SCIENCE:

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

PUBLISHED BY

N. D. C. HODGES,

47 LAFAYETTE PLACE, NEW YORK.

SUBSCRIPTIONS.—United States and Canada.....$3.50 a year.
Great Britain and Europe..... 4.50 a year.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

VOL. XV. NEW YORK, JANUARY 17, 1890. No. 363

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THE WAITOMO CAVES, NEW ZEALAND.

IN a report to the Surveyor-General of New Zealand, Mr. Thomas Humphries gives an interesting description of a visit which he and a small party made in June last to the Waitomo caves, King Country, in the North Island of New Zealand. The Waitomo River, a tributary of the Waipa, which passes through these caves, lies about eighty-five miles south of Auckland in a direct line, though it is about twenty miles further by rail and road. The caves are about ten miles from Otorohanga railway station. The country around is undulating. A quarter of a mile before the caves are reached, the Waitomo, of about twenty feet in width, is seen emerging from the side of a hill, under which it has meandered through limestone caverns of various sizes for about twenty chains. A light canoe can be taken along the river through the caves to within a few chains of its egress, where further progress is barred by the roof coming down to the water.

At the entrance to the cavern the stream is eight feet deep. The natives have never had the courage to enter. The entrance to the cave, thirty feet wide and twenty feet high, is in the face of a cliff. It is beautifully arched, with numerous moss and lichen-covered stalactites. In a canoe the visitor is taken in, ninety feet from the entrance, and landed on a silt-covered beach. By the aid of candles, for all is now dark, he finds himself among ponderous stalactites, three to six feet thick, reaching from the roof, twenty feet high, to within a foot of the ground. Everywhere, all over the extensive and intricate caverns, are seen stalactites and stalagmites of immense size, in vast numbers, with marvellous beauty of form and color. At one place the dark vault was studded with thousands of glow-worms, giving the vault the appearance of a starlit sky.

Passing down the left bank of the stream for one hundred and forty feet, over a large deposit left by floods, the party crossed it by means of a foot-bridge. From the entrance to the bridge the cavern averages fifty feet broad, and from twenty to thirty feet high. After crossing the bridge, a sharp turn to the right is made up a steep incline for a distance of seventy feet, to the foot of a ten-foot ladder, which leads to a narrow passage four feet wide and fifteen feet high, the entrance to the "Grand Cavern." Here is the bottom of the "well," a narrow shaft running up to another series of caves over the lower ones, where it is again met with in the gallery above. The well is four feet across, perfectly true, as if made by human hands, and its sides beautifully marked with horizontal streaks, formed of laminated lime-stone. In the Grand Cavern is an immense mound of material evidently fallen from the roof.

Beyond the Grand Cavern the roof rises and forms two domes, one fifty feet high. High up, forty feet, is the entrance to another cavern. Beyond the dome there is a sudden fall, the roof lowering so much that the visitor has to stoop. The length of the Grand Cavern, at the end of which the stream is again met with, is two hundred and fifty feet. It varies in width from fifteen to forty feet, and from twenty to fifty feet in height. Up to this point the color is a dull brown and a light yellow; but in the upper galleries, thirty feet above, there are alabaster and Parian-marble-like scenes of unsurpassed loveliness.

Twenty feet above the Grand Gallery is the "Organ Gallery," so-called from the appearance of the great stalagmitic mass one hundred and fifty feet from its entrance, rising tier upon tier, like the front of an organ with marble pipes. From the Grand Gallery the Main Gallery above is reached by a twenty-five-foot ladder, and sixty feet along it the "well" is reached. Here it is twelve feet in diameter, with smooth sides of hard limestone, and the sound of moving water below. This is forty-five feet above where it was first seen. Fifty feet along from the upper well is a "fairy grotto," and through an archway thirty feet in length the "Banquet Chamber" is reached, where the surveyor and his friends found a hot dinner had been provided by the natives who own the caves. At the end of this chamber is the White Terrace, a stalagmitic mass rising in a series of terraces. From this the upper entrance to the caves is reached, high in a wooded cliff, sixty feet above and directly over the lower entrance. Mr. Humphries describes in glowing terms other galleries and caves, but this may suffice to show, that, notwithstanding the destruction of the Rotomahana Terraces, New Zealand has still plenty of wonders.

THE WENSTROM DYNAMO.

SOME months ago a description and illustrations of the Wenstrom dynamo were given in these columns. A dynamo of this make was recently sent to the electrical testing bureau of the Johns Hopkins University, where it was submitted to a series of tests, the results of which are given below, under the signatures of Drs. G. A. Liebig, Louis Duncan, and W. F. Hasson. It may be mentioned here that the dynamo tested was designed to give an output of 400 ampères, at 110 volts, running at a speed of 500 revolutions per minute; while the speed under which the tests were made was only 330 revolutions per minute.

"The dynamo electric machine sent to us for examination, a report of which is contained in the following pages, was described by the manufacturers as an 800-light dynamo, and was stated to absorb energy, when doing full duty, at the rate of about sixty-horse-power.

"Having our source of motive power and testing apparatus already in place for the purpose of conducting some experiments on other dynamos, the following tests were made (through the kindness of Mr. F. Hambleton, who consented to allow the bureau the use of a part of the works under his charge), at the plant of the Consolidated Gas Company of this city [Baltimore].

"Here we had set up an Armington & Sims engine of about seventy-horse power capacity; belted to which was a Tatham

dynamometer, which in turn was connected by a belt with the dynamo under examination. At a convenient distance from the dynamo were located the lamps and resistances (resistance coils), through which the current furnished by the former was allowed to flow, as well as the various instruments employed in the electrical measurements. Steam for the engine was furnished by a set of boilers located near by, but in a separate building.

"The source of motive power was, as stated before, an Armington & Sims engine, rated, nominally, at about seventy horse-power when supplied with steam at about eighty pounds pressure. The normal speed of the engine was about 275 revolutions per minute, but this could be varied within limits of a considerable range, without any serious interference with the action of the governor.

"For measuring the power supplied to the dynamo, there was employed a dynamometer originally designed by W. P. Tatham of Philadelphia. This instrument was the same as that used some years ago by the committee appointed by the Franklin Institute of Philadelphia to conduct the competitive tests of dynamos exhibited at the Electrical Exhibition held in Philadelphia in 1885. A description of the apparatus will be found in the *Journal of the Franklin Institute*, November, 1885.

"For measuring the current furnished by the machine, there were employed two methods, the full-load current being 400 ampere, — too great for any single instrument in our possession, — a part of this was measured by a Thomson balance, and part by observing the potential difference between the ends of several heavy strips of German silver immersed in oil. The latter method is known generally as the method of fixed resistances, and the apparatus referred to was standardized by observing the difference of potential at its terminals, when a current of known value, as measured by the Thomson balance, was allowed to pass through it.

"In the measurement of electromotive force there was used a Weston voltmeter, received only a few days previously from the laboratory of Mr. Edward Weston, where it had been standardized. This, however, as well as the other measuring apparatus, was, after the completion of the test, carefully calebrated in the physical laboratory of this university.

"It may be stated that owing to the construction of the measuring apparatus employed, and also to the circumstances that a considerable distance separated the instruments used from the dynamo, no magnetic influence could have interfered with the accuracy of their indications. Before measuring the power absorbed by the dynamo, the dynamometer was run without load, in order to determine its own friction. This amount of power consumed was, in all cases, subtracted from subsequent measurements. The friction of the dynamo itself was determined by running it on open circuit, and with the brushes removed.

"The order of making the tests was as follows: first, the dynamometer was run without load; second, the dynamo was run on open circuit, brushes removed (this measurement gives friction of dynamo); third, the dynamo brushes were placed in position (this measurement represents losses due to friction in bearings, losses due to heating of field magnet wires, losses due to reversals of magnetism of armatures, core, and losses due to Foucault currents in the armature). These losses are, for a given speed, nearly constant. After this, the dynamo circuit was made, and measurements of power, current, and electro-motive force at different loads were begun. The following table gives the results of the several determinations.

Current.	Electro-motive force.	Horse Power.	Dynamometer Horse Power.	Loss.	Losses, Friction, Reversals, etc.	Losses Current^2 × Resistance.	Efficiency.
134.8	114.0	20.6	24.97	4.4	4.4	17	82.5
194.1	115.6	30.1	35.3	5.2	4.5	.38	85.2
371.6	98.3	49.0	54.5	5.5	3.5	1.30	89.9
400.0	110.0	58.9	64.7	5.8	4.1	1.50	91.0

"Speed of dynamo, 330 revolutions per minute."

A NEW USE FOR THE PHONOGRAPH.

AT a meeting of the Massachussetts Medical Society on Nov. 20, A. N. Blodgett, M.D., made some interesting remarks on the use of the graphophone or phonograph in taking and recording the clinical history of a patient. As reported in the Boston *Medical and Surgical Journal*, Dr. Blodgett spoke as follows: –

"Some time ago my attention was called to this instrument, about which I had known something, although not in its present state of perfection. It occurred to me that this might be of interest to physicians in various ways, and particularly to those connected with public institutions. As you have seen, by speaking into the mouth-piece a record can be produced upon the yielding cylinder of wax, which will remain permanent, and can be reproduced a great many times.

"Last night Mr. Thomas and I made experiments at the City Hospital on a patient just admitted to the accident room. His clinical history was taken; but it was not in all respects a success, because he had an injury preventing his speaking with much force, it being a fracture of the ribs. But we got a record from an actual patient in an actual examination which was reproducible and could be understood. Later we got another record from a hypothetical patient; namely, one of the house-officers of the hospital, who was questioned in the same way as would be an ordinary patient admitted under circumstances which precluded any previous knowledge of him or his condition. That record was more distinct, could be very well understood, and I am sure any one with a little practice could use this machine in a way to obtain durable and trustworthy records from the lips of the patient.

"An instrument of this kind might be made portable, and a visiting physician in a hospital might give his directions into the funnel, when they would be recorded upon a small cylinder, which can be put upon another machine, and the physician's directions as to treatment or his description of lesions can thus be accurately recorded. This record is got by means of the graphophone, which is used a great deal in conjunction with the typewriter. I know how difficult it is to get full directions in the wards from the visiting physician, and here we have the means of an absolute record. In medico-legal cases I think it would be of great service because the utterances of the patient could be reproduced at an indefinite period afterward, and I should suppose would be evidence in the case."

HEALTH MATTERS.

Hallucinations in Alcoholism.

DR. F. W. MANN, in a paper upon alcoholic hallucination read before the Detroit Medical and Library Association, brings together some facts and theories which are published in the *Physician and Surgeon*, November, 1889: —

"The visual hallucinations of alcoholics are exceedingly varied. They may be hideous, grotesque, or awful, or they may be gorgeous, splendid, or inspiring. Unpleasant features usually predominate, and the patient is puzzled and tormented by the presence of rats, mice, beetles, worms, fleas, and other insects. This condition of zoöscopic hallucination is one of the commonest among the phenomena of alcohol poisoning.

"I do not recall having seen any explanation of the reason why animals enter so largely into the composition of the primary illusions of alcohol. These illusions a little interrogation of the patient will usually substantiate as present. A patient only the other day declared how he saw a rhinoceros, several huge elephants, and strange-looking reptiles browsing in the yard.

"A word should be said on the snake hallucination. Disorders of this kind are associated in the popular imagination with excesses in the use of alcohol. 'Seeing snakes' is in reality not a common experience. The two or three cases we have seen convince us, however, there is some basis for esteeming this one of the occasional retributions of excessive zeal in devotion to Bacchus.

"The snake hallucination is difficult to explain. Disturbances in the peripheral organs of vision seem hardly competent to account for such aggravated symptoms, although there are facts suggesting the plausibility of such an explanation. A patient in a