

pounds) per square millimeter (0.039 inch); and its ductility is from 8 to 6 per cent.

Cast partinium is employed for making the cases for inclosing the motors of tricycles, and also for making the enormous cases used in the De Dion steam carriages of from 30 to 50 horse power. For all such uses, bronze and copper have, without any inconvenience, been replaced by a metal which weighs one-half less and has a resistance a third greater. It should also be added that for this work the net cost of the raw material is the same, whether it be bronze or partinium, and that the net cost of the finished piece is less in the case of partinium, which is more easily worked.

Finally, the rolled metal has been employed for over a year in the manufacture of the bodies of automobiles.

It can be bent into any shape, and is capable of being decorated with metallic mouldings. A body of this kind mounted upon an angle iron frame, with a sheet iron facing, possesses as a whole, with equal resistance, a weight from 50 to 60 per cent. less than wood, and may, if certain precautions be used, receive the same coats of paint as are employed in fancy carriage-work. Here again the industry has made big strides.

The first partinium body dates back to the Paris-Bordeaux race of 1898. At present this important improvement in carriage work has been adopted by racers, because weight plays an important part in the result of a contest, and by tourists because they think that it is better to replace one or two hundred kilogrammes of dead weight by passengers and useful baggage.

Finally, as a sequel to some experiments on crushing, which showed that this metal can be submitted to a pressure of 38.2 kilogrammes (84.04 pounds) to the square millimeter (0.039 inch) without distortion, there has recently been begun the manufacture of houses which may be taken apart and carried to any point.

It will be seen that aluminium is becoming more and more practical in all its forms. It will become still more so when the cost of it, which is already reasonable, will permit of using it in new industrial applications. For the above particulars and the illustrations, we are indebted to La Nature.

#### A CONVENIENT DARK ROOM.

By JOHN A. FOOTE, Archibald, Pa.

MANY druggists, particularly those doing business in the smaller towns and cities, have found it profit-



FIG. 1.

#### HOME-MADE DARK ROOM.



FIG. 2.

able to sell photographic supplies and cameras. In most cases the druggist is an amateur photographer himself; sometimes he does developing and printing for amateurs, and sometimes he is wise enough to offer the use of a dark room free to his patrons.

This latter course will surely attract business if it is properly arranged. The room does not need to be elaborately furnished, or to contain any wonderful improvements, to accomplish its end. I submit sketches of a dark room that I have had constructed in my store, and I think that it contains some points that may be found useful by other druggists.

The room was built of matched pine, in a corner of the store, and was about four feet square. It was about six feet high, and the top was boarded over closely, with moulding around the floor and ceiling joints to prevent the entrance of light. All suspicious orifices were puttied, and a coat of black paint was applied to the interior.

Most amateur dark rooms are lighted by the nasty smelling "ruby lamps," that not only vitiate the air, but add a wholly unnecessary warmth to the already oppressive air of the closet. In my room the ordinary kerosene lamp or an electric light may be used. Outside of the window, *F*, which is of ruby glass, is a shelf on which a lamp may be set. Or an electric light may be hung in front of the window, and lighted when needed, thus leaving the source of the light outside the room entirely.

The shelf, *B*, and the shelf, *C*, form a box with the sides of the room, and the slide, *A*, forms the side of the box parallel with the wall, when it is closed in position (Fig. 1). Pushing it upward and fastening it in place with an ordinary sash catch leaves the working bench displayed as in Fig. 2. A galvanized iron can, with a stop-cock in its base, such as is generally used for dispensing oils, will furnish a convenient water supply, while a large glass funnel directly underneath, connected by tubing with a water pail, will furnish drainage.

A Device to Prevent Fogging.—The sliding cover, *A*,

is used so that when the operator finds it necessary to leave the dark room during the progress of a development—a not infrequent occurrence—he can, by using this slide, make a light-proof box, in which the plate may be placed, and thus avoid the fogging that would otherwise surely be produced by the opening of the dark room door.—American Druggist and Pharmaceutical Record.

#### THE HIGHEST AIM OF THE PHYSICIST.\*

By HENRY A. ROWLAND.

GENTLEMEN AND FELLOW PHYSICISTS OF AMERICA: We meet to-day on an occasion which marks an epoch in the history of physics in America; may the future show that it also marks an epoch in the history of the science which this society is organized to cultivate! For we meet here in the interest of a science above all sciences, which deals with the foundation of the Universe, with the constitution of matter from which everything in the Universe is made and with the ether of space, by which alone the various portions of matter forming the Universe affect each other even at such distances as we may never expect to traverse, whatever the progress of our science in the future.

We, who have devoted our lives to the solution of problems connected with physics, now meet together to help each other and to forward the interests of the subject which we love—a subject which appeals most strongly to the better instincts of our nature and the problems of which tax our minds to the limit of their capacity and suggest the grandest and noblest ideas of which they are capable.

In a country where the doctrine of the equal rights of man has been distorted to mean the equality of man in other respects, we form a small and unique body of men, a new variety of the human race as one of our greatest scientists calls it, whose views of what constitutes the greatest achievement in life are very different from those around us. In this respect we form an aristocracy, not of wealth, not of pedigree, but of intellect and of ideals, holding him in the highest respect who adds the most to our knowledge or who strives after it as the highest good.

Thus we meet together for mutual sympathy and the interchange of knowledge, and may we do so ever with appreciation of the benefits to ourselves and possibly to our science. Above all, let us cultivate the idea of the dignity of our pursuit, so that this feeling may sus-

longer throw such a reproach upon our country. Nor can we blame those who have gone before us. The progress of every science shows us the condition of its growth. Very few persons, if isolated in a semi-civilized land, have either the desire or the opportunity of pursuing the higher branches of science. Even if they should be able to do so, their influence on their science depends upon what they publish and make known to the world. A hermit philosopher we can imagine might make many useful discoveries. Yet, if he keeps them to himself, he can never claim to have benefited the world in any degree. His unpublished results are his private gain, but the world is no better off until he has made them known in language strong enough to call attention to them and to convince the world of their truth. Thus, to encourage the growth of any science, the best thing we can do is to meet together in its interest, to discuss its problems, to criticize each other's work, and, best of all, to provide means by which the better portion of it may be made known to the world. Furthermore, let us encourage discrimination in our thoughts and work. Let us recognize the eras when great thoughts have been introduced into our subject and let us honor the great men who introduced and proved them correct. Let us forever reject such foolish ideas as the equality of mankind and carefully give the greater credit to the greater man. So, in choosing the subjects for our investigation, let us, if possible, work upon those subjects which will finally give us an advanced knowledge of some great subject. I am aware that we cannot always do this: our ideas will often flow in side channels; but, with the great problems of the Universe before us, we may sometimes be able to do our share toward the greater end.

What is matter: what is gravitation; what is ether and the radiation through it; what is electricity and magnetism; how are these connected together, and what is their relation to heat? These are the greater problems of the universe. But many infinitely smaller problems we must attack and solve before we can even guess at the solution of the greater ones.

In our attitude toward these greater problems, how do we stand and what is the foundation of our knowledge?

Newton and the great array of astronomers who have succeeded him have proved that, within planetary distances, matter attracts all others with a force varying inversely as the square of the distance. But what sort of proof have we of this law? It is derived from astronomical observations on the planetary orbits. It agrees very well within these immense spaces; but where is the evidence that the law holds for smaller distances? We measure the lunar distance and the size of the earth and compare the force at that distance with the force of gravitation on the earth's surface. But to do this we must compare the matter in the earth with that in the sun. This we can only do by assuming the law to be proved. Again, in descending from the earth's gravitation to that of two small bodies, as in the Cavendish experiment, we assume the law to hold, and deduce the mass of the earth in terms of our unit of mass. Hence, when we say that the mass of the earth is  $5\frac{1}{2}$  times that of an equal volume of water, we assume the law of gravitation to be that of Newton. Thus a proof of the law from planetary down to terrestrial distances is physically impossible.

Again, that portion of the law which says that gravitational attraction is proportional to the quantity of matter, which is the same as saying that the attraction of one body by another is not affected by the presence of a third, the feeble proof that we give by weighing bodies in a balance in different positions with respect to each other, cannot be accepted on a larger scale. When we can tear the sun into two portions and prove that either of the halves attracts half as much as the whole, then we shall have a proof worth mentioning.

Then as to the relation of gravitation and time, what can we say? Can we for a moment suppose that two bodies moving through space with great velocities have their gravitation unaltered? I think not. Neither can we accept Laplace's proof that the force of gravitation acts instantaneously through space, for we can readily imagine some compensating features unthought of by Laplace.

How little we know then of this law, which has been under observation for two hundred years!

Then as to matter itself, how have our views changed and how are they constantly changing! The round hard atom of Newton which God alone could break into pieces has become a molecule composed of many atoms, and each of these smaller atoms has become so elastic that after vibrating 100,000 times its amplitude of vibration is scarcely diminished. It has become so complicated that it can vibrate with as many thousand notes. We cover the atom with patches of electricity here and there and make of it a system compared with which the planetary system, nay the universe itself, is simplicity. Nay more: some of us even claim the power, which Newton attributed to God alone, of breaking the atom into smaller pieces whose size is left to the imagination. Where, then, is that person who ignorantly sneers at the study of matter as a material and gross study? Where, again, is that man with gifts so God-like and mind so elevated that he can attack and solve its problem?

To all matter we attribute two properties, gravitation and inertia. Without these two, matter cannot exist. The greatest of the natural laws states that the power of gravitational attraction is proportional to the mass of the body. This law of Newton, almost neglected in the thoughts of physicists, undoubtedly has vast import of the very deepest meaning. Shall it mean that all matter is finally constructed of uniform and similar primordial atoms, or can we find some other explanation?

That the molecules of matter are not round we know from the facts of crystallography and the action of matter in rotating the plane of polarization of light.

That portions of the molecules and even of the atoms are electrically charged, we know from electrolysis, the action of gases in a vacuum tube and from the Zeeman effect.

That some of them act like little magnets we know from the magnetic action of iron, nickel and cobalt.

That they are elastic the spectrum shows, and that the vibrating portion carries the electrified charge with it is shown by the Zeeman effect.

Here, then, we have made quite a start in our problem; but how far are we from the complete solu-

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