as I have long hoped to do, give a name to the venerable temple ruin which has long stood as the only handwork of Periander's Corinth. It must be the temple of Apollo mentioned by Pausanias as the first object of interest on the right of one going from the agora on the road toward Sikyon.

Not wishing to be without advice in such an important matter, I asked Dr. Dörpfeld to visit us. After climbing down the well and crawling along the channels and looking at the chambers, he came up, and, with Pausanias in his hand, said: "I believe this is Pirene. Uncover this and show it to the world, and it will make an impression. There will be no further question about the result of your work. You have success enough for one season."

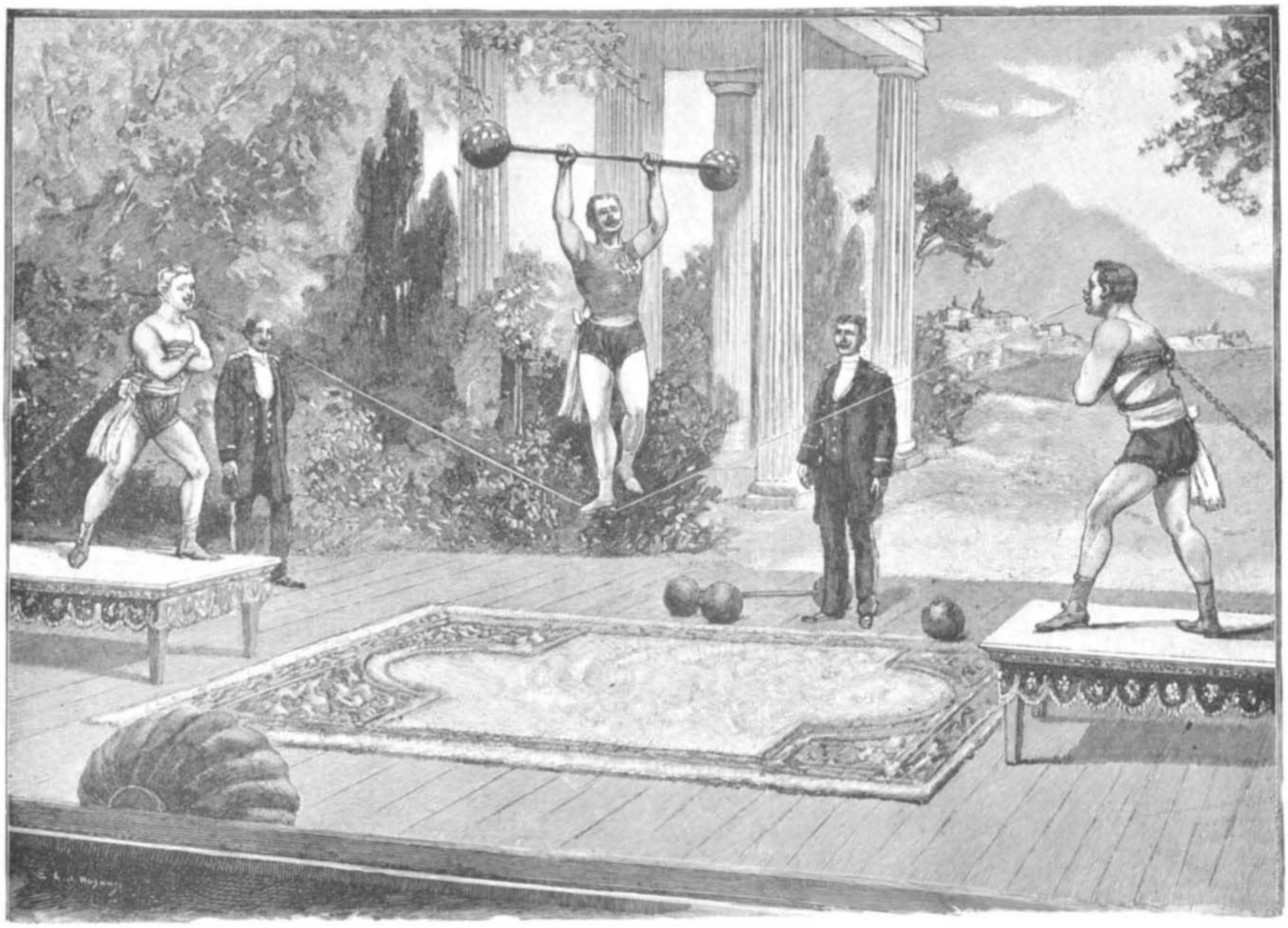
This verdict has especial weight when one knows that it involves a recasting of Prof. Dörpfeld's topography of Corinth. He had hitherto placed Pirene a third of a mile further north, putting the agora north of the square of the modern village, and the Apollo temple near the edge of the lower terrace far to the north of the old temple ruin, which now seems about to come to its rights and take that name.

In my days of discouragement I had read in a Greek newspaper that the Austrians, who were excavating the temple of Artemis at Lusoi in Arcadia, had achieved a brilliant success, finding statues, bronzes, bronze plaques with inscriptions, etc. Although we all rejoice in one another's success, and although the Austrian directors were my dear friends, I could not help thinking, "Why cannot we also have something? Why didn't I get a site with less depth of earth?" But on going up to Athens the day after Prof. Dörpfeld's visit, I experienced quite a pleasing sensation in being congratulated right and left on the grand success of our enterprise. One of the first comers was Dr. Wilhelm, of the Austrian School, who expressed his joy, and regretted, and I with him, that his own work at Lusoi had been fruitless.

Athens, Greece.

THE MILON TRIO, MODERN ATHLETES.

ALTHOUGH our age can hardly produce forms like those of the Apollo Belvedere, of Achilles, and of the Discobolus, celebrated in the mythology and classic art of the Greeks, there are nevertheless many men in numerous athletic clubs and on the so-called "variety" stage who are not far inferior in physical beauty to their Greek prototypes. Among the acrobats who are attracting much attention by reason of their marvelous exhibitions of strength, as well as by their grace, may be mentioned the Milon trio. The concluding feat of these performers is certainly as imposing as it is remarkable. Two of the Milons stand on pedestals placed at each side of the stage, and hold between their teeth a wire rope on which the third of their number stands and lifts hundred pound weights and dumbbells. These latter he holds at arm's length and raises in the air several times, balancing himself all the while on one leg, a feat which fully testifies to the immense strength of the two human pillars. Around the bodies of the two athletes, straps are passed and connected by means of an iron ring, with heavy chains secured to the pedestals. By this means the wire and its weight of 350 to 400 pounds is prevented from tearing the men from their places. Even with the assistance of these chains, the jaws, sinews, and muscles of the neck and back are subjected to an enormous strain and must consequently be abnormally developed.—Illustrirte Zeitung.



ONE OF THE MILON TRIO LIFTING A WEIGHT, WHILE STANDING ON A WIRE HELD BY TWO OF HIS COMPANIONS.

FOREIGNERS IN JAPAN.*

By R. VAN BERGEN, Formerly Principal of the Nobles' School, Tokyo.

FOREIGN residents of Japan look with apprehension forward to the 16th of July, 1899, as the time when the new treaties will go into effect, and the old safeguard to life and property, the ex-territorial clause of the present treaties, will be abrogated. There is a possibility, but it is very slight, that the date may be postponed. Germany, when it consented to a revision of the treaties upon the basis of judicial autonomy, stipulated that the codes shall be completed and shall have been in operation for one year before its subjects shall be placed under Japanese jurisdiction. That country, at any rate, protected its citizens against incomplete codes; but why we should not be safeguarded against an inexperienced and prejudiced judiciary is more than the foreign resident can understand.

It is not, in these days, the acme of happiness to be a resident of Japan. In the recent treaties of the Mikado's empire with China and Corea the statesmen of Japan insisted upon the ex-territorial clause. They decline intrusting Japanese subjects to the tender mercies of irresponsible judges; and while in their inmost thoughts they marvel at the indifference of foreign powers, they evince a perceptible tendency to visit their contempt upon the unfortunate foreigners who are compelled to dwell in the Tenno's realm.

The fact is that the situation in Japan is entirely misunderstood. The public of the United States still look upon the Island Empire as a regenerated nation—one that has discarded the shackles of an obsolete civilization, and has entered into the comity of western nations with the well-defined purpose of emulating them. No opinion could be more erroneous. So far from being in love with us and our institutions, they regard us with a cordial hatred, and look upon our social conditions with heartfelt contempt. It is quite true that they have adopted our public improvements; that railroads, telegraphs, the telephone, and the electric light have been introduced, and that the service of these important social factors is constantly being extended. Nor can the fact be gainsaid that every modern invention improving the condition of army and navy is anxiously watched, and adopted as soon as its value has been demonstrated. These facts granted, it is none the less true that the ill feeling against us is intense.

The government, in 1893, intrusted to the Department of Education in Tokyo the task of publishing a "History of the Empire of Japan," the first edition of which was speedily suppressed on account of the writers allowing their anti-foreign feeling to transpire in its pages. A new and purged edition was issued, but even in that work the national feeling occasionally crops out. In summing up the condition of Japan as it actually exists, the authors state: "During the early years of the Meiji era, any knowledge, however slight, of western sciences and arts was regarded as a qualification for official employment. Students who had shown themselves intelligent were sent to Europe or America to inspect and report upon the conditions existing there; and as each of these travelers found something new to indorse and import, the mania for occidental innovations received constant increments. To preserve or reserve old fashions was regarded with contempt, and so far did the fancy run that some gravely entertained the project of abolishing the Japanese language and substituting English for it. By degrees, however, men's eyes began to be opened to the fact that, while they were uprooting and abandoning much which had the sanction of tradition and the approval of long practice, they were planting in its stead institutions and customs not necessarily suitable to the Japanese, and possibly injurious to any people. Out of this sense of rash denationalization and unpatriotic radicalism a strong reaction ultimately grew, and men's minds turned once more to the customs and canons handed down from their ancestors. The reaction is now paramount, but the introduction of western civilization is, at the same time, never neglected." *

To one who, like the writer, has seen Japan emerge from a distinct theocratic republic into the present hierarchic, so-called constitutional government, there is nothing to marvel at, provided he has analyzed the Japanese mind, so as to understand the impulses producing the natural effect. From time immemorial, Japan, divided into clans, has been governed by the Samurai or Shizoku, as they are now officially designated. Every clan was virtually a republic enjoying the greatest autonomy, the qualified voters being the Shizoku, the Daimio a mere figurehead.† It was the Samurai caste that caused the downfall of the Shogunate, and the impulse inducing the leaders to introduce occidental improvements was nothing else than the desire "to thrash the foreigners, in our turn."‡ When united Japan abolished the clans, the great question was what would become of the Samurai. Okubo and Kido were in favor of the abolition of class distinctions. The result was the frequent insurrections culminating in the Satsuma rebellion of 1877. The government remained victorious, but when, on May 14, 1878, Okubo was assassinated, the other members of the government were seized with a panic and surrendered at discretion. From that time dates the reaction to which the official historiographer somewhat proudly refers. Japan has discarded our furniture, sleeps on tatomi (mats), wrapped in a futon (comforter), warms itself in winter over the hibachi (charcoal brazier), eats its national food of rice, fish, and vegetables with the national chopsticks, and

*From the Outlook.

* "History of the Empire of Japan," published by order of the Department of Education, Tokyo, p. 409.

† "History of the Empire of Japan," from p. 334.

‡ T. Takayanagi in "Sunrise Stories." Scribner, 1896 (Conclusion).

dresses in kimono (gown), obi (sash), haori (mantle), and hakama (bifurcated petticoats), just as their fathers did when Perry first forced his unwelcome presence upon them. "Even now," says a well-known encomiast of things Japanese, "under a written constitution and a representative government it is the four hundred thousand adult male Samurai who rule the forty millions of people, make the politics, and shape the destinies of Tei-Koku Nippon.*

If this be thoroughly understood, the astounding anomalies or idiosyncrasies of Japan disappear. The Samurai class, consisting, as Mr. Griffis correctly states, of about four hundred thousand households, fondly and honestly believe that they are the lineal descendants of the Kami or gods who created the empire for their especial benefit, as their Tenno or Heaven-Child is the direct descendant of Amaterasu, the sun goddess. Their traditions point to an undisputed reign as far back into the dim ages as their records go. Any one not belonging to their illustrious caste is an inferior being, to be treated with a hauteur of which the non-resident has no conception. And woe to the man who assails this doctrine! "Even as late as the year 1892," says the above quoted author, "a learned professor in the Imperial University was punished for studying Japanese history with critical care, as Europeans study it, and saying that the Mikado's ancestors were Koreans."†

The offices, civil and military, are in the hands of the Samurai. They constitute the members of the lower house in the Diet, and thoroughly control the upper house. Every member of the Cabinet, without exception, is taken from their ranks. They control the press and occupy the benches of the judiciary. And when one of their members commits an outrage he is solemnly whitewashed, as was the case with Miura, whose instigation of the brutal murder of the late Queen of Korea was abundantly proved.

This explains the constant disputes between foreigners and Japanese, ending invariably with the discomfiture of the former. Even the missionaries, who carefully and rigorously abstain from so much as an expression on public affairs, suffer, as was the case, now notorious, in the matter of the Doshisha. The Japanese, since the return to power of the Shizoku, have been convinced that they are immeasurably our superiors; and they evince that supposed superiority in an arrogance and conceit which bodes ill for those who shall be compelled to remain after July 16, 1899. Many of us, however, will grasp the opportunity which they have graciously left us, and which is forcibly expressed in their saying, "We did not ask you to come here. If you don't like us, get out! No one will oppose your departure!"

A NEW GAS.‡

By CHARLES F. BRUSH.

THE purpose of this purely preliminary paper is to announce the discovery of a new gas, presumably elementary, and possessed of some extraordinary properties. It is a constituent of the atmosphere, and is occluded by many substances. Its chief characteristic thus far ascertained is enormous heat conductivity at low pressures. In order to appreciate this phenomenon, it is necessary to consider the heat conductivity of some of the well known gases.

A year ago I had the honor to read before this section a paper on the transmission of heat by gases, and illustrated by numerous curve sheets showing the heat conductivity of several gases at all pressures from atmospheric down to the best vacuum obtainable; also an allied paper on the measurement of small gaseous pressures. Abstracts of these papers appear in the current volume of Transactions, and their full text may be found in The Philosophical Magazine for January, 1898, and November, 1897, respectively.

The apparatus used for the described experiments in heat transmission consisted, in part, of a long-stemmed thermometer hanging in a long-necked glass bulb; the bulb of the thermometer being in the center of the glass bulb. Two bulbs were used for different experiments; the larger one 112 mm. in diameter, the smaller one only 20 mm. A tank of water and crushed ice under the bulb was adapted to be raised when desired, so as to immerse the bulb in the cold mixture. The neck of the bulb was connected with an air-pump capable of reducing the internal pressure to a very small fraction of a millionth of atmospheric pressure; also with an elaborate pressure gage adapted to measure small pressures with very great precision, and a barometric gage for measuring larger pressures.

In using this apparatus, the gas to be tested was introduced at atmospheric pressure; the ice-tank was raised, and the falling temperature of the thermometer, which could lose heat only by radiation, conduction, and convection through the surrounding gas, was observed through a telescope. The time required for the temperature to fall through a given range, usually from 15° to 10° Centigrade, was carefully noted. Then the ice tank was lowered, permitting the thermometer to regain the temperature of the laboratory; some of the gas was pumped out, and the cooling of the thermometer again observed at this reduced pressure. This process was repeated many times, until the pressure was reduced to the lowest point attainable.

The results obtained with each gas were plotted in a curve showing its heat conductivity at all pressures from atmospheric down; the ordinates representing the reciprocals of the time of cooling in seconds, while the abscissas represented the pressure.

The present chart shows curves representing the heat conductivity of several gases, from fifty millionths of atmospheric pressure downward. The data for all of these, except the helium curve, are taken from last year's paper, but the scale is different.

I am indebted to Prof. Ramsay for the helium used in obtaining the curve here shown.

The ordinates of each curve measured from A B as a base line represent the total rate of heat transmission by the ether and the gas at the pressures indicated by the abscissas; while the ordinates measured from the line C D represent the heat transmitted by the gas alone.

It will be observed that the curves of all the gases named vanish together at the point of zero pressure, D. Repeated experiments have shown this condition to be always strictly true within the narrow limits of errors of observation, provided that before the introduction of the gas to be tested the whole apparatus has been kept highly exhausted for several days; or, better still, has been heated several hours by means of air and water baths, while kept exhausted. Without one of these precautions, I was never able to get any gas curve quite down to the point, D, for reasons which will appear. The point, D, represents a period of three hundred seconds required for the temperature of the thermometer to fall from 15° to 10°, with the pressure of the surrounding gas reduced to one twenty-millionth or less.

A very brief account of the circumstances which led to the discovery of the new gas may not be out of place. I had long been engaged in high vacua experiments, and had observed that glass apparatus when highly exhausted and heated, evolved gas for an indefinite length of time—rapidly at first, then slower, but never stopped until the temperature was reduced. On cooling, rapid reabsorption always took place, but was never complete, indicating that two or more gases had been evolved by heating, one of which was not absorbed on cooling. In other words, the absorption was selective. The truth of this conclusion was abundantly demonstrated subsequently. However, the percentage of reabsorbed gas was so large that I used a small quantity of pulverized glass in several experiments, to absorb a part of the residual gas after the highest attainable exhaustion was reached. The pulverized glass was always lead glass like that of the apparatus, and was heated nearly red hot for several hours before and during the final exhaustion.

During these experiments a curious phenomenon was noted; the pulverized glass lost its snowy white-

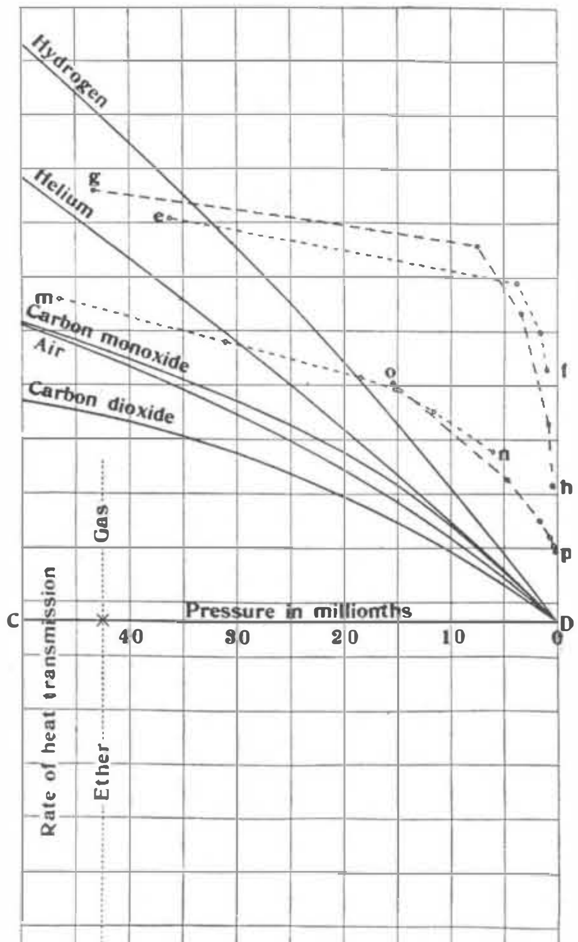


CHART SHOWING RELATIVE HEAT CONDUCTIVITY OF GASES.

ness. This I thought must be due to reduction of some of its lead; probably by hydrogen evolved on heating. If so, I argued that the hydrogen must have been absorbed from the atmosphere since the manufacture of the glass; and its presence in the glass, if proved, would be a long step toward proving the normal presence of hydrogen in the atmosphere.

Following the line of experiment thus suggested, I prepared a quantity of pulverized soda glass free from lead, and placed about 120 grammes of it in a large combustion tube connected with the apparatus already described. The glass was made from an old stock of tubing, and was of such a degree of fineness that it all passed through a sieve of 90 meshes to the linear inch, but would not pass through a 140 mesh sieve. The combustion tube was adapted to be heated by a gas furnace with automatically regulated gas supply, so as to be maintained at any desired temperature.

While prepared to make analysis in the usual way of the gas evolved by the pulverized glass in case it appeared in sufficient quantity, I relied chiefly on its heat conductivity for the detection of any large proportion of hydrogen in the last few millionths, not being prepared at that time for spectroscopic examination; and thinking that perhaps some hydrogen might be evolved in the last stages of exhaustion before heating, I tested the conductivity of the residual air from time to time as the preliminary exhaustion progressed.

When the exhaustion approached a good vacuum, an astounding phenomenon developed. At 36 millionths pressure the residual gas conducted heat twice as well as air, and nearly as well as hydrogen; at 3·8 millionths it conducted seven times as rapidly as hydrogen; at 1·6 millionths, fourteen times, and at 0·96 of one millionth, twenty times as rapidly. These results are plotted in the curve, *e f*. I did not carry the exhaustion lower than 0·96 M. At this pressure the time of cooling of the thermometer from 15° to 10° was only 177 seconds, while pure hydrogen would have required 288 seconds.

Evidently a new gas of enormous heat conducting capacity was present, mixed with the last small portion of air. It must have come from the pulverized glass, and probably formed only a small fraction of the mixture. The last c. c. of gas pumped out was collected, and upon subsequent analysis of it, nothing but air was found.

The discovery of the new gas as above outlined was made nearly a year and a half ago, on March 10, 1897. On the following day the pressure had increased to nearly five millionths, while the time of cooling of the thermometer, instead of diminishing as usual with increase of pressure, had risen from 177 seconds to 245 seconds, showing that the new gas had largely disappeared. This was subsequently found to be due to absorption by the phosphorus pentoxide used in desiccation.

Long continued moderate heating of the pulverized glass caused the evolution of some air, much carbon dioxide and hydrogen, some carbon monoxide, and more of the new gas. The selective absorption which occurred on cooling was confined almost wholly to the hydrogen and new gas. After further moderate heating and thorough exhaustion, I raised the temperature, continued the exhaustion, and got the results embodied in the curve, *g h*, showing that much of the new gas was present; the conductivity at 0·38 of a millionth, the last station in the curve, being twenty-seven times that of hydrogen. Several days of high heating, with frequent exhaustion, failed wholly to deprive the pulverized glass of its new gas, though the output was greatly diminished. For this and other reasons, I believe that the new gas resides in and not simply on the surface of glass.

To make sure that the apparatus was not deceiving me, I sealed off the combustion tube, heated the vacuous parts several hours by means of air and water baths as before indicated, admitted air dried over phosphorus pentoxide, exhausted step by step, and got the data for the "small bulb" air-curve shown here and in last year's paper. Evidently I had not been deceived about the presence of a new gas in the pulverized glass. I subsequently exposed this lot of glass several days to the atmosphere, spread out in a thin layer. When tested again after this exposure, it yielded the new gas both before and after heating, as freely as at first. This rejuvenation of pulverized glass by exposure to the air was fully confirmed with another lot made from common window-glass; and in connection with the results obtained by the diffusion of air, hereafter described, leaves no room for doubt that the new gas is a constituent of the atmosphere.

Pulverized glass appears to begin evolution of the new gas as soon as the atmospheric pressure is reduced. In one case, while making a slow preliminary exhaustion, I tested the air which remained when the pressure was still 132 mm.; and, to my great surprise, found it contained not only a trace, but a considerable quantity of new gas. The amount increased rapidly as the pressure was further reduced. This leads to the belief that finely pulverized glass gives up the greater part of its new gas on simple reduction of pressure to a low point, and without heating; somewhat as palladium gives up occluded hydrogen.

Several other substances than glass were examined, and nearly all found to contain the new gas. A specimen of old charcoal, made from pine wood sawdust by long exposure to a bright red heat, yielded, as was expected, comparatively large quantities of several gases when heated in vacuum. At some stages of the evolution these were rich in the new gas.

It would seem easy in such cases to remove the diluent gases by oxidation and absorption; but it is not. After making the necessary additions to my apparatus, I made many attempts of this kind. The reagents used were in large excess on account of the very small quantities of gas treated; so that some of the observed results may have been due to impurities. Cupric oxide and lead chromate evolved gases of their own almost indefinitely on high heating in vacuum, and then freely absorbed carbon dioxide and moisture at a lower temperature. Soda lime dried in vacuum in the presence of phosphorus pentoxide was almost indifferent to carbon dioxide. All the reagents named, especially phosphorus pentoxide, absorbed the new gas; and all but the latter gave it up again on heating.

A specimen of very fine white silicious sand, when heated in vacuum, gave a large quantity of gas consisting principally of hydrogen and hydrocarbons, with a considerable amount of the new gas. Some of this mixture was exposed successively to the action of red hot cupric oxide, soda lime, and phosphorus pentoxide. By this treatment the gases were reduced to less than three per cent. of their former volume. The residue was not very rich in the new gas, because of the absorption of the latter by the soda lime and phosphorus pentoxide, as I afterward learned; but I have shown the curve, *o p*, of its heat conductivity, because the pressure was carried to a lower point than in any other case. At the last station in the curve, representing a pressure of 0·12 of a millionth, the conductivity was equal to that of 5·1 millionths, or forty-two times as much as hydrogen. From this it seems reasonably certain that the curve, *e f*, if carried to as low a pressure, would have shown a conductivity at least a hundred times greater than hydrogen. And yet the new gas in that experiment must have been very far from pure on account of the continuous evolution of ordinary gases, as shown by the rise of pressure and loss of conductivity during the next few hours.

It will be observed that when the new gas was present, the form of the conductivity-curves was very different from those of the known gases; the effect of the new gas becoming more prominent as the pressure was reduced. I do not doubt that this was due to the interference of the heavier and slower moving molecules of the ordinary gases always mixed with the new gas. In last year's paper I described the same effect found in a mixture of carbon dioxide and hydrogen. When the new gas is obtained in a state of purity, I expect to find its curve of heat conductivity similar to those of hydrogen and helium, but with immensely increased ordinates.

Believing that the new gas is very much lighter than air or hydrogen, and may therefore be separated from

* W. E. Griffis, "Japan: In Story, Folk-Lore, and Art," p. 79.

† "Japan: In Story, Folk-Lore, and Art," p. 43.

‡ Read before the American Association for the Advancement of Science, August 23, 1898.