A RECENT STUDY OF MEXICAN EARTHQUAKES.

"*Estudio del Terremoto del* 17 *de Mayo de* 1879." In a pamphlet with this title, sent us recently by Professor Mariano Bárcena, the learned Director of the Central Meteorological Observatory of Mexico, the author makes a truly valuable and interesting contribution to the science of seismatology in the form of a study of the earthquake which took place in the Mexican Republic on the 17th of May of the present year. This earthquake, the author tells us, like the one that preceded it in January, made itself felt in the valley of Mexico by a tremulous movement, principally a light one, although in other localities its action was more violent. In both January and May the areas affected were included within nearly equal limits having about the same situation, thus demonstrating the persistence and localization of volcanic forces in the eastern region of the republic. The most determinate forms of the movement were two—a tremulous and an undulatory. In many localities the first of these was the only one perceived, while in others an oscillatory motion succeeded in a direction about northeast to southwest. In Orizaba the earthquake ended with three vertical jerking movements and a circular one. The phenomenon, which varied in duration from four to forty seconds, was accompanied by subterranean noises in Orizaba, Vera Cruz, Alvardo, Acayucan, and San Nicolas.

Although in localization the earthquakes of January and May were about identical, they were not thus in intensity and consequently in effects. That of January did no damage, while the one of May was disastrous in its effects, and caused the ruin of many dwellings and public buildings in Orizaba, Cordoba, and other localities. In his study of the January earthquake the author endeavored by the graphic method to establish the focus of seismic action, and deduced the conclusion that it was found toward the south of Puebla, corresponding with the galleries of the volcanoes Citlaltepetl and Popocatepetl, and perhaps related to those of Tuxtla and Toluca. By a like study he reaches the conclusion that, during the May disturbance, the seismic manifestations were most notable in the southern part of Citlaltepetl, in the vicinity of Orizaba.

The comparison instituted by Professor Bárcena, in this study, between these two earthquakes strengthens the conviction that he has heretofore announced concerning the transitions and localizations that have occurred in seismic action during the last nine years. This action, very curiously, moves from one locality to another, fixing itself at certain points, where, so to speak, it quarters itself for an indefinite period; its manifestations decrease, and then it passes over to another region. Thus it has shown itself in the western zone, where it remained till relieved by the craters of Colima and Ceboruco; it made a short residence in Michoacan; passed over to Guanajuanto, where it also was permanent for a time; then turned toward Jalisco; and, from the beginning of the present year, this volcanic force has been found located in the eastern part of the country. The author repeats these particulars, which he has pointed out in a preceding study, because their repetition permits him to establish this new phase of seismic phenomena, not sufficiently noted perhaps by observers, and that is the transitory movements and prolonged residences just mentioned. The centers that the seismic activity has successively occupied are seven, and these are given in detail as a system of classification for future study.

Viewed in the light of the facts here given, the question may throw some light on the details of the subterranean topography, so to speak, of Humboldt's seismic zone. "In fact," says the author, "in mapping out the dynamic zone I do not conceive of it as a great gallery, regular in its dimensions, but an association of tortuous conduits, united by ganglions situated at different levels, affecting a system like that of more or less ramified veins and containing bunches or masses of ores." The seven foci cited "would be immense vacant spaces communicating with each other by galleries of different forms; in these the lavas and aqueous vapors exercise their pressure, and in many cases the secondary conduits are not sufficient to allow an exit to all of the gases that are produced in these central laboratories. If, as supposed by a modern theory, there are waters infiltrated, which, becoming converted into steam, disturb the terrestrial crust, it may well be conceived that the seismic phenomena became stationary until the work terminates in these immense gas generators."

In conclusion, the author cites some meteorological facts that go to sustain an observation previously made by him, and that is that earthquakes happen with greater frequency and with greater intensity after those years in which rains have been very prevalent.

Pliocene Man in California.

The evidences of the human occupation of the Pacific coast in preglacial times, as found in the gold bearing gravels of Sierra Nevada and California, embrace both stone implements and human bones. The superintendent of the California Geological Survey says, in a report on these gravels, that stone implements including tools, pestles, mortars, platters, spear and arrow heads, etc.) have been found in so many places that the fact of their occurrence in the gold gravels cannot be doubted. They have been found in the following localities: In Mariposa County, at Horse Shoe Bend, on the Merced River, at Hornitos, and five miles northeast and near Princeton; in Merced County, near Snelling; in Stanislaus County, at Dry Creek; in Tuolumne County, at Table Mountain, Kincaid Flat, Wood's Creek, Mormon Creek; in Amador County, near Jackson; in El Dorado County, at Shingle Springs, Diamond Springs near Placerville, Spanish Flat, Kelsey's Diggings, Dry Creek, Coloma, Georgetown, Brownsville; in Placer County, near Gold Hill, Forest Hill, Byrd's Valley, Missouri Tunnel; in Nevada County, at Grass Valley, Myer's Ravine, Brush Creek; in Butte County, at Cherokee; also in Siskiyou and Trinity Counties, localities not mentioned.

Human bones are reported from Tuolumne and Calaveras Counties.

(1) Under Table Mountain, Tuolumne County, a human jaw, obtained by Dr. Snell; same locality, in the Sonora Tunnel, at a depth of 180 feet, a portion of a skull, given to C. F. Winslow in 1857, by P. K. Hubbs, of Vallejo, Cal., the finder, and by the former noticed in the Proceedings of the Boston Society of Natural History, for October 7, 1857, the same locality affording also a mastodon's tooth and a "large stone bead" of white marble. Mr. Winslow also says that Captain D. B. Akey related to him a discovery of a complete human skeleton from a tunnel under Table Mountain, but stated that he did not remember the tunnel, and the fact has not been verified.

(2) In Calaveras County, in February, 1866, in the claim of Messrs. Mattison & Co., on Bald Mountain, near Altaville and Angel's, beneath the lava, from a depth of 130 feet. This is the skull which came into Professor Whitney's hands through Dr. Jones, who received it from Mr. Mattison, and which has been described by Dr. Jeffries Wyman. The material in which it had been embedded was mixed tufa and gravel, and attached to it was a specimen of *Helix mormonum*, a species now living in Nevada. According to Mr. Mattison, the succession of beds passed through from above to that containing the skull was: black lava, 40 feet; next below, gravel, 3; light lava, 30; gravel, 5; light lava, 15; gravel, 25; dark brown lava, 9; gravel (that containing the skull), 5. This bed rested on red lava, 4 feet, and red gravel, 17 feet. Professor Whitney brings forward the testimony of Mr. Scribner and also of Dr. Jones, and says: "We have the independent testimony of three witnesses, two of whom were previously known to the writer as men of intelligence and veracity, while in regard to the third there is no reason for doubting his truthfulness. Each one of these gentlemen testifies to some points in the chain of circumstantial evidence going to prove the genuineness of the find. No motive for deception on the part of Mr. Mattison can be discovered, while the appearance of the skull itself bears strong though silent testimony to the correctness of the story."

Dr. Wyman's report, as is now well known, stated that the "skull presents no signs of having belonged to an inferior race. In its breadth it agrees with the other crania from California, except those of the Diggers, but surpasses them in the other particulars in which comparisons have been made. This is especially apparent in the greater prominence of the forehead and the capacity of its chamber. In so far as it differs in dimensions from the other crania from California, it approaches the Esquimaux." The following are the comparisons above referred to by Dr. Wyman, the measurements being in millimeters:

	Breadth of Cranium.	Breadth of Frontal.	Frontal Arch.	Length of Frontal.	Height of Cranium.	Zygomatic Diameter.
22 Esquimaux	134·5	94	296·5	126·6	135	137·6
5 from Alaska	133·5	92·8	285·5	121·8	129·5	132
11 from different parts of Cal.	150·5	93·5	260	117	120·8	134
3 Digger Indians	136·6	88·3	280	119	120·3	141·5
The fossil skull	150	101	300	128	134	145

Professor Whitney regards the gravels as preglacial and pliocene, on the basis of the evidence from the fossils found in them.

The Compressed Air Torpedo.

The cigar-shaped fish torpedo gets its motion from compressed air stored inside, and this, issuing at the tail, sets in motion a screw which revolves with considerable velocity. A well constructed fish torpedo will run many hundred yards at a velocity of twenty miles an hour, and on striking its head, which contains the charge, explodes with considerable violence. The fish torpedo is, therefore, a weapon of terrible effect.

A New Stereotype Composition.

This is known as Jannin's cement, from the name of the patentee, a resident of Paris. The cement is simply a mixture, in suitable proportions, of yellow oxide of lead (the quality known as massicot being preferable) with glycerine. Several other metallic oxides and matters may be mixed with the cement, so as to suit the quality or the color of the cement to the nature of the work to be produced, but the two essential compounds are yellow oxide of lead and glycerine. The proportions of oxide of lead and glycerine vary according to the consistency of the cement it is desired to produce. The proportion of glycerine will of course be larger for a very soft cement than for a stiff cement; it is not necessary, therefore, to specify the exact proportion of each of the two essential compounds.

This cement is specially adapted for moulding those objects which require an extreme delicacy in the lines of the cast, such as engraved blocks and plates, forms of printing type, photoglyptic plates, etc. Under the influence of gentle heat it sets in a few minutes, and then resists perfectly both pressure and heat. When set, it is also a very good substitute for natural lithographic stones, and it can replace them for many practical purposes. It can also be used for artistic reproductions, such as *facsimiles* of terra cotta, whose color and sonorous quality it possesses. Though setting to great hardness in a few minutes it does not shrink. Massicot, it may be observed, is an old name for litharge, but the term is more generally applied to the yellow oxide of lead, prepared from the scum of the molten metal by roasting until the color is fully developed. For purposes in which the color is of no moment, the scum itself would doubtless answer, provided it is thoroughly oxidized.

The Aurora Borealis.

The following letter, by Mr. G T. Temple, appears in the recent "Proceedings of the Royal Geographical Society:"

"Although the conjecture hazarded more than 160 years since by Halley, that the aurora borealis was a magnetic phenomenon, has acquired empirical certainty from Faraday's discovery of the evolution of light by magnetic forces, as well as from more recent observations, the following extracts, translated from a letter written by Herr Pastor emeritus H. M. F. Esmark, may perhaps be considered interesting, Herr Esmark having observed the meteorological conditions attending the display of the polar lights for many successive years: 'The aurora is neither seen during extreme cold or northerly winds, but appears when an ordinary arctic temperature is raised by southerly and westerly winds, and is generally followed by snow. In the southeastern part of Norway it seems to be especially caused by southeasterly winds, which are there very moist and rather warm. Its appearance is always accompanied by a falling barometer. In my opinion the phenomenon is due to the following causes: When a wind laden with warmth, moisture, and electricity comes in contact with a body of cold air, the moisture is converted into snow, the warmth and electricity are thereby released, and the aurora is the result of the disturbances. The northern lights cannot occur in very high latitudes, because the warm, moist air is cooled long before it reaches them.' In this way Herr Esmark would account for the splendid appearance of the aurora in Northern Norway, where the sea winds, bringing warmth, moisture, and electricity from the ocean, are met by cold land winds from the interior. MM. Lottin, Bravais, and Siljerström, who spent a winter at Bosekop, in Alten (lat. 70° N.), saw the northern lights 160 times in 210 nights. The most vivid aurora that I ever saw near Alten was toward midnight of the 12th of November, 1874. The flickering lights played about the masthead so like lightning that it was difficult to believe they were harmless. We had no snow, however, till the evening of the 14th, as we were entering Tromsöe Harbor, and during the discharges of light the compass needle was wildly erratic. The determination of the chemical elements involved by means of spectrum analysis is by no means the least of the numerous scientific results to be derived from Arctic exploration."

Advice to Professional Men.

To professional men, men of business, and, indeed, all who are engaged in pursuits requiring more or less severe mental work, coupled with more or less confinement, exercise is, of course, the *conditio sine qua non* of the recreation to be recommended. The fact is so obvious (says a writer in the *Nineteenth Century*) that I need not dwell upon it further than to make one remark. This is to warn all such persons that feelings are no safe guide as to the amount of muscular exercise that is requisite for maintaining full and sustained health. By habitual neglect of sufficient exercise, the system may, and does, accommodate itself to such neglect; so that not only may the desire for exercise cease to be a fair measure of its need, but positive exhaustion may attend a much less amount of exercise than is necessary to long continuance of sound health. However strong and well, therefore, a man may feel notwithstanding his neglect of exercise, he ought to remember that he is playing a most dangerous game, and that sooner or later his sin will find him out—either in the form of dyspepsia, liver, kidney, or other disease, which so surely creep upon the offender against nature's laws of health. According to Dr. Parkes the amount of exercise that a healthy man ought to take without fatigue is at the least that which is required for raising 150 foot-tons per diem. This, in mere walking, would, in the case of a man of ordinary weight, be represented by a walk of between eight and nine miles along level ground, or one mile up a tolerably steep hill; but it is desirable that the requisite amount of exercise should be obtained without throwing all the work upon one set of muscles. For this reason walking ought to be varied with rowing, riding, active games, and, where practicable, hunting or shooting, which, to those who are fond of sport, constitute the most perfect form of recreative exercise.

Copying Architectural Designs.

In Philadelphia the other day an architect applied to the courts for an injunction to restrain a builder from copying an original design for a porch on two houses erected in 1876. The preliminary injunction was dissolved, because the architect had neglected to have his design patented. It appeared that an exact copy was being made of a portico that gave distinctive character to two prominent houses, and the design of which was valuable on that account. It was, of course, an unpleasant thing for the owner to have this design literally copied, but he had neglected to secure for himself legal protection which the patent laws would have given him.