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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 290,

For the Week ending July 23, 1881.

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SEPARATION OF THE COMET.

As Professors Stone and Wilson of the Cincinnati Observatory were watching the comet, on the night of July 6, it was seen to separate into two parts. The report of the observation says that a jet was seen to proceed from the nucleus in the direction of the tail, and gradually form a separate nucleus, the division being sharply defined.

This is not the first known splitting of a comet, Biela's comet having divided, probably in a similar manner, some time between 1845 and 1846; but this is the first time that the actual separation has been observed.

This spontaneous division of the comet into two comets gives peculiar interest to certain speculations as to the identity of the present comet and the possible fate of all comets.

In a communication to the *Herald*, dated July 1, Prof. Lewis Boss, of Dudley Observatory, Albany, N. Y., discusses the striking similarity of certain elements of this comet's orbit to the corresponding elements of the orbit of the comet of 1807. That the two comets are not the same body—that is, that the comet of 1881 is not a premature return of the comet of 1807—he is quite sure; but, he asks, could these bodies have originally formed a part of the same body?

For illustration he refers to the comet discovered by Biela in 1826, whose splitting has already been mentioned. This comet was found to revolve around the sun in the comparatively short period of seven years. It was not seen again, however, until 1845, when it presented its usual appearance.

On the 12th of January, 1846, Professor Hubbard, of the Washington Observatory, on looking at the comet through his telescope, was surprised to find not one, but two distinct comets in the same field of view. The distance between the two bodies was small, but went on increasing night after night, until in March the distance apart had become 200,000 miles. At its next return in 1852 this distance had become more than a million miles. What became of the comet in subsequent years can only be conjectured, for it has never since been seen, unless an observation of a strange body by Pogson, in Madras, is held to be authentic as a view of this comet of Biela—a matter about which opinions are divided.

Professor Boss continues: "What has happened once may happen again. It is known that great forces of mutual repulsion exist in the particles which constitute a comet. It is to this that we probably owe the varied appearances in the head of a comet as it approaches to or recedes from the sun. By able astronomers this force of repulsion is held to explain the existence of the gigantic tails which are seen projected from the heads of comets on the side opposite the sun.

It would seem possible that the two comets of 1807 and 1881 may have formed a single body in distant æons of time, and that at a certain period the original body separated into two, diverging more and more widely, until now we have them, the one following nearly but not quite in the wake of the other at an interval of about seventy-four years. It is a question well worth the close examination of astronomers. If the present comet should prove to have a period of from 1,100 to 2,200 years, the reasonableness of the above conjecture will be almost demonstrated."

The observed division of the comet now in sight gives peculiar significance to these suggestions. It also shows that the natural subdivision of a comet is no longer to be considered—as the splitting of Biela's comet has been—an astronomical anomaly. And the question arises: To what extent can this process of subdivision go? The hypothesis suggested by the behavior of Biela's comet, namely, that meteoric belts or streams may be due to cometary disintegration, certainly receives additional plausibility from this repetition of (so far as positive observations go) the primary act of division. With a few more splittings the comet might entirely cease to be visible.

FULMINATING COMPOUNDS.

In answer to a number of correspondents respecting fulminating compounds and mixtures, we give the following:

A fulminating composition is one that detonates by percussion or friction. There are a large number of substances, chemical compounds and mixtures, that come within the scope of this definition, but for various reasons only a few of these have found any practical application as primers. Nitro-glycerine, nitro-cellulose (gun cotton), and the chloride and iodide of nitrogen are fulminating compounds, though not usually classed with percussion mixtures; but their detonation takes place with extreme violence, and so quickly that in many cases they do not ignite gunpowder when detonated in contact with it. Chloride of nitrogen is so exceedingly sensitive to friction or percussion, that its preparation is rarely attempted. It can only be prepared and used safely in minute quantities. The following are some of the metallic fulminating compositions:

Fulminating Antimony: Tartar emetic (tartrate of antimony and potassium), 100 parts; charcoal, finely powdered, 3 parts.

The mixture is well triturated together and put into a crucible, capable of holding one-fourth more than the charge; and covered with a layer of charcoal. The cover is then luted on and the crucible exposed to a bright red heat for three hours, then covered with clay and allowed to stand for seven hours, after which the contents is carefully transferred to a wide-mouthed, glass-stoppered bottle, where, after a few hours, it crumbles into a powder. This powder contains much metallic potassium as well as finely divided antimony, and fulminates violently when brought into contact with water, or when moistened with a drop of that liquid.

Fulminating bismuth is prepared in a similar manner from bismuth, 120 parts; cream of tartar, 60 parts; niter, 1 part.

The tartar is heated until it begins to blacken before mixing. This compound is rich in potassium and fulminates violently.

Fulminating copper is prepared by digesting precipitated copper with fulminate of silver and a little water. It explodes by percussion with a great flame. Fulminating zinc is prepared from zinc filings in a similar manner.

Gold fulminate is formed by digesting the terchloride of gold in a slight excess of aqua ammonia. It is a brownish-yellow powder, and can be safely made only in very small quantities at a time, as it explodes with great violence on the slightest friction or sudden increase of heat.

Platinum fulminate is similar to the gold salt—it may be prepared by digesting platinum sulphate with ammonia.

There are several methods by which fulminating silver may be prepared. The following is one of the best:

Dissolve 1 part of silver in 10 parts of hot nitric acid (sp. gr. 1·37), and add the solution to 20 parts of alcohol of 85°. Gradually heat the mixed liquid to the boiling point, then set it aside to cool. The fulminate of silver deposits in lustrous white crystals. They are washed with a little cold distilled water and distributed upon separate pieces of filtering paper in portions not exceeding 2 grains, and left to dry in the air. This fulminate dissolves in 36 parts of boiling water, but the solution deposits the greater portion of it on cooling. It is exploded when dry with great violence by slight percussion or friction, or by contact with a drop of sulphuric acid. When wet it is not quite so explosive, but under any circumstances it can hardly be handled or kept with safety.

Fulminate of mercury, the material now almost universally employed for the priming of gun-cartridge caps. The most convenient way of preparing this substance is as follows:

Dissolve by aid of gentle heat 1 part of mercury in 10 parts of nitric acid (sp. gr. 1·40), and pour the solution at a temperature of about 131° F. into 8⅓ parts of alcohol (density 0·83), contained in a capacious glass flask—at least six times larger than is necessary to contain the volume of liquid. A few minutes after there begins at the bottom of the flask a light disengagement of gas, the quantity increasing until a quick ebullition is produced. The inflammable white vapors given off are very poisonous, hence the operations are performed with the vessels in the draught of a chimney or out of doors. When the ebullition and disengagement of vapors have stopped, the contents of the flask are turned out upon a filter, and the precipitate is washed with pure cold water until the washings have no action upon litmus paper. The filter paper containing the washed fulminate is then spread out on a copper plate, and heated by hot water or steam to about 200° F. The dry fulminate is separated into portions of about 1¼ drachms, wrapped up in softpaper, and kept in large stoppered bottles. The powder, when properly prepared, is composed of small brownish-gray crystals.

It is decomposed with flame and explodes by a shock or when heated to 370° F. The largest crystals detonate most easily. When it is mixed with thirty per cent of water it may be ground on marble without danger of explosion.

POISONOUS REFRESHMENTS.

The need of especial care in the preparation of refreshments for picnic parties and the like has been shown with painful emphasis in several instances recently.

At Decatur, Georgia, thirty-five persons are reported to have been seriously poisoned, June 21, by a salad prepared in a brass kettle. All suffered seriously; but, thanks to prompt medical service, no lives were lost.

Less fortunate were a party of 500 or more who attended a picnic at Warrensburg, Missouri, July 4. The caterer provided lemonade, so called, in which some unwholesome acid was substituted for lemon juice. A press report—possibly exaggerated—dated the following day, said that eight drinkers of the spurious lemonade had died and a hundred more were in a critical condition.

Ice cream made in a copper-bottomed boiler is similarly charged with poisoning painfully two hundred persons, near Keota, Ill., on the 4th. Possibly indiscretion on the part of the cream eaters may have occasioned serious gastric trouble without any mischievous agency on the part of the alleged copper-bottomed boiler; and similar indiscretion may have occasioned the illness charged to poisoned salad in Georgia. Still it should be borne in mind that badly prepared refreshments are a too frequent attendant of popular merry-makings, and people cannot be too careful with respect to their eating and drinking on such occasions.

THE MANUFACTURE OF CELLULOID.*

Celluloid, a complex combination formed by mixing gun-cotton and camphor, is to-day well known, as it is an industrial product. It is being manufactured in France, at Stains, near Paris, whence it is sent out ready to be worked like wood, ivory, or tortoiseshell. It can be turned, sawed, moulded, polished, etc. We have, on a previous occasion, stated that it originated in America, having been invented by the brothers Hyatt, as long ago as 1869.

Much care is necessary in preparing it. A recent com-

*Revue Industrielle.