

though every room in my cottage was thick with mosquitoes, excepting that of my daughter, there were only two of these insects at any time observed in her room during the whole period of her illness."

W. W. Johnston, M.D., Washington, D.C., says, "In my own family one case of scarlet-fever occurred: other children escaped. In another family of eight children, isolation and disinfection prevented the spread of the disease, but such instances are numerous."

Charles W. Covernton, M.D., Toronto, Can., ex-president Provincial Board of Health, and Peter H. Bryce, M.D., Toronto, Can., secretary of the Provincial Board of Health, relate an instance where each succeeding member of the family took it at intervals of three or four days. At the period when desquamation of the first was beginning, a younger took a mild form of the disease. A few days afterwards conjunctivitis of both eyes appeared, ending rapidly in the destruction of sight. The disease afterward extended to the middle, with perforation, of tympanum, etc. Thereafter the disease attacked the knee and elbow joints, with intense suppuration and inflammation, ending in their destruction. The child died on the twelfth day. There were some four or five children in all. In the family of one of these physicians, a Cambridge student had a book which he was studying at the time of the seizure with scarlatina. After his death, said book, with others that had been open in the sick-chamber, were packed up and sent to the latter's family in London, where they were placed in a garret. Ten years after, a younger brother at Cambridge sent for these works. Shortly after receiving them, he took scarlatina and died. No other exposure to the disease was known.

Dr. Bryce, in speaking of the methods to be adopted in preventing the spread of the fever, refers to an experience he had five years ago, in the following language: "A child in a family in which there were five children was taken with scarlet-fever. It and its mother were put in an upper room, and the lobby cut off by a curtain antisepticized with a solution of corrosive sublimate. The soiled articles of clothing, etc., were placed in the same solution, and the remnants of food were burned in the fireplace of the room. Seclusion was perfect. At conclusion of desquamation every thing was disinfected. No second case occurred in the family. Dr. Bryce thinks the period of infection is not less than forty days.

EXPLORATION AND TRAVEL.

TRANSVAAL.—The railroad from Delagoa Bay to Transvaal, which was mentioned in *Science*, No. 245, has been opened from Lorenzo Marques to the boundary of the Portuguese Possessions. It is somewhat difficult to form a correct idea of the state of affairs in that region, as all news comes from English journals, and as the English are in constant fear of an increase of Boer, German, or Portuguese influence in South Africa. The Boers, of course, make strenuous efforts to open a route to the sea independent of the English, who threaten to swallow up the republics. This aim has been achieved by the new railroad, the greater part of which runs through Transvaal, and is in the hands of the Boers, while the part now opened is in the hands of American capitalists. The opening of this railroad, which was represented by English travellers as improbable, will result in a rapid development of the natural resources of the Transvaal. Although a strong influx of Englishmen into those countries may be expected, it is not probable that they will swamp the Boer element, which has so long resisted the incessant attacks of the English.

ZANZIBAR.—The Sultan of Zanzibar, whose territories have been reduced to a narrow strip of coast-line by recent treaties, has leased his rights on the African coast between Wanga, at the mouth of the Umba, and Vitu, to the British East African Association. As he has made a similar contract with the German East African Association, his rule is practically limited to the islands of Zanzibar and Pemba and several parts of the coast that are of little importance. The part of the coast leased to the British Association includes the whole coast-line between the line of demarcation between German and British influence and the German district of Vitu. It is said that vigorous attempts will be made to open a route from the coast to the Victoria Nyanza.

FARINI AND CHAVANNE.—Dr. Hans Schinz, who made a long

and interesting journey in South Africa, undertakes to expose Farini, who claimed to have accomplished a long and hazardous journey to Lake Ngami. He gives convincing proof that Farini, who wrote a large volume on his adventures, never entered the Kalahari, and never came into those remote regions in which he claims to have made important explorations. Several passages in his book had excited the suspicion of scientists; and Schinz gives now, in two letters to *Petermann's Mittheilungen*, conclusive proof that his adventures and discoveries are one great fraud. The work of another African traveller, J. Chavanne, has been justly and severely criticised. Chavanne travelled for some time on the Kongo, and published the results of his observations in a magnificent volume, which is now shown to be largely an audacious plagiarism on other publications on the Kongo, particularly Pechuel-Loesche's important work. Part of Chavanne's own observations are shown to be untrustworthy. Dr. von Danckelmann, who criticised Chavanne, and Schinz, must be congratulated for their courage in exposing these scientific impostors. Nothing should be more rigidly demanded from travellers than truth and a strict distinction between their own observations and those of others. Those infringing these rules cannot be too severely criticised.

THE OBANGI.—Captain van Gèle, who attempted to reach the Welle from the falls of the Itimbiri last summer, but gave up his plan on account of the difficulty of obtaining food at that point, left Leopoldville on Oct. 2 on board the 'En Avant.' He proposed to ascend the Obangi, and thus to ascertain its connection with the Welle. It will be remembered that Grenfell succeeded in ascending the rapids of Zongo, which prevented Van Gèle from exploring the upper part of the river. After having passed these rapids, Van Gèle hopes to find navigable water and to reach the Welle. As it is doubtful whether the Obangi receives a large tributary from the east which may be identical with the Welle, he will carefully examine the left bank of the river, and explore important tributaries which he may discover (*Mouv. géogr.*).

MENTAL SCIENCE.

Re-Action Time for Sensations of Temperature.

IN a recent number of *Pflüger's Archiv* of physiology, Vintschgau and Steinach give a preliminary report of a series of experiments upon the time necessary to perceive a sensation of heat, of cold, or of contact with the skin in various parts of the body. The time necessary for the mere feeling of contact on the middle of the forehead was for Vintschgau .119, and for Steinach .107, of a second. The time of feeling a contact upon the right cheek was .119 and .101 of a second respectively; and similar numbers for the volar and dorsal surface of the left hand are .126, .128, and .133 and .111 of a second. The results of their experiments upon the time it takes to perceive a sensation of cold and of warmth are given in the table below:—

	COLD.		HEAT.	
	Vintschgau. (2.2°-4.8° C.)	Steinach. (2°-2.8° C.)	Vintschgau. (48°-49° C.)	Steinach. (45°-49° C.)
Right temple.....	.160	.116	.166	.132
Left temple.....	.170	.124	.185	.138
Middle of forehead...	.143	.116	.144	.128
Right cheek.....	.143	.114	.154	.117
Left cheek.....	.151	.116	.158	.146
Volar surface of hand.				
At middle joint of finger.....	.186	.152	.205	.173
Near the ulna.....	.206	.186	.208	.206
On ball of thumb....	.185	.194	.251	.175
Dorsal surface of hand				
Near the ulnar side	.208	.179	.246	.199
Near radial side....	.204	.170	.233	.196

The conclusions that these tables enable us to draw are, that we feel a sensation of cold more quickly than one of heat, though the difference is slight; again, that we re-act more quickly to sensations of contact than to those of temperature. If the stimulation be applied to the same spot repeatedly and at short intervals, the time is in general lengthened. This was found to be true for the forehead and cheek, for sensations of cold, after a very few minutes. The same is true for the forehead with the stimulation by heat; but on the cheek after fifteen minutes, with the time taken each minute, there was no such lengthening of the time. More details regarding the method of obtaining these results will be given in a future paper.

The same topic has also been investigated by Dr. Goldscheider (*Archiv für Anat. und Phys.*, 1887, v.). His method was to approach a metal ball to the skin, thus breaking an electric connection and re-acting by a simple movement of the jaw. To get reliable results, he chose parts with a thin epidermis, and used an intense stimulus. For cold, the ball was at a temperature of 15° C.; and for warmth, at a temperature of 50°C. In all, over two thousand observations were made. The average of all these times was, for cold, on the face, near edge of the eyelid, .135, on upper arm .150, on the abdominal surface .226, and on the inner surface of the thigh .255, of a second. Corresponding times for the perception of warmth on the four places were .190, .270, .620, and .790 of a second. Warmth is thus much more slowly perceived than cold, and the more so the farther from the brain the part of the body tested, the difference amounting in the lower limbs to nearly half a second. It should be said that care was taken to choose parts of equal sensibility in the several regions of the body. If the stimulation is only moderately strong, and especially if the stimulation is weak, the re-action time is much lengthened. For example: a moderately warm stimulus on the arm takes .46 to .54 of a second to be re-acted upon, and, if the stimulus is weak, it takes .90 of a second to 1.1 seconds. That this lengthening of the time is really an effect of the intensity of the stimulus, is shown by the fact that it occurs in weak stimulation of the most sensitive areas, and not only in strong stimulation of insensitive areas, as would be the case were the lengthening due to the slow radiation through the epidermis. These facts are all in good accord with former investigations of the topic. The explanation of this difference between the reaction time for heat and for cold cannot yet be given. But Dr. Goldscheider is not ready to ascribe it to the fact that the one sensation passes up the white columns of the cord and the other through the gray matter. The results of the two investigations agree fairly well on the time for the perception of cold, but the latter gives much higher values for the re-action time to a warm stimulus.

VISUAL UNITS IN THE RETINA.—In viewing a series of uniformly scattered dots, we will at a certain distance be able to recognize them as dots; but if the object be further removed, they will fuse into a more or less uniform surface. By testing back and forth, one can quite accurately determine the distance from the eye at which the dots are just visible as single dots, and, if we measure the distance between the dots, it is possible to calculate how large a surface on the retina is necessary to impress us with the vision of a separate dot. Such a surface would be a visual unit, and the point of importance is to find what anatomical basis there is for this physiological unit. In 1881 Carl Du Bois-Reymond measured the size of these visual units in the fovea, or yellow spot of the retina, and found that such a unit was exactly the size of a cone at this point. He did not use dots, but rays of light shining through holes in a screen. This makes it extremely probable that a cone is the anatomical unit of vision. Dr. Wertheim (*Graefe's Archiv*, 1887) has continued these determinations for the lateral parts of the retina, where the vision is less fine, and where it is in general known that the number of cones is fewer. In tracing the decrease in the number of visual units to a certain area as we go upwards from the centre of the fovea, he gets a curve, showing at first a marked decrease, then a short period of almost no change, and then a long period of slow, regular decrease. If we ask, How does this harmonize with the anatomy? the answer cannot be as definite as we would wish. The part of the curve showing a marked decrease corresponds to the outer parts of the yellow spot; and the ratio

between the number of visual units at the edge of this, compared to the number in an equal surface of the centre, is as one to two or three, while the ratio of the number of the cones in the two places is about as one to three or four. The next period of the curve cannot be thus compared, because the size of the yellow spot is differently determined by different observers. With regard to the lateral portions of the retina, it can be said that the largeness of the visual units makes it necessary that the cones be separated, and this the anatomy bears out. The general conclusion is, then, that the cones are very probably the anatomical basis for the visual units, and that the rods (that become more numerous as we recede from the centre of the fovea) cannot convey the sensation of a single objective point.

THE PSYCHOLOGY OF JOKING.—Dr. Hughlings-Jackson publishes some interesting remarks on this topic in the *Lancet* of Oct. 27. He regards punning as the lowest stage of the evolution of humor, but even in the pun he sees a material for the study of normal mentation. In a pun we have two ideas called to the mind at once,—a double vision, as it were; and, as all thought is the comparison of relations, this is simply a caricature of the normal process of thought. Again: the world owes a great debt to the first punster, because he began the 'play' of the mind (in the same sense as art is founded on the play-instinct), and so detached himself from the grossly useful, and showed a surplus energy capable of developing into the highest traits of mankind. To lack a sense of humor is a bad thing. "The man who has no sense of humor, who takes things to be literally as distinct as they superficially appear, does not see fundamental similarities in the midst of great superficial differences, overlooks the transitions between great contrasts. I do not mean *because* he has no sense of humor, but *because* he has not the surplus intellect which sense of humor implies." Again: "I think that observation confirms what *a priori* seems likely,—that *pari passu* with the evolution of the sentiment of jocosity (playing at unreality) is the evolution of power of realistic scientific conception,—from sense of the merely ridiculous with parallel realistic conception of simple things, up to sense of humor with parallel realistic conception of complex things." Dr. Jackson then looks upon punning as a 'mental diplopia' in which there is a double mental vision, but not of the kind conducive to useful ends. It is something like the thought in dreams. He sums up his view in these words: "The process of all thought is double, in degrees from a stereoscopic unity of subject and object to manifest diplopia (two objective states in one subject). The process of all thought is tracing relations of resemblance and difference, from simplest perception—to say what a thing is, is to say what it is like and unlike—up to most complex abstract reasoning. The formula of the caricature of the normal process of thought is the 'pretence' of some resemblance between things vastly different, from punning, where the pretended resemblances and real differences are of a simple order, up to humor, where both are highly compound. We have the 'play' of mind in three degrees of evolution, three stages of increasingly complex incongruousnesses."

BOOK-REVIEWS.

Geology and Mining Industry of Leadville, Colorado. With Atlas. By SAMUEL FRANKLIN EMMONS. (U.S. Geol. Surv., Monograph XII.) Washington, Government. 4°.

THE magnificent volume in which the geology of the Mosquito Range, and more particularly that of the environment of Leadville, Col., and its mining industry, is described, contains the results of investigations begun in 1879, at the instance of Clarence King, first director of the United States Geological Survey, and continued until May, 1881. Abstracts of the results of these investigations have been published in the 'Second Annual Report of the Director of the Survey,' but it is only now that the full work and the magnificent atlas have been issued. We will cull only a few points from this great work which are of general interest. The first part of the book deals with geology. A brief history of the discovery and growth of the Leadville region is given. Emmons demonstrates that the paleozoic and mesozoic strata lie unconformably on the Archæan, and, what is of the greatest importance, that the formation which is immediately adjacent to the Archæan varies from