the globules were counted after passing the night. The author then mounted to Grands Mulets alone from Chamonix and made another determination. He thus studied the action of a long ascension, the action of a short stay at a high altitude, then the passage to a still higher station, then a second ascension near the first. The red globules, diluted in Marcano serum, were numbered by a globule counter of the Malassey type, with a portable Zeiss microscope. He makes the determinations upon a quantity varying from 4 to 7 million globules, and forms a table from which he deducts the following conclusions: The blood undergoes a rapid and considerable increase in the number of red globules when we pass from one altitude to a higher level. If we remain in the latter place the first number of globules is found to diminish slightly, but not to a great extent in a few hours. Descending to the starting point makes the number diminish to a greater degree, but it is still above what it was before the ascension. He finds that a second ascension, made before the number has fallen to the original value, causes a new increase which is greater than is remarked in the first ascension. A subject who is acclimated to a greater degree is less subject to a change in the number of globules. This is the first time that the corpuscles have been counted at the summit of Mt. Blanc, which, it will be remembered, is the highest point in Europe.

A PRIZE FOR A NON-POISONOUS DIAMOND CUTTER'S COMPOSITION.

Considering the fact that the setting and resetting of diamonds for cutting purposes involves the use of an alloy, consisting of tin and lead, the handling of which has been ascertained to produce injurious effects, i. e., lead-poisoning, the government of the Netherlands has decided to open a competition under the following conditions.

The government desires a medium for the setting and resetting of diamonds to be cut—which need not necessarily be an alloy—the use of which cannot produce effects detrimental to the health of those handling the same, or an elaborate project of altering the method now in use, in such a manner that no such injurious effects can be produced.

The following requirements have further to be fulfilled:

1. The medium or the method must be practicable for all sizes and shapes of diamonds in the following branches of the diamond industry, viz., brilliants, roses, and so-called *non-recoupés*, now being cut in the Netherlands.

2. The application must be such as to be learned by the workmen, adapted to the present method of work, without any great difficulty, while the setting and resetting must not require more time, or considerably more time than is usual now.

3. The application and use must not entail considerable pecuniary outlay.

The Minister of the Interior has appointed a committee of experts to consider the answers submitted, and to award the prize. The answers must be written in the Dutch, French, English, or German language, and must be accompanied by samples or objects to enable the committee to form an opinion of the practical value of the invention, and also by a legibly written address of the competitor.

The answers, and the samples or objects pertaining thereto, must be sent carriage paid, and if sent from foreign countries duty paid, before January 1, 1906, to Prof. Dr. L. Aronstein, chairman of the committee, Chemical Laboratory of the Polytechnic School, Delft, Holland.

The prize to be awarded for a complete solution of the problem is six thousand florins. The committee is empowered to divide the prize among different competitors, or to award the prize partially in case of a partial solution of the problem, for instance if it is applicable to one of the above named branches of the diamond industry. The committee is also empowered to prescribe certain conditions, to be fulfilled by the competitor, before awarding the prize.

For the use of those who desire to enter the competition, the manner in which the diamond workers come in contact with the poisonous metal while engaged in setting and polishing is here briefly explained.

The metal, or solder, used, is an alloy, consisting of two parts of lead and one part of tin; by heating the composition becomes kneadable before melting; by cooling it regains its former firmness. This plasticity is an important property of the solder, as will be seen hereafter.

Before the polishing of the split and cut stones is commenced, they are given to the setter, who places them in a "dope," consisting of a nearly semi-spherical brass pan, into which a tough, thick copper wire is screwed. Into this pan solder is put, so that not only the pan is filled, but that a conical eminence is formed also, which is kneaded into shape.

When the solder is rendered kneadable by means of a gas flame, the "dope" is placed on a wooden block, called "verstelblok" (setting block); the diamond is then pushed into the top of the conical eminence by means of a pointed pair of iron pincers, so that only the facet or facets to be polished remain exposed; the setter then fastens the stone and smoothes the still plastic solder into shape with his unprotected fingers. The "dope" is then cooled and handed to the polisher.

Considering that one setter works for four or five polishers, and that about two hundred "dopes" have to be daily manipulated for each polisher (when the stones are very small this number is considerably larger), it is evident that the setter's fingers are constantly polluted with lead-laden particles, which easily attach themselves to the skin, while he is, moreover, exposed to the lead-laden fumes arising from the heating of the solder.

The polishing process is as follows:

The polisher is seated before a bench, in the center of which a metal disk is horizontally placed; this disk revolves rapidly on its own axis (about 2,400 revolutions a minute). The polishing medium consists of a mixture of pulverized diamond and olive oil. The "dopes," wherein the diamonds are fastened, are held by their copper wires in tongs, to which a fixed position in relation to the bench can be given; by bending the copper wire more or less the diamond is placed against the disk in the proper angle and is firmly pressed against the same by loading the tongs with heavy weights, for which purpose iron blocks are successfully used in Holland since 1904, instead of the leaden blocks that were used before them.

The friction occasioned by the polishing process creates a great heat, so that the "dopes" have to be repeatedly cooled. The "dope," however, never gets so warm locally that the solder turns soft, because it conducts heat well.

If the diamond were set in the cement (a mixture of resin, shellac, and sand), used in the processes of cutting and splitting, the "dope" would conduct the heat badly, turn soft, and the diamond would be immersed.

The constant manipulation, the ceaseless turning and bending of the "dopes" in the tongs (four tongs at least are being used on each bench), and also the fact that the stone and the solder-cone are wiped with the bare hand every time the polisher wants to see whether the facet has attained the required shape and size, are so many reasons why the polishers' hands are constantly polluted with particles of solder.

The way in which diamonds are cut and polished is therefore not without danger to the health of the workers. The setters and polishers are constantly in touch with metallic lead, which exposes them to the peril of chronic lead-intoxication, when no adequate precautions are observed.

Instances are given in the medical literature, a. o. by Dr. Coronel in the Netherlands' Medical Review (1864). Hirt, who verified Coronel's statement in 1870, relates that of ninety setters he examined in Mr. Coster's factory, about thirty showed traces of lead-poisoning. (Dr. L. Hirt, Die Krankheiten der Arbeiter, vide vol. i., die Staubinhalations-Krankheiten, p. 102.)

Dr. Pel, professor of medicine at the Municipal University of Amsterdam, has described a remarkable case of lead-poisoning in a diamond setter in the Centralblatt für innere Medizin, year 1897, No. 23. Dr. A. Norden, of Amsterdam, medical adviser to the Amalagamated Society of Diamond Workers (who examines the majority of the members of that society applying for sick pay), has had a large and varied experience on the subject. He drew attention to this important matter in the journal of the said organization, issues of June 28 and July 5, 1901 (Nos. 26 and 27).

PHOTOGRAPHING THE SOLAR CORONA.

BY J. W. DAVIDSON.

"Can a photograph of the solar corona be obtained without having to wait for the occurrence of a total eclipse of the sun?" is a momentous question in the astronomical mind at this time, especially in view of the approaching total solar eclipse which is to occur August 30, and to which eclipse expeditions are being dispatched. A distinguished scientist says: "Such a feat would be an astronomical discovery of the first rank."

It is now announced that Dr. Hausky, of the Odessa Observatory, in Russia, has succeded in obtaining such pictures from the summit of Mont Blanc and no less an authority than the veteran French astronomer, M. Janssen, who has seen the negatives, seems to be convinced that the actual corona has been photographed.

Dr. Hausky employed particular colored screens, through which he allowed the sunlight to pass before the image fell on the photographic plate. The negative thus obtained showed a nearly uniform halo around the solar disk. From this negative he produced a series of positives and negatives alternately, and treating them in a special manner he was able to produce the form and different degrees of intensity of the corona itself. The same form was constantly produced in spite of the changes in the position of the screens. On several occasions the problem has been considered solved, but further investigation showed that the image obtained was not that of the actual corona, especially in 1885-87—when a number of attempts were made to solve this intricate astronomical problem and a great deal was written on the subject at that time.

Now comes the suggestion which is the most plausible cause of renewed interest in the scientific world, of a probable solution of the problem; so great have been the improvements in photographic processes and in making colored screens, that it seemed quite possible that the object would soon be obtained.

Before, however, the problem can be considered solved it will be well to wait until the most crucial test can be applied, namely, that of photographing the sun by this means before or after a total eclipse, and then comparing the results with a picture taken during the eclipse with an ordinary camera. The test is a simple one, and the approaching eclipse of August 30 will present an early opportunity for carrying it out. Fortunately, the track of totality passes over some high mountains in the northern part of Spain, so that a high altitude is available.

SCIENCE NOTES.

Thus far it has been difficult to throw any light upon cell-absorption and selection in many complex natural relationships by cailing in the assistance of the dissociation theory and the ionic relationships of the salts in the soil. The external relationships of nutrient salts, or the relative abundance of these in substrata supporting vegetation, constitutes a problem with which the physiologist must be concerned. It is necessary only to glance at the results of work done by various experiment stations in this country to be convinced of the great physiological importance which may be attached to such studies.

If, as has been well demonstrated, the germ of typhoid fever is transmitted principally in water, there seems no reason to doubt the ability of health officers, collaborating with broad-minded municipal authority and high-class engineering skill, to perfect means whereby this deadly germ shall be practically eliminated from our water supply. Consumption may be checked by the establishment of camps of detention where the unfortunate victims of this terrible disease may receive not only the highest degree of proficiency in medical treatment, but also be so segregated from the non-infected portions of the community as to render the spread of the disease difficult.

In point of quantity and value corn is the leading cereal crop of the United States. Its annual farm value in later years has nearly equaled and sometimes exceeded $1,000,000,000. While less subject to insect damage than wheat, the next most important cereal, the corn product would be considerably greater were it not for important insect pests. The work of several of these is obscure, and many farmers are entirely ignorant of the existence even of some of the worst enemies of this crop. In this last category falls the work of the corn root worm (*Diabrotica longicornis*), which ordinarily passes unnoticed, or at least is often misunderstood. The larva of this insect feeds on the roots of young corn, and in regions of bad attack may cause an almost entire loss of the stand. The corn root worm, together with one or two allied species working in substantially the same way, causes an annual loss of at least 2 per cent of the crop, or some $20,000,000.

Acccording to the annual report of the Royal British Observatory at Greenwich during the year ending May 10, 1905, 15,842 observations of transits were made of the sun, moon, planets, and fundamental stars. Great progress has also been made in the observation of the reference stars connected with the Greenwich section of the astrographic catalogue. This section extends from 65 deg. north declination to the North Pole, and in carrying out the measurement of the photographic plates, the accurate positions of 10,000 reference stars are desired. Of each of these stars five observations are desired, making 50,000 observations in all, and of this number 9,500 have been obtained during the past year. There now remain only five stars requiring three observations each, and 1,500 requiring one observation each, to complete the work; 603 double stars have been measured, 143 of these having their components less than one second of arc apart. A large number of photographs of Neptune and its satellite and 100 photographs of comets have been obtained during the year. The measurement of the catalogue plates for the Greenwich section of the International Astrographic Survey has been completed.

The losses occasioned by insects to farm products exhibit a wide range in different years, due, as a rule, to favorable or unfavorable climatic conditions, and also to the abundance, from time to time, of natural enemies. The result is more or less periodicity in the occurrence of bad insect years. In other words, periods of unusual abundance of particular insect pests are, as a rule, followed by a number of years of comparative scarcity. Furthermore, seasons which may be favorable to one insect may prove unfavorable to others, hence there may be not only periodicity in the occurrence of the same insect, but more or less of a rotation of the different insect pests of particular crops.