conductors. Interesting results may be brought out by comparing the effects of using solid metal plates and similar plates cut into sectors, insulated from one another. These results suggest the use of different forms of cores in a solenoid placed in series with the secondary circuit, or with the lamp and coil used to show induced currents.

The screening effects of conducting plates may be shown by placing them between the secondary coil and another coil in circuit with a lamp. For high frequencies, thin sheets of copper or of iron may cut down the brilliancy of the bulb very decidedly.

If a short-circuited coil is used instead of the plate, a similar screening effect may be shown.[4]

To show "resonance," arrange a second oscillating system containing capacity, self-induction, and a small lamp. If the coil of one system is laid upon that of the other, and the natural periods of the two systems are made approximately the same, the bulb lights up and the pitch of the note is changed. There is a considerable range of response in the second system, but with proper adjustment a maximum of light for varying frequencies may easily be observed. The use of two coils in series in this second oscillating system is convenient. One below the secondary coil and the other sliding on top of it makes the adjustment for maximum effect easier. The reaction of this new oscillating system on the secondary and thus on the arc may be very interestingly shown by making and breaking the new oscillating circuit while changing the capacity in the secondary circuit and noting the resulting change of pitch of the arc-note. The direction of this change depends on which of the two free periods is the greater.[5]

In conclusion it should be said that the above suggestions are made merely to call further attention to a means of demonstration which in some respects is simpler than the spark-discharge, and which has certain advantages over models.

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[4] Cf. J. J. Thomson, "Recent Researches," § 427.

[5] J. J. Thomson, "Recent Researches," § 432.

THE "ROCK WALL" OF ROCKWALL, TEXAS[1]

For many years reports of a more or less definite nature have been circulated describing the wonders of the ancient wall surrounding the town of Rockwall, Texas. The writer was able during the past winter to spend a few days investigating this supposed historic structure. It proves to be not a wall, but a number of disconnected sandstone dikes, strictly speaking, not surrounding the town, but trending in many directions. As exposures are few, they have been discovered in such scattered localities in the town's environs as to suggest the idea that they were fragments of a ruined wall.

Rockwall is located in a rich farming district about twenty-five miles east of Dallas. Black waxy soil covers the rolling hills, and only where erosion has been considerable can the underlying rocks be seen. These, when exposed, reveal blue limey strata of upper Cretaceous age in nearly horizontal attitude. A white clay, the decomposed product of the lime muds, generally occurs beneath the black soil. These lime muds are remarkable in their fredom from grit and in the peculiar property which causes them to decrepitate when exposed to the weather; notable also in that, on drying, cracks develop of various sizes. Within this series of semi-consolidated beds a few sandy layers occur. One is revealed by a drill record 1,800 ± feet below the surface; another may be seen near the town of Rockwall at the surface and consists of thinly bedded flaggy sandy limestone.

Though good exposures are infrequent, owing to the depth of soil, a peculiar condition affords ample opportunity to observe the dikes in place. These latter are natural courses for underground waters, and wells are often located on them. Though these walls are filled with water, the rock forming the dike, removed during the sinking of the well, may be examined at leisure.

The dikes are of various sizes, varying from an inch in thickness to eighteen inches or two feet. They stand vertically, or nearly so, and have in cases been followed downward fifty feet or more, always imbedded in the lime muds. They are composed of exceedingly fine-

[1] Published with the permission of the Director, U. S. Geological Survey.

grained quartz sands, cemented by calcium carbonate. So far as observed they do not vary appreciably in width through vertical range. Two joint systems, one nearly horizontal, the other vertical, have cut these dikes in such a manner as to suggest masonry walls, *i. e.*, they are composed of oblong blocks in horizontal layers.

Certain facts may be noted, however, which preclude this view. In a photograph at hand exposing a portion of the dike near Rockwall, it may be seen that many of the vertical joints occur above each other, *i. e.*, they are not broken, which condition would not exist in a wall constructed by hand. It may also be noted that the curve to the upper surface of one block exactly fits the curve on the under surface of the next block above, which leads to the same conclusion. The weathered sands between the joints, stained with iron oxide, have been mistaken for mortar.

To define accurately the steps which have taken place in the forming of these dikes is not as easy as to recognize the nature of the phenomenon. They may have originated in several ways. The sands may have come from above or from below. The cracks may be due to drying or to earth movements. The writer was not able to decide the direction from which the sands entered. Inasmuch as circulating waters have passed for long periods through the sands, dissolving and redissolving the cement between the grains, the original position of the latter can not be postulated. At present they show no signs of bedding. On breaking blocks, what might be called a stalagtitic fracture is obtained, *i. e.*, cylindrical or tubular forms arranged in vertical position. As has been pointed out, this may well be secondary structure induced by circulating water.

The limey muds were probably deposited in very clear quiet waters. A slight elevation of the sea or an increased supply of material from the land may have altered deposition and spread fine sands upon the muds. Cracks formed by earthquakes may have permitted unconsolidated sand to enter as a filling. Again, the muds may have undergone a drying-out process since their elevation above the sea, cracks may have formed from this cause, and overlying sandy layers aided by percolating waters served to supply material wherewith to fill them.

The joints may be ascribed to forces arising from slight warping of the earth's surface, acting on hard vertical masses imbedded in relatively plastic strata.

It is fair to say in conclusion that the believers in the theory which ascribes the origin of these dikes to prehistoric men are in the minority in the locality itself.

SIDNEY PAIGE

APOGAMY IN ŒNOTHERA

THERE seemed at one time a possibility that the phenomena of mutation in *Œnothera Lamarckiana* might be associated with a condition of apogamy in that species. A survey of the hereditary behavior, however, and particularly of the results of certain crosses between the mutants and *O. Lamarckiana,* and also among the different mutants themselves, soon made it apparent that such a condition could not be of high frequency at any rate, in the parent form or in such mutants as *O. rubrinervis* and *O. nanella.* The results of crosses between *O. Lamarckiana* or certain of its mutants, and such wild species as *O. biennis,* also could only be explained by assuming that fertilization had taken place uniformly in the ordinary way, and often the resulting hybrids show the predominating influence of the pollen parent.

But while it seems highly improbable that apogamy in *O. Lamarckiana* is concerned in the origin of the mutants, yet, as I shall proceed to show, there is some very good evidence that one at least of these mutants is itself apogamous, though only in a small percentage of cases.

Œnothera lata is well known to be sterile in its anthers, so that self-fertilization has never been effected. MacDougal[1] has reported that the form closely resembling *O. lata,* from near Liverpool, England, can be self-fertilized, and

[1] "Mutations, Variations and Relationships of the Œnotheras," Carnegie Inst., Pub. 81, p. 15, 1907.