As far as beards and velvet chaff are concerned, it is seen that these hybrids obeyed Mendel's law in a very satisfactory manner.

In all the fourteen crosses one parent had the short head characteristic of the club group of wheats, while the other had the common long form of head. In general the first generation of hybrids were intermediate between the parents in this respect. In the second generation the progeny of each plant of the previous generation presented every gradation between the parents, presenting a continuous series, which, in most cases, extended beyond both parents. Correns mentions such a series in some of his hybrids, and offers the explanation that in some individuals the character of the male parent is dominant, in others, the corresponding character of the female parent, while in the remaining individuals there are all degrees of variation as regards the dominance of this pair of characters. I shall not take issue with him, but will offer a different hypothesis to explain the facts. According to Mendel's theory, when a pair of characters separate, they do so completely. For instance, if a hybrid has in it both the bearded and the beardless character, on the formation of pollen and ovules, the one character passes entire into some of the pollen grains and ovules, the other passes entire into the others. This would indicate that the character of beard-producing is due to something which retains its individuality during the process of germ cell formation; and so for all characters that obey Mendel's law. Is it not possible, however, that the protoplasmic basis of some characters, instead of passing entire into the germ cells, itself splits up in all possible proportions, so that we may find pollen grains and ovules possessing all degrees of the tendency to develop a certain character. This hypothesis would explain the behavior of my hybrids with reference both to length of heads and color of chaff.*

Recurring now to the form in which I first stated the law governing the transmission of parent characters in hybrid offspring, I would modify the second clause of the law to read as follows: With reference to some of the parent characters, the second generation of a hybrid presents all possible combinations of the characters of the two parents; with reference to other characters, the hybrids (second generation) show every possible gradation between the characters of the two parents.

The first clause here applies to character pairs that separate in the manner called for by Mendel's theory; the second clause applies to characters which separate in all possible proportions. I am at present unable to present data for the third and later generations of my hybrids, since the work I inaugurated at Pullman, Washington, is now in other hands, but I hope to be able to do so in the near future.

W. J. Spillman.
U. S. Department of Agriculture.

* Since the above was written I find that Professor Bateson has proposed the same hypothesis. See Rep. Evol. Com., Royal Society.

NOTES ON INORGANIC CHEMISTRY.

'The Chemical Composition of Insecticides and Fungicides' is the title of Bulletin No. 68 of the Bureau of Chemistry, U. S. Department of Agriculture, just issued by the government. Its author is J. K. Haywood, chief of the Insecticide and Agricultural Water Laboratory. The investigation of the subject of the report was undertaken with the cooperation of the Division of Entomology. Through the state experiment stations and special agents, samples were procured from different sections of the country of the various insecticides and fungicides on the market, and the report embodies the analyses of some one hundred and fifty. Of these nearly one third were Paris green, and a dozen more were London purple. Most of these samples were excellent in quality, few only showing an excess of soluble arsenious oxid and still fewer revealing any suspicion of adulteration. Of the insecticides sold under fancy names and containing arsenic not as much can be said. Some of them are excellent, but many reveal a large proportion of inert matter. If the price were correspondingly low this would not be an objection, but where a mixture of gypsum with less than two per cent. of Paris green is sold at five cents per pound it is an imposition on the purchaser. The soaps, hel-

lebores and pyrethrums were generally found of good quality. The roach powders, some of which are also sold for killing fleas, ants and other insects, were found to consist generally of borax or pyrethrum, or both. The price at which these are sold should yield a satisfactory profit to the manufacturer, one specimen of borax containing nearly seven per cent. of impurity, selling at one dollar per pound. Roach pastes contain one per cent. more or less of phosphorus, mixed with flour, meal, sugar, molasses or lard. Several bug poisons consist of gasoline or of turpentine. 'Rough on Rats' is a mixture of arsenious oxid with barium carbonate. Altogether the report makes very interesting reading and is valuable for reference. A point of particular interest to chemists is the description of the methods of analysis used in each case.

From his investigations of the metallic carbids Moissan has recently drawn several geological conclusions and developed a new theory regarding the origin of petroleum. According to his views, in the early periods of the earth's history almost the entire quantity of carbon was combined with metals. Later, water reacting with these carbids formed hydrocarbons, and from these carbon dioxid was formed by oxidation. The origin of natural gas is the action of water upon aluminum carbid, by which methane is evolved. From other metallic carbids liquid carbon compounds have been formed, although a different origin is possible for some petroleums. Certain volcanic phenomena may be caused by the action of water upon easily decomposable carbids, while in other cases a similar action might give rise to earthquakes. After all, Moissan's theory seems to be an extreme development of that put forth a number of years ago by Mendeleef, and which has been furnished very strong support by the experimental work of Moissan.

Moissan has continued his researches upon liquid silicon hydrid, and finds from its vapor density that its formula is Si_2H_6. It ignites on contact with the air, and when dried by sulfuric acid it explodes still more violently on coming to the air. When the electric spark is passed through the vapor under reduced pressure it is completely decomposed and amorphous silicon obtained in long filaments. This amorphous silicon, probably thus for the first time obtained in a pure condition, possesses remarkable reducing properties. Potassium permanganate is slowly reduced in the cold, copper sulfate and gold chlorid are reduced to the metal on boiling, and mercuric chlorid is reduced to calomel.

The deterioration of platinum crucibles, even when carefully used, is well known and has been generally attributed to the action of the carbon of the flame, though other explanations have not been wanting. The matter has been taken up recently by W. Rosenhain, and his results have lately appeared in the *Proceedings* of the Royal Society. He attributes the cause of the brittleness of platinum which has been used for a long time to a recrystallization of the metal, which has taken place at a temperature far below the fusing-point. Similar changes are known to take place in the case of lead, tin, zinc and cadmium. When platinum is heated to a high temperature, even in the presence of a large excess of oxygen, it gradually becomes quite brittle, so that when at a low red heat it is easily shattered by a blow. An examination of the fragments reveals a crystalline structure throughout the metal. Under such circumstances the surface assumes a crystalline appearance, and this crystalline structure is not merely superficial, but penetrates the metal. Indeed the external appearance is probably due to an etching action of the gases of the flame.

J. L. H.

THE COMET B, 1902, AND THE MASS OF MERCURY.

MR. F. E. SEAGRAVE calls attention to the close approach of Comet *b*, 1902, to Mercury on 1902, November $29^d\ 17^h$. The heliocentric coordinates of Mercury at that time are $\lambda = 225°6'$, $\beta = +0°14'0''$, log. $r = 9.65328$ and of the comet, according to the elements given in the Lick Bulletin No. 25, $\lambda = 225°18'$, $\beta = -1°50'40''$, log. $r = 9.63581$. The logarithm of the least distance will, therefore, be 0.0177, corresponding to a distance of 1,644,000 miles.