A FEW GRATUITOUS HINTS TO INVENTORS.

It often happens that the germ of an important discovery is contained in a short paragraph; but as it is the early bird that catches the worm, so it is only the most alert reader that seizes upon the obscure fact and appropriates it to his own use. We have inserted a short notice of a number of discoveries which we hope to have brought back to us in matured plans for their application; but, for fear that some of them may have escaped the vigilance of our readers, we refer to them again in a more conspicuous manner by way of gratuitous suggestion.

Has the cupro-ammonium solvent for cellulose been employed on a large scale in the manufacture of artificial wood, water-tight paper, incombustible fabrics and the like? The name may frighten many persons from paying the regard to this important reagent which it deserves. It is very easy to make it, as it is only necessary to keep strips of copper standing in concentrated ammonia, occasionally shaking it to admit the oxygen of the air. Oxide of copper is produced, which dissolves with a blue color in the ammonia and gives the reagent sought. There is certainly a large scope for invention in the use of this material. Paper bags can be rendered impermeable to water by immersing them for a few moments in cupro-ammonium and running them between rollers. They can then be substituted for parchment for many purposes. If numerous sheets of paper were to be similarly prepared and pressed together, thick layers of great lightness would result, which could be employed as a substitute for wood in architectural structures and interior decorations. By impregnating the wood paper with tungstate of soda, it would be rendered wholly uninflammable, and in this manner theatrical decorations, and the packing surrounding steam pipes and boilers, could be made of it; and in its fireproof form, it is capable of a wide range of application which the inventor must think out for himself. It is said that paper bands, nearly as strong as leather, can be made on the same plan. The cupro-ammonia paper would find application for roofing, water pipes, hats, boats, clothing, collodion; and as all kinds of cellulose are attacked by this resgent, much waste material, such as seaweed, grass, sawdust, shavings and rags, could be applied to many purposes. It is a question whether, by combining cupro-ammonium and tungstate of soda, wood and timber could not be rendered fireproof as well as waterproof and otherwise indestructible. There is evidently a wide field for research in this matter, and it would be well for inventors to give it attention.

There is another question which sometimes occurs to our mind, which is this: Are there any practical applications of thallium in glass making and otherwise? Lamy exhibited a specimen of thallium glass at the Paris Exhibition of 1867, possessing a higher index of refraction than anything of the kind that had been previously made. Since that time a considerable quantity of thallium has been found in the various stages of metallurgical processes, and enough material could be found if there was any call for it. The whole astronomical world is turning its attention to the use of the spectroscope in observations on the stars: and it is of great importance to employ a highly refracting medium. Lead glass answers a very good purpose; but if thallium glass is better, it ought to be tried. For optical instruments of all kinds, a new material of this character would always prove most serviceable. The employment of thallium in medicine and in colors is also a matter to be investigated.

A third suggestion we have to make is in reference to new applications of copal. We have seen it stated that gum copal can be vulcanized, so that it becomes very hard and closely resembles amber, for which it can be substituted for many purposes. The vulcanized amber can be turned on a lathe and is said to possess great durability. In what way the process is accomplished has not been disclosed. It appears to be worthy of examination.

The above are some of the paths that might be taken by industrious students in their search for new applications, and we commend them as being worth pursuing.

PROFESSOR AGASSIZ ON OUR COLLEGES.

Professor Agassiz has evidently no very high opinion of our educational institutions, and publishes his adverse views with characteristic freedom. He says our colleges are nothing but high schools, and that even Harvard is far from being a university; while the knowledge imparted is "the traditionary learning of the middle ages," and only "the dregs of scholarship."

In common with all progressive lovers of science, Professor Agassiz strongly advocates a freer scope being given to the study of nature. This branch of education should begin in childhood, and not nominally be taught in normal schools from text books which are often unsuitable. With regard to our system of popular education, he acknowledges that it is better than the European, but declares that the substance is wanting.

It is probable that these ideas, from so eminent an authority, will give new impetus to the war of science against classics which, for some years past, has been waged in our colleges. That there is a strong and growing popular taste for science is amply evidenced by the interest manifested in the discourses of Professor Tyndall and the writings of other distinguished savants; but that, at the same time, there exists, even among people otherwise well educated, an inexcusable ignorance in scientific matters, is equally true. That the latter is, in a great measure, due to the imperfections of our college courses, we consider there is little doubt, and we adhere to the belief that, were the classics in our seminaries made subservient to the thorough study of the ordinary principles of science, the graduates would leave their books much better prepared to encounter the world.

DRAPER AND TYNDALL ON THE INVISIBLE RAYS.

To the Editor of the Scientific American:

In your issue of February 1, you gave an abstract of Professor Tyndall's lecture on "The Invisible Rays," in which I find the following statements: "On both sides of the spectrum there is a copious overflow of rays which are incompetent to excite vision, but which, however, are able to agitate the molecules of certain substances so as to shake them asunder and produce chemical decomposition," and, further on, "it is shown that the heat radiated from the non-luminous portion is seven or eight times as great as from the luminous or visible." The latter proposition is illustrated by a well known figure in which the invisible rays are represented by a curve very large in comparison with a similar line indicating the visible rays. In the same number of your journal you publish Dr. J. W. Draper's researches in actino-chemistry, in which the author says: "As Dr. Draper demonstrated the heating power of radiation to reside in all equally, whatever their refrangibility, so in this he proves the power to produce chemical changes to be manifested by rays of every refrangibility, different substances being acted on by different rays." The discrepancy apparently existing between the views of Drs. Draper and Tyndall, thus plainly indicated by the two articles from which the above extracts are made, has led me to obtain a more extended report of the investigations of the former physicist. The conclusions therein contained seem to me to be flat contradictions of Professor Tyndall's assertions, as proved by the following: It follows that the true distribution of heat throughout the spaces of the spectrum is equal, and that "the figure so generally employed in works on actino-chemistry to indicate the distribution of heat, light and actinism in the spectrum serves only to mislead. The heat curve is determined by *the action of the prism, not by the properties of calorific radiations*; the actinic curve does not represent any special peculiarities of the spectrum but the habitudes of certain compounds of silver."

Can you or any of your readers reconcile such completely opposite ideas? How is it that Professor Tyndall did not allude to so radically different a theory, of the existence of which he must have been aware, in the course of his lectures? When such eminent and learned doctors disagree, it is indeed a question who is to decide. A PERPLEXED PHYSICIST.

REMARKS BY THE EDITOR.—The discrepancy between the views of Dr. Draper and Dr. Tyndall, pointed out by our correspondent, did not escape the attention of scientific men during the visit of the latter to this country; and the subject was frequently discussed by them without the friends of either party being able to reconcile the differences. Dr. Draper, we are told, is disposed to think that the spaces in and out of the spectrum measured by Dr. Tyndall were so small that the chance for error was a very close one, and he intimates that an error was probably committed. On the other hand, Dr. Tyndall does not appear to believe in Dr. Draper's results. We suspect that Professor Tyndall did not allude to the radically different theory, of which he was fully aware, partly because it might have been considered a breach of hospitality and partly because the rostrum of a public lecture is not the place for the discussion of such nice points of physics. The question is one which can only be determined by actual experiment. The learned doctors must repeat their observations, and, if they still disagree, let a high court of arbitrators appoint competent physicists to go carefully over the same ground and report the results to a scientific congress. We take the opportunity to say that, in our opinion, Dr. Draper has never received the credit that fairly belongs to him for his early researches in prismatic analysis. In the *Philosophical Magazine*, for May, 1847, and February, 1848, are contained papers "On Methods for the Prismatic Analysis of Substances," in which will be found foreshadowed Bunsen's application of the spectroscope to chemical analysis. Bunsen at first proposed to substitute prismatic analysis for flame analysis as an aid to qualitative chemistry. In this he had been anticipated by Draper, but Bunsen went further and discovered a new element; that event fixed the method beyond all possibility of being forgotten, and Kirchoff clinched the matter by his magnificent researches in solar chemistry. Still it must not be forgotten that Draper pointed out this line of research fourteen years before Bunsen took it up, and that if he had not been loaded down with the cares of administration and the toil and drudgery of teaching, he too might have pursued it to such a degree of perfection that no subsequent doubt could have arisen as to his share in the great discovery. The present is a good time to revive these points of history, and to accord credit where it belongs.

RAPID TRANSIT IN NEW YORK.

The venerable Peter Cooper of New York has sent to State Senator Tiemann a new scheme to secure rapid transit in New York, which consists in locating a double railway track in the second story of the buildings along the line of the route. On these tracks he proposes to place a string of light cars in the form of an endless belt, to be moved by endless ropes. There are to be just as many cars as are required to move the vast numbers of people who are expected to patronize the work. The right of way is to be purchased by the corporation, to the stock of which, if placed in proper hands, Mr. Cooper engages to subscribe the sum of one hundred thousand dollars.

Peter Cooper, as all our readers probably know, is one of our most highly esteemed, generous, and practical fellow citizens. He rarely recommends to others a scheme in which he does not himself liberally engage. He was the originator of one of the earliest locomotives ever built in this country, and from that machine down to and including the Atlantic Telegraph Cable, to which he was one of the original contributors, he has been an assistant in many highly useful and successful enterprises. The Cooper Union Buildings, which have now for several years afforded the most splendid opportunities for education, free of charge, to working people, by its evening classes as well as day privileges, was a gift from him to our city, and will ever be a monument to his fame. Whether his present plan fo rapid transit is ever brought into practice remains to be seen.

Mr. Speer and friends, whose plan for the Traveling Sidewalk was illustrated not long ago in the SCIENTIFIC AMERICAN, are also applicants before the Legislature for a charter intended to afford rapid transit to our citizens. They would like the privilege of erecting their improvements on posts over the present sidewalks on Broadway. The route is a good one. The plan of Mr. Cooper is somewhat analogous to this. The Traveling Sidewalk consists of an endless moving belt, in the form of a floor, on which settees and chairs are placed. You step on board the floor and away you go, and step off wherever you like. No stoppages.

Another new plan for rapid transit in this city is the "Mid-Avenue Elevated and Surface Railroad," of John B. Church, who proposes to erect a railway on iron columns in the center of some street to be selected for that purpose. He thinks that such a road can be built strong enough to carry trains and locomotives at a speed of thirty miles an hour, for three hundred thousand dollars per mile, the right of way being granted free by the authorities. This is lower than any estimate we have heard of. The estimate, we believe, for the Gilbert elevated railway, which, by the way, it is said is shortly to be built here, is from seven hundred thousand to one million dollars per mile. The construction is substantially what Mr. Church proposes, that is, in the street, on iron columns. We think that Mr. Church will find that one million dollars per mile are more nearly correct figures than those he has given.

Still another scheme for rapid transit is proposed by a party of citizens who desire to have some of their number receive authority from the State to manage the road, the money to build with to be supplied from the city treasury.

Meantime, while these various plans are being talked about, the committees of both branches of the State Legislature have unanimously recommended the passage of the bill authorizing the Beach Pneumatic Transit Company to go ahead and complete their railway under Broadway. When this bill passes we shall have a practicable route authorized for an underground railway, the construction of which costs one million dollars per mile, the same as the elevated; and it will be a valuable acquisition to rapid transit facilities in New York. In London the underground railway is very popular, and carries between fifty and sixty millions of passengers per annum.

SCIENTIFIC AND PRACTICAL INFORMATION.

PORTABLE DRY INK.

At a recent meeting of the Frankfort Polytechnic Association, Professor Boettger exhibited a novel kind of ink, which is admirably adapted to take on journeys and exploring expeditions. White blotting paper is saturated with aniline black and several sheets are pasted to form a thin pad. When wanted for use, a small piece is torn off and covered with a little water. The black liquid which dissolves out is a good writing ink. A square inch of the paper will give enough ink to last for considerable writing, and a few pads would be all that an exploring party need carry with them. As water is always available, the ink is readily made.

TO CLEAN SILVER.

Dr. Elsner says that hot water poured off potato parings or boiled potatoes is admirably adapted to clean silver. The objects can be easily rubbed by the fingers with the settlings of potato meal, and they become as bright as they usually do when rubbed with tripoli. The process is particularly advantageous for engraved and raised objects, where the powder is liable to collect in the cavities. German silver and plated ware can be cleaned in the same way. Potato water which has become sour by long standing can be substituted for acids to clean copper vessels.

NEW USES OF HYDRATE OF CHLORAL.

The hydrate of chloral, which is now made on a large scale, has been found to be useful for other purposes than the original one of a hypnotic. It is said to be an excellent antiseptic; it stops fermentation and destroys germs that would be likely to develope in organic substances. One per cent of hydrate of chloral will prevent the decomposition of glue and albumen for a great length of time. Another use of hydrate of chloral is as a reducing agent. It is said to precipitate metals from solutions, and this property suggests its possible application in photography and for depositing metals.

AN INDELIBLE RED INK.

Dr. Elsner states that an indelible red ink can be prepared as follows: Equal parts by weight of copperas and cinnabar, both in fine powder and sifted, are rubbed up with linseed oil with a muller and finally squeezed through cloth. The thick paste can be employed for writing or stamping woolen and cotton goods, and the color remains fast after the goods have been bleached. The reds usually employed are not fast colors, and do not resist the action of bleaching agents.

THE TRANSIT OF VENUS.

The planet Venus, it has been calculated, will apparently cross the disk of the sun on December 8, 1874. A full explanation of this important astronomical event, and of the nature of the knowledge which, it is expected, will be derived from its observation, will be found in Professor Young's excellent lecture on "Our Present Knowledge of the Sun" on another page of this issue.