west Pacific coast, reports the government telegraph-line from Tatoosh Island to Port Angeles, Washington Territory, as so badly grounded that it is impossible to exchange time-signals for longitude over it.

— The Zuni maiden Wa-Wah, who has been in Washington as the guest of Mrs. James Stephenson for several months, is now engaged in weaving a blanket in the national museum, on the loom procured by that institution from the Zuni Indians. The loom, with the blanket upon it, will be placed in a case in the museum, together with photographs of Wa-Wah at work upon it, which will illustrate the mode of weaving employed by the Zunis. Wa-Wah is well versed in all the mysteries of the Zuni religion and the customs of her people, and has given Mrs. Stephenson and the museum authorities much valuable information. She took great interest in the model of the town of Zuni at the museum, and gave testimony of its accuracy by pointing out her own house. She will go back to her home in the Zuni country with the geological-survey party, who will visit that region next month.

— M. Tourette has recently published certain results of observations on the gait in walking, in health and in various pathological states, which are of interest. The average full or double normal step he finds in the adult man to be sixty-three centimetres; in woman, fifty centimetres; in both sexes the right step is a little longer than the left. The average separation of the feet, or the base of support, in man in walking, is from eleven to twelve centimetres; in woman, twelve to thirteen; in both sexes the lateral distance being one centimetre greater on the left side. The sum of the divergence between the axes of the feet and the axis of direction is, in man, thirty-one or thirty-two degrees, the angle being about one degree greater on the right side; in woman, thirty or thirty-one degrees, with one or two degrees greater divergence. In one of the pathological types occurring in locomotor ataxia, in paralysis agitans, etc., the step is smaller, and the distance between the feet as well as the angle between them is larger, than normal. Another type, seen in diseases of the spinal cord, hemorrhages of the cerebellum, and in vertigo, shows a zigzag manner of walking. The step may be either short or long: in either case the footprints are confused and indistinct, and deviate from the line of walking. Other differences have been wrought out. Perhaps the most unexpected

result was that the pathological step is more regular than the normal in all the points above noticed. In other words, in the normal walk it is the man himself who is walking, and his natural variations appear: in the other the disease does the walking, and the step is marked by the constant symptoms of his malady.

— Advices just received from Mr. William T. Hornaday, who was sent out by the national museum in search of buffalo, are to the effect that he has secured two antelopes; he has also sent to the museum three complete skeletons of old bull-buffaloes, and two skulls.

— The *Iron trade review* estimates that the quantity of domestic iron ore used in the blast-furnaces, rolling-mills, and forges of the United States in 1885 was 7,600,000 gross tons.

— Anatomists were considerably startled some time ago to learn that Professor Hamilton had discovered that the corpus callosum was not a commissural structure at all, but represented the decussation of fibres on their way from the cortex to lower parts. Almost every thing has been doubted in the anatomy of the brain, but the corpus callosum has always been regarded as a system of fibres whose connections and functions were rather definitely known. In a recent article (*Brain*, April, 1886), Dr. Beevor shows conclusively that our faith in the corpus callosum may remain undisturbed. The sections figured in his plate distinctly represent the fibres of the corpus callosum intersecting, and in no way joined with the fibres of the internal and external capsules. He answers Professor Hamilton's morphological argument that some animals exist without a corpus callosum by pointing out that in those (marsupials, for instance) the anterior commissure becomes proportionately developed. Dr. Beevor concludes then that the current view of the connections of corpus callosum and of the internal capsule are perfectly correct.

— That frogs have a formidable enemy in the common mouse is evidenced by the following. A correspondent of *Nature*, Mr. W. August Carter of South Norwood, states that he observed, a short time since, several mice pursuing some frogs in a shed which was overrun with these reptiles. The alacrity of the latter, however, rendered the attacks of the mice futile for a considerable period. Again and again the frogs escaped from the clutches of their foes, but only to be recaptured, severely shaken, and bitten. The energy put forth by these reptiles was so great that they actually swayed their captors to and fro in their efforts to wrest themselves from their grasp. At length the wounds inflicted upon them rendered the frogs incapable of further resistance, and they were easily overpowered by the mice, which devoured a certain part of them.

— In 'Flowers, fruits, and leaves,' by Sir John Lubbock, Bart. (*Macmillan*), we have a popular, readable, and withal scientific account of many of the phenomena of fertilization of flowers, of the structure and varieties of seeds, and of many of the endlessly varied forms of leaves with which vegetation is covered. The first two chapters, on flowers, are a reprint, with some emendations and additions, from a previous volume by the distinguished author, and deal principally with the modes of fertilization, showing how, in many cases, appropriate insects are enticed into doing this important work, while other insects, not adapted to the work, are repelled or excluded from access to the flower. The next two chapters treat of fruits and seeds, and of their development and protection, and the modes of dispersion adapted to the habits and habitats of the plants in which they originate; while the last two chapters, on leaves and the varieties in their forms and arrangements, abound with suggestions of possible or probable causes determining the character of leaves and the diversities found within generic limits, and often even upon the same individual plant, according to age or size, as well as, on the other hand, the striking resemblances found among plants of widely different natural orders. The book is well calculated to awaken and foster in young people a love of nature, and to direct their attention to what is going on around them. It gives, also, an excellent idea of how many facts in the economy and ornamentation of plant-life can be rationally explained, without reference to the taste or wants of man, but solely by the 'survival of the fittest' in the struggle for existence.

— It is fortunate for those who need the valuable tables, the first instalment of which Professor Carnelly has just issued ('Melting and boiling point tables,' vol. i., London, *Harrison & sons*, 1885), that one so admirably adapted to the task should have been willing to devote eight years of almost continuous work to the compilation of a mass of material amounting to 50,000 data. The entire scheme comprises the presentation of all known data concerning the melting and boiling points of the elements, inorganic and organic compounds, and much miscellaneous information beside. The volume now before the public contains nineteen thousand data, and treats of the elements, inorganic compounds, and such organic compounds as contain not more than three elements. The second volume will include the remainder.

It is the aim of the author to state as fully as may be the constitution of every substance concerning which any thing is said, and original sources of information are indicated when known. For the convenience of readers who do not have access to large libraries, reference is also made to such related matter as may be found in Watt's 'Dictionary of chemistry,' or in the Journal of the Chemical society in London. The system of arrangement is simple, and the material accessible. The work, far more complete and convenient than any thing of its scope previously attempted, is a monument of patient industry intelligently applied.

— The wealth and thoroughness of information contained in Dr. O. Stoll's book on Guatemala (*Guatemala*, Leipzig, *Brockhaus*, 1886, 8°) shows at sight that the author is not one of the common travellers trying to perpetuate the memory of their sights in foreign countries. Stoll's main purpose in expatriating himself for five years to practise medicine in a land like that, was the thorough study of the aborigines. This enabled him to acquaint himself fully with the history, customs, and habits of the Indians, Ladinos, and whites in the western part of the country, where he resided. The results of his studies of the Indian antiquities and languages he published in a previous work, reserving for his 'Guatemala' the recital of his travels, which, from Guatemala City, extended over the east and south also, the political history, statistics, mode of life of the inhabitants, and general remarks upon the country. The numerous shortcomings and barbaric customs of the population do not excite in the writer a spirit of rancor, implacable hatred, or justifiable irony; for in most instances he simply presents to the reader, in frank and unmistakable terms, what he has seen and heard, and then leaves it to him to judge for himself. The tyrannic mode of ruling inaugurated by Barrios, the late president, forms a chapter too interesting to be skipped over.

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.*

Barometer exposure.

MR. H. HELM CLAYTON'S interesting letter on the above topic (*Science*, vol. vii. p. 484) is not quite so satisfactory as his previous communication on thermometer exposures. He seems to think that "the facts all suggest that the wind, in blowing by at right angles to the cracks and crevices in the building, produces a mechanical effect, which tends to draw the air out of the building, and decrease the pressure inside."

Until it is incontestably established by observation that such fluctuations in the height of the barometer as he cites are peculiar to indoor barographs, it seems to me quite premature to ascribe them to the rarefaction of the air within the building. It certainly would be more satisfactory to the physicist, had Mr. Clayton made comparisons of the simultaneous indications of indoor and outdoor barographs. The observed facts are, that fluctuations of wind-velocity correspond with fluctuations of air-pressure. In some cases it may be difficult to decide which is cause, and which is effect. Certainly, in ordinary cases, the alteration of air-pressure is the cause, and wind is the effect. But if, in certain cases, it can be shown that indoor barometers are differently affected from outdoor ones, there would be rational grounds for reversing the usual relation of cause and effect. If such is actually the case, it certainly is an important item in barometric records.

JOHN LECONTE.

Berkeley, Cal., June 8.

Amblystoma and Gordius.

Recently a fine specimen of Amblystoma mavortium, presented me by Professor Sedgwick, was seen to be greatly distressed in its left fore-arm. The arm was swollen to its utmost; and, holding it out at right angles to the body, the 'salamander' seemed quite unable to use either arm or fingers. Enlargement of a small pore, in a prominence near the base of the little finger, behind the carpals, disclosed the cause of the trouble in a robust hair-worm a little less than five inches in length and nearly one-twentieth of an inch in diameter. Posteriorly two-thirds of the worm's body was of a light pink or flesh color; in front of this it was darker, except about three-quarters of an inch at the head, where it was almost white. The worm was coiled among the muscles of the fore-arm, and did not appear to have wrought them any injury, the member in a few days being as useful as its fellow.

Submitted to Dr. Fewkes, the parasite was pronounced an undetermined species of Gordius.

S. GARMAN.

Mus. comp. zoöl., June 10.

Penetrating-power of arrows.

I notice in *Science* for June 11 a short letter concerning the penetrating-force of arrows.

I have made the following experiment with a Chinese bow and Japanese arrows: length of bow unstrung 5 feet 11 inches; length of string 5 feet 8 inches; length of arrow 35 inches, weight of same 2¾ ounces; height of feathers ⅝ of an inch, length of same 4 inches.

The bow has a strength of 110 pounds when the string is pulled back 34 inches: it is made of whalebone and bamboo cut in long strips and glued together.

At 50 yards the entire arrow passes through an inch plank of clear pine wood. At the same distance, with oak of the same thickness instead of pine, the board is penetrated by the head of the arrow, but the shaft is shattered to small pieces. With a live pigeon at 20 yards, hit anywhere, the entire arrow passes through intact.

L. O. KELLOGG.

Oswego, N.Y., June 12.