FIVE BRAZILIAN DIAMONDS.

AT the International exposition held at Amsterdam during the summer of 1883, was exhibited a suite of wonderful round diamonds, that, for their size and merit, were awarded the prize for 'round bort.' They were purchased by a New-York firm, who offered them to Messrs. Tiffany & Co., and, on examination, were found as follows: —

They are of Brazilian origin, four in number, and all as round as marbles. In this form they can be used for drilling-purposes to equally good advantage with the black amorphous carbonado, as the intricate twinning or compounding destroys the easy cleavage property that renders ordinary crystals unfit for this purpose.

No. 1 (fig. 1), the largest diamond, is entirely round, of a light vitreous brown color, and translucent; its entire surface being covered with small re-entering angles, giving it the appearance of the fibrous, or, rather, bunched crystals of acicular rutile, variety nigrine, from Magnet Cove, Ark. These markings, numbering hundreds, are over the entire surface, and render it very evident that the crystal is the result of a multiplicity of twinnings of cubic crystals, as is often the case with iron pyrite. It is 17 millimetres in diameter, and weighs 8.542 grams ($41\frac{3}{4}$ carats); specific gravity is 3.51954.

No. 2 (fig. 2) is entirely round, of a milky gray color, and translucent. To the eye the surface appears quite smooth; but under the glass the same markings show, on a smaller scale, as in the large diamond, though the surface is duller. It is 10 millimetres in diameter, and weighs 2.0815 grams ($10\frac{7}{32}$ carats); specific gravity is 3.522.

No. 3 (fig. 3) is almost entirely round, of a milky, translucent white, no crystalline markings being visible, and has a fused vitreous appearance, as if it had been originally round, with small pit-markings, and then the entire mass fused, thus nearly obliterating the pitting. It is 9 millimetres in diameter, and weighs 1.289 grams ($6\frac{3}{8}$ carats); its specific gravity is 3.5218.

No. 4, the weight of which was 1.478 grams, and its specific gravity 3.649, proved, on examination, not to be a diamond, but a red hematite sphere that had been rolled, and was evidently a pseudomorph after limonite or some other like mineral, or was filled with air-cavities (see low specific gravity). Not coming into ownership of it, I could only try the surface, whereas, if it could have been broken, more definite results might have been arrived at.

It seems very remarkable, however, that this specimen, having been viewed by the majority of the Amsterdam diamond-dealers, examined by the judges and experts, and then passed through the hands of several old and experienced importers of diamonds, should have deceived them all. So perfect was its color and lustre, that even a diamond-cutter, when informed of the facts in the case, was not convinced until he had tried the stone on the wheel.

Another curious diamond (figs. 4 and 5) is now in possession of Messrs. Tiffany & Co., weighing $6\frac{3}{32}$ carats, the original weight of which was $10\frac{1}{2}$ carats, 4 carats having been lost

FIG. 1.

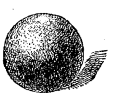

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

in cutting. This stone has eighteen facets, of which four, of the top and the table, are white, and four are a distinct black; on the back, four facets are white, and the other four and the culet are black. The stone was found to be excessively hard, much above the average of hardness, in fact; and, although apparently poorly cut, the cutter had sustained a loss, owing both to the longer time required in the work, and also to the fact that he was remunerated at a certain rate per carat. This diamond is of Brazilian origin, and was originally an octahedron. When found, the entire stone was a jet black, and it was cut with the intention of producing a black stone. After the table had been put on one of the points, and the four edges of the octahedron had been removed to make four facets, it was found that the black color was only a superficial coating, and that the inside of the crystal was entirely white, with the exception of an occasional carbon inclusion. It shows no more play of color than a black stone, but gives very decided brilliant metallic reflections. The curious effect of five white and four black reflections, and the appearance of a clearly defined Greek cross in black outline, when viewed by transmitted

light, make the stone a remarkable freak of nature; and not a little interest is added to it by the fact that its strange features were so well developed by mere accident.

Among curiously marked diamonds resembling the above, may also be mentioned the two presented to the Jardin des plantes by Halphen, and described by Descloizeaux (see *Poggendorff's annalen*, 1849, ix. p. 447).

These stones are colorless and round, and a distinct three-leaved clover in black occupies the entire dimension in each stone. Another in the Duke of Leuchtenberg's cabinet, now in the Bavarian state cabinet at Munich, has three leaves united by a circle. All these three are of Indian origin.

A curious diamond (fig. 6), also in the possession of Messrs. Tiffany and Co., is a red brilliant, that at first glance appears brown, while through it a beautiful dark rose-red light breaks in every direction: really, therefore, it is a red brilliant, or combination of red and brown; or, more correctly, a red diamond with a brown cloud, the red predominating as the stone is turned, or the light strikes it in different directions. This change of color gives the stone its dichroitic effect, although no effect is produced in viewing it by the dichroscope.

By artificial light it appears brown; but the entire stone throws out bright red reflections, such as are produced by the diamond only.

One-half of the stone is filled with hundreds of irregular-shaped cavities, either empty, or filled with a transparent fluid, or, as in nearly all cases, with carbon, which in some instances is in pieces, or so fractured as to admit the light through it. These inclusions appear to affect the color sufficiently to produce the brown appearance.

Light seems to be very faintly restored under the crossed Nichols prisms, in addition to that produced by the cutting of the gem. The specific gravity is 3.5696. GEORGE F. KUNZ.

THE DISTRIBUTION OF COMETS WITH REFERENCE TO SOLAR MOTION.

THE regions of space outside the solar system furnish a supply of comets which seems to be inexhaustible. Their origin is simply a matter for speculation; and it is not reasonably to be expected, that, even with the large amount of attention being given to cometary investigation, any definite information upon this subject can be attained for centuries to come. There is no probability that any considerable number of them have had their origin in the mass which has gone to form the solar system.

Between six and seven hundred comets have been recorded; and if we take the large proportion of telescopic comets which have been discovered when searching has been vigorously prosecuted, to the number visible without the aid of a telescope, it would not be an exaggerated estimate to place the number of comets which have come into our system since the beginning of the Christian era, under such conditions as to have been visible by the aid of our modern appliances, at four thousand.

Undoubtedly there are many, which, either from their small size and faintness, or from the unfavorable positions of their orbits, never could be seen. Were the orbits of all these known, the discussion would furnish some reasonable basis for an hypothesis in regard to the origin of the comets themselves; and light would be thrown upon other problems concerning the system of the universe.

While the sun, drawing all bodies within its influence towards itself, swings the comets into orbits which may bring them, at some point, almost into contact with the sun's surface, or, on the other hand, never within the confines of our planetary system at all, the motion of the sun itself must have an influence upon the position of these orbits. The limited amount of material at hand furnishes some features which are at least suggestive.

There are two hundred and eighty-five comets, which, up to the present time, have had their orbits determined with greater or less exactness. The axes of the orbits lie in the directions along which the comets come to the sun.

The table exhibits the grouping of the points which represent the directions of the origins of these comets about that point which investigation has indicated as the direction to which the solar system is moving.

The method of making the reductions will be apparent. The elements were reduced to 1850, and the longitude and latitude of the perihelion point computed for each comet. The point directly opposite this was then reduced to a new system of co-ordinates, having the direction of solar motion, as the pole.

The point toward which the sun is moving is taken at longitude 256°, latitude +57°.

For convenience this may be referred to as the north pole of the new system; and the hemisphere surrounding it, as the northern. This hemisphere is then divided into ten zones of equal area, the most northern surrounding the pole, while that at the base may be called the equatorial.

The southern hemisphere is similarly divid-