

the University of California for the erection of a suitable building for the departments situated in San Francisco, the Colleges of Law, Medicine, Dentistry, Pharmacy and Veterinary Surgery. Adolph Sutro, Mayor of San Francisco, has given a tract of thirteen acres just south of and overlooking Golden Gate Park as a site for the building. On the adjoining thirteen acres Mr. Sutro proposes to erect a building for his magnificent library of about two hundred and fifty thousand volumes.

THE work in Physics at the University of California, formerly done by the late Prof. Harold Whiting, who lost his life by the foundering of the Colima, is now divided between Dr. E. P. Lewis, formerly assistant in physics at the Johns Hopkins University and associate professor of physics in the Columbian University, and Dr. A. C. Alexander, formerly assistant in physics at the Sheffield Scientific School.

MR. W. D. FROST, who has been assistant in the Laboratory of the Minnesota State Board of Health, has accepted a similar position in bacteriology in the University of Wisconsin.

DURING the summer an experimental laboratory in psychology has been fitted up at the University of Kansas. The work is in charge of Olin Templin, professor of philosophy.

THE University of Pennsylvania has received additional contributions to the dormitory fund amounting to \$40,000.

It is stated that Charles Broadway Rouss recently gave \$25,000 to the New York Association of the alumni of the University of Virginia, for the fund to replace 60,000 volumes of the university library recently destroyed by fire.

MR. HENRY LEWIS, A.R.S.M., has been appointed to the chair of mining in the Durham College of Science, which was recently vacated by Prof. Merivale.

LUMAN T. JEFTS, of Hudson, Mass., has given \$5,000 to Boston University to found a scholarship.

THE attendance in the Scottish universities for the year 1894-95 was: Edinburgh, 2,924; Glasgow, 1,903; Aberdeen, 812.

DR. JOHANNES GAD, professor of physiology in Berlin, has been called to the University of Prague, and Prof. Riedel, of Jena, has been called to the chair of surgery at Göttingen in succession to Professor König.

DURING the academic year 1894-95 the University of Leipzig granted the Ph. D. degree to 163 candidates.

THE Bavarian government has appropriated \$150,000 for the enlargement of the buildings of the University of Munich.

PROF. E. MACH, who has this year resigned a professorship of physics at Prague to accept the chair at Vienna vacated by the psychologist, Prof. Franz Brentano, gave an inaugural address on 'The Influence of Chance on the Development of Inventions and Discoveries.'

DISCUSSION AND CORRESPONDENCE.

THE INVERTED IMAGE ON THE RETINA.

TO THE EDITOR OF SCIENCE—The discussion in recent numbers of SCIENCE concerning the inversion of the retinal image has occasioned me surprise, because I had supposed that the interpretation which has been familiar to me for many years had been universally accepted.

The interpretation is simply that we learn to associate the image with the correct position of the external object. Is it not the accepted view of psychologists that the primary conceptions of space are acquired by the child through touch and through its own movements connected with touch sensations? May we not look upon the visual sensations of external space relations as mental translations? If these two questions be answered affirmatively, then seeing objects right side up, despite the inversion of their retinal images, is a purely psycho-

logical and not a sensory phenomenon, and Prof. Le Conte's ingenious explanation becomes unnecessary.

In parenthesis, may I not ask whether since the rods and cones are inverted, *i. e.*, turned away from the light, would not Prof. Le Conte's 'push' produce an inverted sensation?

That the rectification of the retinal image is a matter of experience, will, I think, be readily believed by any one who has worked much with the microscope. The microscope also inverts the image, and when it is re-inverted in the eye it falls on the retina rightly placed, that is to say without inversion. A beginner finds it almost impossible to move a preparation under the microscope in the way he wishes, but with practice the coördination of sight and movement becomes so perfect that the adjustment is unconscious. Now suppose a child had inverted glasses kept permanently before its eyes, so as to correct the retinal inversion, would it not learn to adjust all its movements, just as microscopists learn to adjust one set of movements? In short would not that child think it saw everything right side up? Would it be conscious of any peculiarity in its visual conditions—of a great difference between it and all other children? I think, clearly not.

CHARLES S. MINOT.

HARVARD MEDICAL SCHOOL,
November 11, 1895.

SHELLS AS IMPLEMENTS.

EDITOR OF SCIENCE: Since writing about the pierced mussel shells of Florida and from the Shingu I have received a most obliging letter from Dr. Karl von den Steinen, in which he says: "On the Shingu they scrape wood with the pierced mussel *Anodonta*, while the Bororó of the Southern Lorenzo use the pierced *Bulimus* in their woodwork. Oars, handles of axes and other implements, bull roarers and bows are rasped down and smoothed therewith. The objects are not put through the hole for polishing, but the mussel passes along them, the two edges of the hole operate alternately and greater accuracy of work and control over the implement are secured. The edge of the hole is not necessarily very sharp, neither does the workman retouch the edges as would the flint worker. He simply

throws the shell away, or makes another hole, as do the Bororó when it fails to work.

"They make the hole with the point of a palm nut, *acuri* on the Shingu *oaussú* on the Southern Lorenzo. Before making the hole they remove the outer part of the shell with the teeth." Dr. von den Steinen also sends drawings of the Payagua mounted spoon, with small, smooth holes bored near the hinge to aid in the lashing. I should like my colleagues to note this interesting information in connection with the mussel shells of the Southern United States, having holes punched through them.

O. T. MASON.

A REPLY.

EDITOR OF SCIENCE—I note the criticisms in SCIENCE for November 1st, which my friend, Mr. Witmer Stone, has made upon my little book, 'A Naturalist in Mexico,' and I beg leave to answer the same through the columns of the same paper.

In the first place I wish to say that a foot note was prepared for pages 13, 80, etc., but which unfortunately did not appear in the published edition, and which was printed as follows upon a slip to be inserted in the volume. This slip was not, unfortunately, placed in the first fifty copies, and hence Mr. Stone's very just first criticisms:

ERRATA: For the account of the early discovery and conquest of Yucatan, and for the measurements of the ruins of Uxmal and Labna, the author is indebted to Stevens' 'Incidents of Travel in Yucatan.'

For the data used in the descriptions of the mountains, and for the identifications, and some notes on the birds, and of the land and fresh-water shells, the author is indebted to the papers of Messrs. Heilprin, Pillsbry and Stone, published in the Proc. Phil. Acad. Sci., 1890-5.

Our next point is the description of the different measurements of Orizaba, which were taken from Prof. Heilprin's paper as a matter of course, since the original papers from which he took them were not at my command. The error of measurement by Dr. Kaska with a 'thermometer' instead of barometer is a typographical error.

In regard to his next point I fail to see how my short description of the birds could well be