Science and Art.

The Appearance and Movements of Comets.

The solar system consists of its central sun, supplied by its own mysteriously caused and unsurpassably intense light, a number of substantial planets, which, with their satellites or moons, reflect light received from the sun, and of an unknown number of singular appearances termed comets. The last named class attract attention only at intervals. The planets, sailing at regular distances round the sun, are, on the contrary, always more or less subjects of examination.

The term *comet* signifies *long hair*. The heavenly bodies which we denote by this name, have frequently one or more tails, or radiating arms, though some have none. It is worthy of especial remark that the diminishing horn or luminous streak attending comets, does not lie in the path behind the main body, like the smoke and flame following a burning brand thrown through the air, but like a luminous shadow is invariably projected in the direction opposite to the sun. Comets shine by a light, the nature of which has, so far, been undetermined; some astronomers deciding it to be solely reflected, and others purely direct, like that from a fire, or from phosphorous. Comets are very erratic in their movements. If the regularity of the motions of the sun and planets be properly compared to the wheels of clock-work, comets may be described as insects which buzz in and out amongst them. So far there has been no collision observed between a comet and any planet, nor in examining the motions of the latter can there be detected indications of any motion which could, by any supposition, have been derived from such a collision.

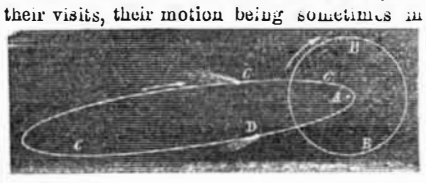
The earliest records of comets are very extraordinary, but they are preserved in such terms as are very unsatisfactory. They were universally regarded with superstitious awe, as forerunners of war, pestilence, or the like, and are described as "flaming swords" of "prodigious size," "presenting an horrible aspect," and the like terms, of no possible value as data for comparison with other heavenly bodies. But there is reason to suppose that there were exhibitions far more brilliant and extraordinary than any observed in later times. One is described as rivaling the sun in brilliancy, and although it is difficult to say how much in this expression should be allowed for extravagance in the writer, it cannot be an ordinary display of what are now, at best, but blazing stars. Hundreds of appearances and disappearances of comets have been carefully observed since astronomy has been cultivated as a science; and although no two appearances exactly agree, there have been sufficiently near coincidences, both in magnitude and times, to identify several. Sir Isaac Newton, Edmund Halley, and others worked out and collated a great amount of evidence regarding a remarkable one appearing in their time, in 1682, and judged it identical with that of 1531 and 1607. They predicted its re-appearance about the year 1759, and again about 1835, and the comet kept both these appointments with tolerable punctuality. Its period being 75 or 76 years, this body termed "Halley's Comet," will make its next appearance about 1910.

Several less important comets have been quite carefully timed. M. Biela, of Josephstadt, discovered Biela's comet, a small affair, completing a revolution in 6 3-4 years. This is a faint body without a tail, and only seen through telescopes, as are also Professor Encke's of Berlin, having a period of 3 1-3 years, De Vico's, of Rome, of a period of 5 1-2 years, Brorson's, of a like period, and Peter's of 16 years.

Comets revolve in anything but circular orbits. The larger ones dash in from the darkness of space, pass very near the sun, shining at those periods with great brilliancy, and again retire in the same manner, gradually fading as they withdraw. This accounts for their appearing only at intervals. The orbits of some, so far as can be observed, indicate that they will never return; but the great mass are *supposed* to be more or less regular in their periods; the telescopic comets of short periods, referred to, do not retire to any very great distance, but are, at all points of their course, within the orbit of Jupiter.

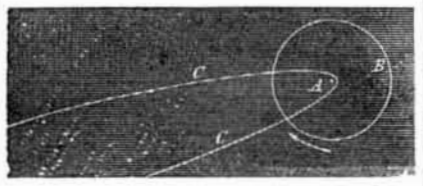
Some comets move very swiftly, others with extreme slowness. Some pursue a very irregular course; but Newton's law of gravitation fully accounts for all these motions. Observation, so far as such has been made available, indicates that all move in paths which, but for the influence of the planets, would be either ellipses, parabolas, and hyperbolas.—These terms are worthy of a further elucidation.

In fig. 1, A represents the sun, B the orbit of the earth, and C the path of a comet moving in an ellipse. In this general form, but more or less elongated, are the paths of all those comets which have been found to repeat their visits, their motion being sometimes in



the direction represented by the arrow, or corresponding with that of the earth and other planets, and sometimes in the reverse direction. Whatever the direction of the motion, the tail is always stretched from the sun, so that it streams behind as the comet approaches, and goes before it as it recedes from the sun, the latter condition being represented at D. The propriety of terming such an appendage a *tail*, may be very much questioned.

Fig. 2 represents the path of a comet, which, like that of a very notable one in 1680, if an ellipse, is so extremely long that it could not



be distinguished from a parabola, or one of infinite length. It is, therefore, very uncertain when, if ever, this comet will return.

Fig. 3 represents a comet moving in a hyperbolic orbit, or one which cannot connect and return into itself. Such comets cannot, in the nature of things, ever return again.—They travel almost directly toward the sun, with a continually increasing speed, make a kind of short bend around it at an immense

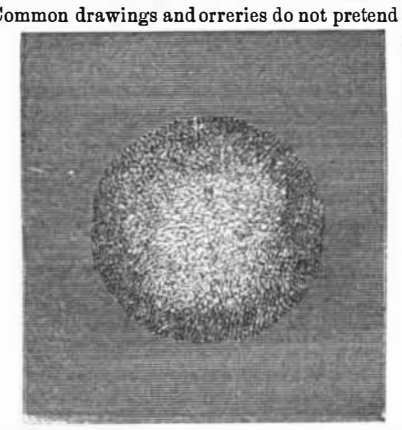
velocity, and then depart into the immensity of space, to be attracted, it is presumed, finally into some other system, where the same interesting programme will be repeated.

The first appearance of any comet is usually faint. As they approach the sun they become more luminous, and throw out tails of greater or less length, and as they retire fade away in the same manner. But it is a remarkable fact that each successive appearance, either of Halley's, as of any other known comet, has has been less brilliant than before. It has been conjectured by some that the matter forming the tail, whatever may be its nature, is diffused in space, and never attracted back to join the mass—a theory sufficient to account for the diminution of each.

Planets all revolve in pretty nearly the same *plane*. By this we mean that their orbits can all be traced with tolerable correctness by making circles or slightly elliptical figures on a sheet of paper, or on a field of ice, but the orbits of comets seem to observe no such law. Their paths could only be represented by supposing an immense number of rings, or rather long elliptical loops, shook up together irregularly.

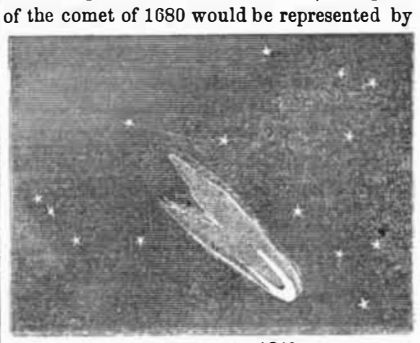
The possible collision of a comet with the earth is now attracting considerable attention from a silly rumor that a French or German savan has predicted such an event to occur on the 17th June next. The distinguished astronomer referred to has utterly disclaimed any such prediction, asserting in a published letter that the only comets in sight, or expected, move in paths which do not coincide with that of the earth at any point, and that the chances are exactly on a par with those of a collision of an omnibus in the streets of London with another in the streets of Paris.

Millions of miles are quantities which it is difficult to grasp and compare, but most of our readers are habituated to the contemplation of models and drawings on a small scale. Common drawings and orreries do not pretend



TELESCOPIC VIEW OF BRUHN'S, ONE OF TWO NEW COMETS NOW VISIBLE.

to show magnitudes and distances, but only the motions. A correct model on the liberal scale of one million miles to one foot, would represent the sun by a cannon ball ten inches in diameter, and the earth by a shot one-tenth of an inch in diameter, and revolving in a circle 190 feet in diameter about the former. Taking into account the probable number of comets which have visited, or ever will make make their appearance within the solar system, the chances of a collision have been computed by mathematicians, and endorsed by astronomers generally, to be about 1 to 200,000,000. Halley's comet, the only *large* one which has been correctly calculated for, moves pretty nearly in the plane of the ecliptic or of the earth's orbit, but the still larger one of 1680 moved like that referred to in the strong comparison to omnibusses in different cities, in an orbit which can by no possibility touch the earth. There is no up and down in astronomy; but if the orbit of the earth around the sun be represented as a level circle, the path of the comet of 1680 would be represented by



THE COMET OF 1819.

an almost vertical plunge from above, making a short bend around the sun, almost in contact, and again arising and disappearing by a corresponding path. Conditions nearly similar exist with regard to the other, the small, comets known except Biela's. This latter chances to travel in a path, which at one visit in 1832, careful computation showed would exactly cross the track of the earth, and although the times of the two masses arriving at that point differed by nearly or quite a month, it was much feared that from the unstable and fickle character of the gauzy monster, it might chance to hasten its visit, so as to endanger us.

Comets can never be timed with certainty, as they are liable to great accelerations and delays from the attractions of the planets. It is considered a very close calculation if Halley's comet is computed to within even two or three months of its actual appearance, and a prediction that a comet will be at any point on a set day will be readily seen to be most arrant quackery in science. There was in 1832 a possibility of collision, though the results would very probably have been insignificent, but at the present time no comet is expected whose orbit passes across ours.

All search for the great comet of 1556, which it was supposed might be identical with that of 1264, and consequently should have appeared again about 1848, has been long since abandoned. Two new telescopic comets have been lately visible, and the first, that discovered by M. D'Arrest, was distinctly seen for several nights through the large telescope of Mr. Campbell, in this city, but it gradually departed several weeks or months ago; and the last, discovered by M. Bruhn, of Berlin, on the 18th of March, the one pictured above, attracts no more attention than usual among astronomers.

We may recur to the subject again, particularly in reference to the magnitude of some, and the almost inconceivable lightness of all comets so far as observed.

Glycerine and Kreosote in Scarlatina.

The Boston *Medical Journal* states that Dr. King has used the above combination with much satisfaction in several cases. To one ounce of glycerine he adds two drops of kreosote, and rubs the mixture over the entire surface, except the face and scalp, night and morning, previously sponging the body well with warm water.

Cultivating Shad.

R. L. Pell, Esq., in a communication to the *Journal of Commerce*, recommends the fishermen to devote half an hour at the end of each fishing season, to plant the spawn of a dozen shad, each of which would produce fifty thousand fish towards the next year's supply. He has succeeded in cultivating the ova until they were fully developed fish.

Frankland, the German chemist, has discovered two remarkable acids, which result from the the action of nitric oxyd upon zinc-ethyl, and zinc-methyl. They slowly absorb nitric oxyd, and form a crystalline body which inflames in the air.