normal again unless the environment had been essentially changed.

In the main, the effects of this eruption on marine vegetation were temporary. The burial of rock that had served for anchorage will no doubt interfere permanently in some places with algæ in the littoral zone. It is possible that this same cause may also lessen the production of the two large kelps, *Nereocystis luetkeana* and *Alaria fistulosa,* but the evidence now at hand indicates that these kelps are well on their way toward recovery.

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## *EFFECT OF LIGHTNING ON A REINFORCED CONCRETE AND STEEL DOME*

OWING to the increased use of reinforced concrete for buildings I have thought that an account of the effects of lightning on a metal dome surmounting walls of this construction may be of some general interest and of particular interest to astronomers.

On the afternoon of January 2 last occurred the heaviest thunderstorm in the immediate vicinity of the observatory since I came to Córdoba. The conditions were well marked—the weather had been very hot and sultry for several days, the barometer had been falling steadily and was low. The center of the storm, judging from the clouds and their motions, was not over a mile south by southeast of the observatory. In an area between one and two miles in diameter the clouds were very dark and low and masses of dark scud moved about underneath them.

In nearly all the storms which I had seen here previously the discharges were nearly all between clouds. (Perhaps because most of them occur at night?) In this storm nearly all of the discharges were between the clouds and earth.

Very heavy single flashes of lightning began about $2^h\ 20^m$ P.M. Córdoba time—apparently under the blackest part of the clouds and not over a half mile away. All of these which I saw were discharges between the clouds and earth, as also with only one exception, were all which discharged within a half mile of the observatory.

The direction of motion of this storm, as is usually the case, was from south to north. After some half dozen discharges close to the south there was a heavy one to the northwest about three hundred meters away—then another to the northeast about the same distance.

On account of this being a heavy storm and apparently passing directly over us, I was interested to see what the effect would be on our two new reinforced concrete walls and steel domes sheathed with galvanized iron, and was outside among the central group of buildings and not over 100 feet from the dome in question, one of them in full sight.

A minute or two after the flash to the northeast, mentioned above, there was a general illumination close by, followed almost instantly by the ripping sound of a very close stroke. The interval between the flash and the sound was certainly not over $\frac{1}{10}$ second. To me the sound appeared to be made up of three or four separate discharges blended into one—not consecutive.

I was standing within a few feet of the machine shops in easy hearing of the noise of the machinery. This noise stopped instantly after the flash. The main fuse on the light circuit had been blown twice before the flash, probably by induced currents. It was also blown again at the time of the flash.

Mr. Mulvey was in the underground optical shop at the time and thought there had been an explosion in the shop. He saw a flash and immediately afterward the lights went out. It was later ascertained that one lamp had burned out, which probably caused the flash which he saw in the shop. No other damage was done there. The circuits and machines were carefully examined but aside from the fuses being blown at the pump motor, on the 220-volt alternating current no sign of a spark was found.

The power and light currents were cut off until about 6 P.M., when it was found that fuses had been blown on our lines (which were special ones) just outside the step-down-station, some 400 meters away. No other effects of the storm were noticed in or near this station.

The dome which had just been completed was barely out of sight from where I stood and no one at the observatory seems to have seen the actual flash. A peon however in the grounds of the Meteorological office about 100 meters away had a full view of both domes and buildings, was facing them and saw the flash just over and about the new dome. This accords well with the direction and distance from my point of observation.

After hearing of this observation I made a careful examination of the dome and in particular the connection of the copper cable with the track upon which the dome revolves, which forms the connection between the metal dome and one of the vertical I beams imbedded in the concrete for grounding the circuit. The lightning-rod proper extends about a meter above the highest part of the dome and terminates in a brush of heavy wire. No signs whatever of any discharge have been found at any point about the dome.

Close to the dome stands the wooden derrick which was used in its construction, the top of which is about two feet higher above the ground than the lightning-rod. Three wire cable guys lead off to trees, two of which actually touch the ground—but scarcely so—and a fourth to a brick building. The cable used for lifting did not touch the ground. Careful examination of all of these points failed also to disclose the slightest sign of a spark.

The three wires of the alternating power circuit pass close to both dome and derrick.

About 70 or 80 meters east and west are, respectively, three lightning rods on the director's residence, and one on the assistants' house. To the south some 100 and 150 meters, respectively, are the metallic tower for the windmill and water tank, about 50 feet high and the first astronomer's residence with two lightning points.

I have been particular in referring to these various conductors, for it seems probable that so many must have been instrumental in reducing the difference of potential somewhat.

The bolt which struck the dome was undoubtedly not a light one for it frightened badly a number of persons in the residences near by and was described by several as a very bright flash. I do not think, however, that it was an especially heavy one, possibly not so heavy as most of the others which struck in the vicinity.

The peon who saw it from the neighboring quinta, was seated at the time under a shed and watching the dome. He says the flash appeared to descend as a single ray, striking the lightning rod and then the whole surface of the metallic dome appeared to be covered with sparks or flashes.

At the time the bolt struck there was a peon inside the closed dome, cleaning the running-gear. When questioned he said he had felt nothing nor had he noticed anything unusual beyond the heavy noise.

It seems certain, therefore, that the dome was actually the principal point of discharge for a fairly heavy flash of lightning. (It is uncertain how much of the discharge was taken by the derrick, but it would appear to have been relatively small.) That the induced currents in the light and power lines were sufficiently heavy to blow the fuses in both.

This experience seems to be a fairly severe test for such a construction—a metallic dome surmounting concrete walls which are heavily reinforced with iron—the metal in the walls having a good ground connection and being connected also with the dome.

From the effects in this case one concludes that after the resistance of the air was broken down, the dome and metal in the walls were ample to carry off the discharge without the slightest apparent damage to either the structure or the man who was inside at the time.

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## *SCIENTIFIC NOTES AND NEWS*

An international committee has been formed to establish a foundation in memory of Henry Poincaré. A medal will be struck in his honor, and a fund will be established under the Paris Academy of Sciences to en-