

Correspondence.

Do Birds Eat Acorns?

To the Editor of the Scientific American:

In your issue of December 3, 1892, your correspondent from Troy, N. Y., says that woodpeckers and blue jays do not eat acorns, but do appear to, while they are only opening the acorn in order to secure the juicy morsel—the worm. I think that your correspondent is lying; under a misapprehension in regard to the matter. I have seen blue jays that were domesticated eat white oak acorns, and I have shot wild pigeons whose crops were filled with them. Gray squirrels do eat acorns, to my certain knowledge, when they are in captivity. Your Troy correspondent to the contrary notwithstanding, the Iowa gray squirrel would starve to death before he would eat a worm.

N. B. PAIN.

Eagle Grove, Iowa, December 5, 1892.

Acorn-Eating Woodpeckers.

To the Editor of the Scientific American:

In your issue of Dec. 3, Mr. Nial, of Troy, N. Y., questions Dr. Gibbs' idea or assertion that the woodpecker and blue jay eat acorns. I have quite near my stable an oak (*Quercus agrifolia*) bearing a full crop of nuts. To this tree hundreds of jays and woodpeckers come, carrying off the acorns and stowing them away in every nook and crevice they can find. The woodpecker drilling holes in fence posts (redwood), under the eaves, and about houses, wherever he can find soft wood, much to the annoyance of the householder. I have taken nuts out of these deposit holes months after they had been placed there and found them perfect and no trace of a worm. I have also gathered acorns and kept them one and two years; when opened, dry and perfect. It is said the woodpecker places the acorn in the hole point inward (fact), so that the water running down the tree leaves the porous base of the nut and thus extracts the bitterness.

The Indians use the acorns for bread making, they are bitter when they first fall from the tree, but later on they sweeten. "Rains and melting snows extract the bitter and injurious principle and leave the farinaceous and starchy." Do not the birds lay away for the same purpose, and not for a worm?

Nordhoff, Cal.

JOSEPH HOBART.

A Peculiar Gas Well.

To the Editor of the Scientific American:

I have a gas well on my farm which is very peculiar in its habits, and if any of your readers can explain it would enlighten a good many in my vicinity at least. Three years ago last summer I was drilling for water, and at the depth of 160 feet I struck a vein of sand that took all of the water I could put down. I stopped for a few days, when my man lighted a match and found that we had a small amount of gas. I put a pipe to it and it continued to get stronger until I could get a flame as large as the pipe (that is, 4 inches) and 6 or 8 feet high.

It continued to flow until cold weather, when it went away. I thought I had just struck a pocket and it was all gone; but after a while we had a rain, when here comes the gas again. Now, since then I have piped it to the house and we use it for light and fuel in the cook stove. It is burning now with a nice white light, but it will be gone in the morning, as the weather is cold, with northwest wind. Before a rain it will commence to suck and sometimes continue sucking for several days, according to length and severity of the storm. When it first comes it blows air out, and when the gas comes the flame is as blue as the sky and no light; but it finally changes to a red, and last to white. Sometimes it only stays a few hours, and again for weeks. There is a very black soot on all that the flame comes in contact with, and when not burning has a peculiar smell, and none in a room when burning. The country is fine, black loam soil, blue clay in about 10 to 15 feet from surface; it is 100 feet and more thick. About eight miles northeast is a gas well, 180 feet deep, with a pressure of 10 pounds on a steam gauge; also in that locality they strike gas in 12 to 30 feet, digging wells; but do not know if any have that peculiar affection for the weather. My well has 136 feet of 4 inch casing, and then is piped to the house in a 1½ inch pipe. I would like to hear from any inquirers who think they can solve the problem, or be glad to have answer in SCIENTIFIC AMERICAN.

JOHN A. ROBERTS.

Morton, Tazewell County, Ill.

[That you should obtain gas from beneath a thick bed of clay underlined with soft coal is not at all strange, but rather may be expected. The soft coal beds are impregnated with gas that gives great trouble to the miners in all the soft-coal-bearing States. We have had several communications in regard to the blowing wells in the Western country. The cause seems to be due to the variation in barometric or air pressure during stormy periods. A falling barometer indicates lighter atmospheric pressure, causing the well to blow or breathe, as some call it, while a rising bar-

ometer makes the well draw air in. The change in the color of the flame arises from the mixture of air with the gas in the pipe. There is but little doubt that the pressure of the atmosphere is felt well down in the depths of the earth, wherever there is soil or sand that is pervious to water or gas, and through any openings through the vast clay and rock beds of the Western States, lying as they do nearly level and covering great areas. The barometric air action sweeping over these areas must cause a tidal action upon the air or gas spaces beneath the earth's crust, as it is well known to do upon the Western lakes by causing a surging of the waters from shore to shore.—EDITOR.]

The New Chronology of the Pantheon.

About two months ago we referred, with astonishment and no little skepticism (a feeling shared by some of the first English archæologists of the day), to the theory about the rotunda of the Pantheon which had been propounded by M. Chedanne, a young French architect, and set forth in an article in the *Revue des Deux Mondes* in August last by the French sculptor M. Guillaume, to the effect that the rotunda was not of the age of or the work of Agrippa, at the date of 27 B. C., but a building of the second century A. D., erected in the reign of Hadrian, and that it was tacked on to the portico, instead of the reverse process hitherto believed in. The inherent architectural improbability of the portico being erected first and a circular building added behind it seemed too strong an æsthetic argument to be passed over, and it must be added that the rather inflated style of M. Guillaume's article, which was manifestly a piece of trumpet blowing for French archæology, was not calculated to predispose one to an attitude of faith. Whatever we may think, however, of the good taste of the *Revue des Deux Mondes* article, it would appear that the trumpet has not been vainly blown, and M. Chedanne has led the way to one of the most important discoveries for some time back in Roman archæology, and has established the fact of the later date of the rotunda, though, as we shall show, there is room for another theory than the improbable one of the round building having been actually built against and fitted to the portico as it stood. Possibly, if M. Chedanne had written the article himself, in a more practical style, and accompanied it with representations of some of the objects which furnish the evidence for this view, he would have found more ready acceptance than was likely to be accorded to the rather exuberant eloquence of M. Guillaume.

As is known to all students of Roman archæology, an inscription on the frieze of the octastyle portico records that the Pantheon was built by Augustus' able minister and relative, Marcus Vipsanius Agrippa, during his third consulship, that is, in the year 27 B. C. The inscription runs thus:

M. AGRIPPA. L. F. COS. TERTIVM. FECIT.

And this inscription has naturally been taken to refer to the whole structure, more especially since the point of junction between the great portico and the rotunda behind it appeared to show that both were of the same date and had been built together—not that one had been added to the other.

Early in the year 1892, the appearance of certain patches of damp on the inner surface of the dome rendered necessary some repairs to the stucco lining of the coffer of the dome and a careful investigation of the point where the rain was able to soak in from the outside.

The Italian authorities very kindly allowed the work of repair and investigation, together with the erection of the necessary scaffolding, to be placed under the superintendence of M. Chedanne, who is one of the Prix de Rome students in the Villa Medici.

This enabled M. Chedanne to make a new and very careful set of measurements of the whole building, and to produce a most valuable set of drawings for his *envoi*, to be submitted to the authorities of the Ecole des Beaux-Arts in Paris.

As already noted, the result of the investigations which were thus made has been described, with a certain amount of rather tentative theorizing, by M. Eugene Guillaume, the able French sculptor who is now director of the Ecole Francaise de Rome, in the *Revue des Deux Mondes* for August, 1892, p. 562; and the subject has also been treated by the Roman archæologist, Signor F. Bongioannini, in the "Nuova Antologia," vol. xli., serie iii., fascicolo del 1° Settembre, 1892. The conclusions arrived at by these two authorities are not altogether the same, and it may, perhaps, be well to indicate briefly what appear to be the really important pieces of evidence, and what the most probable conclusions to be derived from them seem to be.

First, with regard to the comparatively late date of the rotunda, the one really valuable and, it may be said, conclusive piece of evidence is derived from the inscriptions stamped upon the bricks which are used as facing and as bond courses in the solid concrete both of the drum and of the dome.

A large number of these bricks or tiles (*tegula bipedales*) have been withdrawn from various parts of the

structure, and all their stamps agree as to the date of the tiles being not earlier than the first half of the second century A. D.

As examples of these brick stamps we may quote the following. The inscriptions are arranged in the usual manner in two concentric circles around a central badge or symbol. It is to be regretted that neither M. Guillaume nor Signor Bongioannini have in their articles quoted these inscriptions, which are by far the most conclusive evidences of date:

1. DOL ANTEROTIS SEVERI
CAESARIS N

Badge or trade mark, a bull's head. This may be translated: "Clay work of Anteros Severus [slave or freedman] of his Majesty."

2. C AQVILI APRILIS EX PRAEDI
CAES BIPEDALE DOLIA

Badge, a pine cone. "Two-foot tile of clay work made by Caius Aquilius Aprilis on the imperial clay fields."

3. ROSCIANI DOMIT AGATHOB

Badge, a bust of Isis between a palm branch and a sistrum. The translation of this is doubtful; it may mean "Clay work of Roscianus [freedman] of Domitianus Agathobulus."

4. APRILIS CN DOMITI
AGATHOBVLI

Badge, a bull's head between two palm branches. "Clay work of Aprilis [freedman] of Cn. Domitianus Agathobulus."

5. TEG DOL DE FIG IVLIAE
PROCVL FLV NEG

"Tile work of clay from the potteries of Julia, the daughter of Proculus."

All these inscriptions have previously been discovered on bricks in other buildings, and they are known, from various reasons, to be of about the time of Hadrian. Brick stamps of any kind of as early a date as Agrippa's time, in Rome at least, are unknown.

The fact that *tegulae* bearing these inscriptions have been found in many different parts both of the walls and of the dome is sufficient evidence that they do not belong to a partial repair of an older structure. They must, therefore, be taken as evidence that the existing rotunda and dome were not built till about a century and a half after the time of Agrippa.

The second important piece of evidence was the discovery of an earlier pavement nearly seven feet below the present floor of the rotunda, showing that the original Pantheon stood at a considerably lower level than the existing building.

On the whole, the most probable theory of the structural history of the Pantheon appears to be this—that Agrippa built the existing portico, which bears his name, as the approach to a *cella*, which was probably of the normal rectangular form; the pavement of this *cella* being that of which a portion has been exposed at the lower level.

Then, in the time of Hadrian, the original *cella* was pulled down, and in its place the present dored rotunda was built, with its floor at the higher level.

Agrippa's portico was at the same time taken down and carefully rebuilt on to the new circular *cella* at the higher level; the inscription on the frieze not being interfered with.

This would account for the absence of any signs of two different dates at the junction of the portico with the rotunda. The inscription, therefore, must be taken to refer to the portico only, with its sixteen magnificent monolithic columns of red and gray Egyptian granite.

At present this theory is only conjectural, but there can now be little doubt as to the rotunda not being earlier than the second century A. D. Further investigation may possibly throw clearer light on this difficult and very interesting problem.—*The Builder*.

Moisture in Gases.

The important bearing of moisture upon the combination of gases, and in some cases even when this combination is attended with combustion, is mentioned by Sir Henry Roscoe in the course of an appreciative notice in *Nature* of a book of chemical lecture experiments recently published by Mr. G. S. Newth. Mr. Newth gives several experimental demonstrations of the fact that many gases, when perfectly dry, do not combine; carbonic oxide and oxygen being of the number. Sir H. Roscoe adds a striking illustration to those mentioned in the book. It is as follows: Dry a current of carbonic oxide over glass balls moistened with strong sulphuric acid; light the stream of gas as it issues from a horizontal tube; then plunge over the blue flame a cylinder full of air which has been previously dried by shaking it up with a little strong sulphuric acid. The flame instantly goes out. This remarkable result of extinguishing a flame of gas by merely dried air is very suggestive of the hidden value that may attach to what are commonly regarded as impurities in chemical compounds and mixtures.