

Scientific American.

ESTABLISHED 1845.

MUNN & CO. Editors and Proprietors

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico... \$3 00
One copy, six months, for the U. S., Canada or Mexico... 1 50
One copy, one year, to any foreign country belonging to Postal Union... 4 00

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN.

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MUNN & CO., Publishers, 361 Broadway, New York.

The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO.

NEW YORK, SATURDAY, NOVEMBER 26, 1892.

Contents.

(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 882.

For the Week Ending November 26, 1892.

Price 10 cents. For sale by all newsdealers.

Table listing the main contents of the supplement, including sections on Entomology, Geography and Exploration, Mechanical Engineering, Medicine and Hygiene, and others.

A RECENT PROJECTILE TRIAL.

A very interesting ballistic trial of an armor-piercing projectile took place on November 10, at Reddington, Pa.

While great strides have been made in the development and manufacture of armor and guns in this country of late, the subject of armor-piercing projectiles has not been neglected.

In this country a number of steel makers have taken up the study, manufacture, and development of projectiles, some having purchased the secret processes of foreign makers.

The projectile fired at Reddington was one that had been manufactured under the Wheeler process, by the Sterling Steel Works, at Demmler, Pa.

It was then sent to Reddington, to Lieut. J. F. Meigs, United States navy, who fired it again on November 10. He gave it a velocity of 1,660 feet per second, firing at a soft nickel-steel plate of 14 inches thickness.

The point and ogival head were in splendid condition and were highly polished. The cylindrical part of the projectile had split longitudinally, one part remaining intact with the ogival head, the other part detached.

The average projectile either breaks up or becomes so distorted on the first fire at a modern armor plate that it is useless; but this one had passed, with very slight distortion, completely through one plate, and on its second firing did not break up badly.

THE COMET.

A day or two after the date of this issue of the SCIENTIFIC AMERICAN the earth will be on intimate terms with a celestial visitor from far-off regions. For on November 26 and 27 it is calculated that Biela's comet will be probably within one million miles of the earth.

For to-day we know little of comets. They have as distinctive features a head or nucleus and a tail. The latter is of such excessive tenuity that although it may be conspicuous on the absolutely black background of the heavens, yet stars can shine with virtually undiminished luster through a million miles of it.

Sir Isaac Newton compared the brightness of a comet's tail to that of the notes in a sunbeam an inch or two thick. Imagine this diffused through the vast space filled by the comet.

But the nucleus of the visitant is more solid and contains a greater concentration of mass. From it the tail emanates. The tail points away from the sun in whatever direction the comet is moving, suggesting Stockton's "negative gravity."

speck may be solid incandescent matter or may shine by reflected light. From it in its passage through space fragments of all sizes may be torn off and distributed along the comet's orbit.

The tail of a comet points away from the sun. Running down its axis, a dark straight line has been observed. This seems to be the shadow of the unknown nucleus.

Volcanic eruptions making or annihilating islands impress us as overwhelming in their might. The impact of a cometary nucleus in the formation of a crater, with the possible penetration of the earth's crust, and in the creation of tidal waves, might affect the destinies of a continent.

But even this is all conjecture. Meteorites are principally composed of metallic iron and nickel. These incidentally are about the last things we should look for in them.

An extraordinary thing is noted by Langley. Sir Isaac Newton, he says, made one of his "guesses" in this connection that take the nature almost of prophecy. Two hundred years before the spectroscope was invented, and a century before the work of Black had borne its fruits, Newton surmised that comets might supply the atmosphere with its carbonic acid gas.

The comet of 1680 was subjected to heat two thousand times greater than that of red hot iron, according to Newton's calculations. From the neighborhood of the sun the comet flew into the regions of almost absolute zero.

The size of meteorites is generally small. In view of their high velocity this is a fortunate circumstance for us, who have to stand their bombardment. They are also very widely dispersed. In a shower of meteorites, it is probable that the individual masses are ten miles apart.

When the earth meets these asteroids, which are of far more than icy coldness, they fly through its atmosphere with enormous velocity. As certainly as the impact with an armor plate heats an iron cannon ball, so the friction with the atmosphere heats the celestial projectile.

Here is at least a notch or foothold for a theory. The meteorites which reach us intact are masses of nickel and iron. Curiously enough, one of the very alloys proposed for use in making projectiles for guns and armor for war ships is a nickel-steel alloy, so that we are not yet much in advance of the celestial artillery.

Leaving this aside, we may assume that, however large the nucleus of a comet is, it is composed for the most part of carbon and of easily disintegrated materials to which our atmosphere will offer a real resistance.

This would account for the cosmic dust, and for the survival of the fittest projectile material, nickel-iron or nickel-steel, for even the carbon is there for its cementation. This gives us the satisfaction at least of feeling that our earth's envelope of oxygen and nitrogen will protect us from all but metallic projectiles, and if we are to be bombarded, it will be with improved and modern shot.

THE demand for Percheron horses for export is so great that the purity of the breed is threatened, and a stud-book has been started in France by which the pedigree may be preserved and the race kept up to the standard