pipe, which pipe enters the room at a height of about ten feet, and, passing downward, ends in a faucet over a zinc-lined sink, the sink being connected by a pipe with the ground. The ball of fire was about an inch and a half in diameter, of a semi-transparent bluish color, giving a feeble light, which first appeared at the top of the pipe, and rolled down it at a nearly uniform velocity of six or eight feet per second, and, upon reaching the faucet, fell into the sink with a report about as loud as the discharge of a gun-cap. We at once examined the sink, but found no trace of any thing. But, as we stood watching the pipe, the same phenomenon was twice repeated, making three discharges in the course of ten minutes.

This occurring, as it did, five years and a half ago, I am unable to give as accurate an account as I might wish. There were twelve or fifteen persons in the room at the time, some of whom I have since seen, and all agree. In regard to the location, it was in the Sunset Hill house on Sugar Hill, in the White Mountains, about seventeen hundred feet above the sea. The pipe which supplies water to the house comes from a spring on the mountain-side, and, passing up through the wall, leads to a reservoir on the roof of the kitchen.

The pipe on which the globular lightning was seen is a branch of this main pipe. On its way to the upper story — starting from a height of about ten feet, it comes out of the wall, and passes downward at an angle of about 30° with the vertical, ending in a brass faucet over the sink. The pipe was of wrought iron, covered inside and out with a coating of coal-tar to prevent rusting.

The phenomena described occurred during a heavy thunder-storm, and, so far as I can learn, nothing of the kind had ever happened there before, nor has it even been repeated. N. C. WARDWELL.

Hartford, Jan. 10.

The genesis of the diamond.

In an interesting communication under this title, Prof. H. Carvill Lewis gives in No. 193 of *Science* an apparently satisfactory theory of the structure and origin of the diamond-bearing necks of South Africa and of the genesis of the gem in that region. The discovery of undecomposed peridotite as the original form of the puzzling blue ground confirms the suspicion long entertained by my friend, Prof. Henri Goraix, and myself, that very slight analogies, if any, exist between the South African and Brazilian diamond-fields, in the latter of which we have, as we think, traced the diamond to its original matrix. Communications on the subject will be found in the *American journal of science* for February and July, 1882, by myself, and in papers by Professor Goraix in the *Comptes rendus de l'académie des sciences* and *Bulletin de la Société géologique de France* of 1884.

The main points of these papers may be briefly summarized as follows. The diamond region about the city of Diamantina, in the province of Minas-Geraes (the oldest and best-known diamond-field of Brazil), consists geologically of very ancient and profoundly disturbed metamorphosed strata, which may be divided into three groups: 1°, wholly crystalline rocks, gneiss, mica-schists, etc.; 2°, less perfectly crystalline rocks, unctuous schists, quartzites (itacolumites), iron ores (itabirites), and limestones; and, 3°, quartzites. The first two groups form the nucleus of the mountainous diamond-bearing region, No. 2 greatly predominating over No. 1. No. 3, which in hand specimens (and often in the field as well) can only with difficulty be distinguished from the quartzite of group 2, with which it has up to the present been very generally confounded, lies in undulating folds over the upturned edges of Nos. 1 and 2, and at times passes to a conglomerate including fragments of both the older groups. The geological age of these groups is undetermined, but the newest of them can scarcely be younger than the Silurian, and, if not older, belongs more probably to the earlier than to the later part of that age. The eruptive rocks thus far recognized in the diamond district are granites, diabases, gabbros, and serpentinous rocks, which very probably were originally peridotites. It should be remarked, however, that the latter are apparently far less abundant than in the region farther south in the same mountain-range, in which diamonds are only found rarely, or, over large areas, not at all.

The greater part of the diamond-washing, being in river-alluviums or in gravel-deposits on the uplands, gives no clew as to which of the three groups or of the associated eruptions may have furnished the gems. A few of the upland gravel-deposits are evidently decomposed but undisturbed conglomerates belonging to group 3. The famous Grao Mogol locality described by Helmreichen, Claussen, and Heusser and Clary, where diamonds are found embedded in a hard quartzite with a conglomeritic character, belongs also, in my opinion, to this group; the diamond entering, like the other elements, as a rolled pebble. Professor Goraix, however, who has had the advantage of a personal examination of the locality, refers the diamantiferous rock to the quartzites of group 2, and admits the possibility of the genesis of the gem *in situ*, though he does not insist very strongly on this point. The difficulty I have often experienced in distinguishing the quartzites of the two groups one from the other, even when they are in juxtaposition in the same section (as I believe Professor Goraix admits them to be at Grao Mogol), leads me to the apparent presumptuousness of maintaining my opinion against that of so acute and conscientious an observer.

At a single locality, Sao Joao da Chapada, the miners have penetrated deeply the decomposed but undisturbed schists of group 2, extracting the diamond from a decomposed vein-rock from which Professor Goraix took out, with his own hands and with all possible precaution against error, several of the precious stones, after I had expressed to him the opinion that it was the veritable matrix of the diamond. Three veins of somewhat different character have been recognized. One is of quartz with plates of specular iron, to which the diamantiferous *barso* (clay) adheres. This last is an earthy mass rich in iron, which gives, on washing, an abundance of microscopic tourmaline. This last circumstance, with the abundance of iron, suggests a comparison with the peculiar auriferous veins of quartz, pyrites, and tourmaline of the vicinity of Ouro Preto in the same geological horizon, and in very similar conditions. The other veins are without quartz, and consist of a lithomarge-like clay charged with oxides of iron and manganese, which, as Professor Goraix states, bear a strong resemblance, both in composition and geological occurrence, to the topaz and euclase bearing viens of the vicinity of Ouro Preto. These veins are coincident with the

bedding, or nearly so. Besides quartz and tourmaline, they carry iron and titanium minerals (magnetite, hematite, rutile, and anatase), amorphous chloro-phosphates of some of the rarer elements (cerium, lanthanum, didymium, etc.), and, almost certainly, euclase.

The observations at this place exclude completely the idea of peridotite or other eruptive rocks. The diamond at Sao Joao da Chapada, and presumably at other Brazilian localities, is a *vein mineral*, and the conditions of its genesis (unless we admit the hypothesis of a subsequent deposition of carbon, which is uncalled for by any of the observations thus far made) must have been such as were favorable to the segregation of iron and titanium oxides, phosphates of rare elements, and certain silicates, such as tourmaline and presumably topaz and euclase. The hypothesis of a genesis through the reaction of eruptive masses on carbonaceous schists is here as inadmissible as would be that of a vein formation for the South African mines. If the origin of the carbon is to be sought in the rocks traversed by the eruptive or vein masses containing it, it is not without interest to mention that the schists of the veins in which the Sao Joao mine is excavated frequently contain graphite, though at that particular locality they are too much decomposed to enable one to determine whether it occurs there or not. It may be stated, that, in the other diamantiferous regions of Bahia, group 2 occurs either at the mines or in sufficient proximity to have furnished the diamonds. In the Bahia fields the precious stones appear to have come mainly from a conglomerate which, as it lies in the prolongation of the same range, is presumably identical with group 3 above described, and, like it, rests on a base of unctuous schists, itacolumite and itabirite. The Goyaz fields and those of Bagagen in western Minas seem to be similar to those of Diamantina, though perhaps lacking the upper quartzite. To the west of Diamantina, in the San Francisco valley, diamonds are washed from the *débris* of a conglomerate presumably of upper Silurian or Devonian age, but containing pebbles of the Diamantina rocks. In the province of Paraná the immediate origin is in a Devonian conglomerate, and this is also apparently the case with the diamantiferous placers of the province of Matto Grosso.

The Brazilian and African diamond-fields thus indicate two very distinct modes of occurrence and genesis for the gem, — one as a vein mineral accompanying oxides, silicates, and phosphates; the other as an accessory element in an eruptive rock. In the last number of the *Bulletin de la Société géologigue de France*, M. Chaper presents a third mode of occurrence as the result of his observations in an Indian diamond-field. He satisfied himself that the gem occurs there, along with sapphires and rubies, in a decomposed pegmatite, having taken out two diamonds, two sapphires, and three rubies from an excavation made in that material. The circumstance that all these stones were found during the preliminary work with pick and shovel, whereas nothing was found in the washing, would, notwithstanding M. Chaper's confidence that no deception was practised, seem to the practical diamond-miner to be extremely suggestive of *salting* very inartistically done. The occurrence of remnants of a sedimentary formation of a conglomeritic character in the neighborhood of the old washing examined suggests another explanation for the occurrence of the gem in placers resting on a bottom of granitic rocks.

ORVILLE A. DERBY.

Museum nacional, Rio de Janeiro,
Dec. 16.

A German sentence.

Will you allow me a brief reference to a remark of one of your contributors? 'M.' quotes the following German sentence by 'one of the most distinguished German zoölogists:' —

"Man darf für wahrscheinlich halten, dass die so sehr wechselnde Gestalt und Ausbildung der 'Tastborsten,' nach der Art des Thieres und den Körpergegenden, noch bestimmten Nebenzwecken zu dienen hat, ohne dass wir uns davon Rechenschaft zu geben vermögen."

In the original quotation the commas after 'Tastborsten' and before 'noch,' etc., are omitted. 'M.' quotes this as a sample of sentences which prove that German scientific writers despise the 'French qualities of grace and lucidity.'

He goes further than this. He is quite convinced that the scientific men in Germany show an 'absence of the literary sense,' though he admits there are some exceptions.

It seems to me that if 'M.' wished to furnish a proof for his assertion, he ought to have chosen a different sentence. Evidently every thing depends upon the reader for whom the sentence was intended. If the author wrote for children, his sentence was objectionable; but, if he wrote for educated persons, the sentence must be pronounced just as clear, lucid, and elegant in German as any similar sentence might be in French. 'M.' assumes to judge of the literary qualifications of people who use a language with which he himself is less familiar than he is with French and English; a language, moreover, which greatly differs in its laws of construction from French and English. Supposing he should apply his French or English standard to a similar Latin sentence by one of the recognized masters of Latin style, would the difficulty of understanding its meaning justify a person who is not perfectly at home in that language to condemn the form of the sentence?

It seems to me 'M.'s' reasoning is the reverse of 'scientific.' It looks very much like 'jumping at conclusions.' 'M.' goes further than this. He remarks on the lack of German inventiveness. But do the Germans lack inventors? They are inferior to the Americans in invention of labor-saving machinery, because they have not hitherto felt the need of it as much as Americans in their thinly peopled country.

But let us ask who invented watches, lithography, the original hand-press for printing, and the later revolving press, for the first time used in printing the London *Times*, which created a new era in newspaper printing? Who has a greater claim to the invention of the electric telegraph than Gauss of Göttingen, or Steinheil of München? Where are there more practical inventors than Krupp and the men that have made his steel-works famous all over the world? And how about Siemens (the two elder brothers), Halske, Schaefer, Budenberg, Gruson, and scores of others? Germany, so long disunited, could not afford a patent law like our own until quite recently: hence many of her inventors went to England, France, and some to this country.

There is some truth in 'M.'s' remark about the bad style of many German scientific writers, but I venture the assertion that the number of really fine