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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE N-RAYS: ARE THEY REAL OR ILLUSORY?

Just why English and German scientists have been uniformly unsuccessful in detecting the strange emanations to which Prof. Blondlot, their discoverer, has given the name "N"-rays, and why French physicists, on the other hand, furnish more convincing proof of their existence every day, is one of those scientific anomalies for which no adequate explanation can ever be offered. French eyes are certainly blessed with no greater clarity of vision than those of Englishmen; and yet the fact remains that Blondlot's rays, or at least the more important phenomena of which they are the cause, have never been observed by any but Blondlot, Charpentier, and a few French investigators. The prompt reply with which each objection to the existence of the N-rays is met by Blondlot in the form of experimental proof, and particularly the photographic evidence of N-ray activity that is now offered, would seem sufficient to dispel whatever doubts may still linger.

What the N-rays are has not been determined with any greater certainty than has attended similar inquiries into the nature of the Roentgen rays. Only their effects have thus far been studied. How the emanations were discovered is probably well known to readers of this journal who have followed the accounts that we have published from time to time of Blondlot's work. A brief recapitulation, however, may not be out of place.

In his experiments on the rapidity of propagation of the Roentgen rays, Blondlot noted effects that could be explained only by assuming the existence of undiscovered radiations. Experiments with other bodies than a Crookes' tube confirmed that assumption. A Welsbach burner, a Nernst lamp, flint exposed to the sun's rays, rapidly-vibrating sonorous bodies, the sun, and many other substances were found to be radio-active, to give off rays that resemble both heat-waves and Roentgen rays—heat waves in so far as the rays were absorbed by the slightest film of water, Roentgen rays in so far as they penetrated aluminium with ease. By far the most startling announcement that has been made by any investigator who has made the N-rays a special study, comes from Charpentier, who boldly proclaims that the human body sends forth N-rays. That it should be possible to measure the force exerted in muscular contraction, to note the activity of the brain and nerve centers, and, indeed, to trace by substances rendered phosphorescent, the general arrangement of nerves in the human system, seems more like a fantastic Jules Verne dream than a scientific achievement. And yet this is what Charpentier claims that he has done.

In Great Britain and Germany, as we have said, the existence of these puzzling emanations has been boldly denied. At the University of Glasgow seven skilled observers of one experiment were unable to note any of the characteristic phenomena of the rays. In Germany, Prof. Lummer has ingeniously shown that many of the Blondlot experiments can be imitated without employing any of the means prescribed by Blondlot, and that the effects observed may be referred to processes taking place in the eye itself. It has also been suggested that the dilation of the pupil, which occurs when the attention is fixed upon an object, may account for the peculiar manifestations recorded by Blondlot and Charpentier. A well-known British scientist offers the fanciful explanation that self-hypnotism due to the fatigue of the optic nerve is the cause of the N-ray phenomena. In a word, most if not all of Blondlot's opponents seek to account for the N-rays by classing them with optical illusions or by considering them purely subjective perceptual processes.

However plausible these theories may be, they most certainly fall before the incontestable proof afforded by means of objective instruments of precision. Blondlot has demonstrated the existence of his N-rays by photography. Furthermore, he has actually measured the wave length of the rays both by means of the diffraction grating and Newton's rings. Surely it cannot be contended that the photographic plate is subject to hallucinations; nor can it be said that optical illusions have measurable wave-lengths.

If the N-rays do exist, what are they? A satisfactory answer cannot be given until we know more of radio-activity, and until the information thus gathered has been properly classified. The Roentgen rays were discovered several years ago. And yet, how much of their true nature do we know. Even the radio-active substances discovered long before radium burst upon us are still puzzles.

If the N-rays are still but little understood, we may nevertheless attempt to classify them with other undulatory phenomena. It will be remembered that by means of the old periodic law of chemistry it was possible to tabulate the chemical elements according to their properties and their atomic weights in a sequence that brought out their relation to one another strikingly. Wherever gaps occurred, it was reasonable to infer that they would be filled by elements still to be discovered—an inference that was more than once justified. By a similar tabular arrangement, the N-rays may be shown to fill a gap in the series of undulatory rays. In rate of vibration and length of wave there is a difference so vast between the shortest electrical waves (0.60 millimeters) and the longest heat waves (0.024 millimeters) that the N-rays with their average wave length of 0.2 millimeters may well be assumed to fill the intervening gap.

SUBMARINE MINES ON THE HIGH SEAS.

It is the opinion of a well-known officer of the United States navy, a leading expert on the subject of submarine mining, that both the Russians and Japanese have been sowing the waters in the neighborhood of the Liao-tung peninsula with submarine mines on a most extensive scale, each of the combatants aiming to render the harbors and roadsteads and the courses that would naturally be followed by the enemy's warships so perilous that they would either keep clear, or if they did venture into these waters, would do so at the imminent peril of losing their ships.

That such a policy has been followed with reckless abandon is suggested by the fact that during the present war no less than eight vessels, from the 15,000-ton battleship down to the small torpedo boat, have been either disabled or entirely destroyed by contact with mines. On the part of the Russians, as far as can be made out from dispatches, the torpedo cruiser "Yenesei," the protected cruiser "Boyarin," a torpedo destroyer or a torpedo launch, and the battleship "Petropavlovsk" have been utterly destroyed by these deadly weapons, while the "Pobieda" was so badly injured as to have difficulty in getting back into the shelter of Port Arthur. The Japanese acknowledge that they have lost by the same instrumentality a torpedo boat, the protected cruiser "Miyako," and the battleship "Hatsuse."

Both the Russians and Japanese freely admit that they have resorted to mine laying, the latter claiming that the "Petropavlovsk" was sunk by mines that were placed for the express purpose of intercepting Admiral Makaroff's fleet on its way out through a certain channel that led from Port Arthur. It seems also to be pretty well established that one form of mine that has been freely employed makes use of connecting cables between two or more separate floating mines, the idea being that if the ship does not happen to hit the mines themselves, her stem will engage the connecting cable, and as she moves forward through the water, the mines will be swung in against her hull and explode on contact. There is strong confirmation of this in the fact that in the sinking of both the "Petropavlovsk" and the "Hatsuse" there seem to have been two explosions at different points of the ship's length, the second following very closely upon the first, which is exactly what would happen if a ship steered across the cable, and drew the mines in upon herself, particularly if her stem engaged the connecting cable at some other point than midway between the two mines. Now the fact that this double explosion occurred in the case of both the Russian and Japanese battleships, would indicate either that both contestants are using the same form of mines, or that the loss of both battleships is to be attributed to a Japanese source. It is more than probable, however, that immediately upon the loss of the "Petropavlovsk," the Russians set about doing what the Russian press has persistently asserted was done, namely, sowing the waters frequented by the Japanese in their bombardment with mines which were laid by torpedo boats under cover of the night.

It is probable that these mines have been anchored and that in the heavy storms which have been frequent of late, many of them have broken adrift and floated far outside the immediate theater of war. According to Admiral Togo's report, the "Hatsuse" was sunk ten miles off shore. It is unlikely that the mine which sunk her was anchored, for the chance of a vessel steering directly over such a small floating object, anchored far outside the range at which she could use her guns effectively, was so remote that the Russians would not consider the chance worth the time and risk that it would take to place a mine in such a spot. No doubt this particular mine, like the two which were seen floating within three miles of the port of Wei-Hai-Wei, over eighty miles from Port Arthur, by a correspondent of the London Times, was one of the derelicts that had broken adrift.

Immediately upon the sinking of the "Hatsuse," it was announced from Tokio that the Russians were sowing floating mines upon the high seas outside of the three-mile limit. The matter was taken up in the British press, and Russia was charged with violating the unwritten principles of international law as it affects the rights of neutrals on the high seas. We must confess that common fairness demands that no such charge be made until it has been absolutely proved that this has been done. It is well, however, that the point has been raised; for there is no question that scores, and possibly hundreds, of these terrible weapons have either broken loose or been deliberately cast loose, to float out on the high seas where they must, for many months, and possibly years, remain as a deadly menace to ships of all nations. It will probably never be known whose ships were blown up by whose mines, or what character of mines have been laid by whom, or where or how they were laid; but the terrible menace which undoubtedly exists will, we hope, lead to some international regulations that will put a strict limit upon the uses that are to be made by belligerents of this method of warfare.

Now that it is certain that an unknown number of mines, any one of which would be certain destruction to a merchant vessel, have been floated out onto the high seas, to be carried by wind and weather Heaven knows where, the question arises as to the length of time during which they will retain their deadly efficiency. The United States navy has some experience on this subject, purchased happily at no cost to itself; for when our ships were entering various harbors of Cuba during the Spanish war, no less than three of our vessels came in contact with Spanish mines which, most fortunately, had been clogged by the marine growths, which accumulate so rapidly in tropical waters. These mines were provided with projecting levers which, upon being struck by a ship, should have acted with a trigger-like effect and discharged the mine. There are two of these mines on exhibition to-day at the New York navy yard. Although they had been but a few months in the water, they were so incrusted with barnacles that the triggers refused to work, and our ships escaped. Many mines, however, are not dependent upon any projecting levers for detonation, the outer case being entirely free from openings, and the firing mechanism being contained within the water-tight shell; and there is no reason why, especially in the colder waters of northern seas, such a mine should not retain its efficiency for the probable duration of an ordinary war, say for one or two years. In course of time the high explosive, through chemical changes, will lose its efficiency, and ultimately the salt water will attack the shell and leakage will take place. It can safely be said, however, that for at least twelve months to come, the world at large may thank the contestants of the Russo-Japanese war for having set afloat on the high seas a tremendous peril to navigation; and we repeat, that the United States could not do better than improve the present opportunity to bring about a thorough discussion of this subject, with a view to rigidly circumscribing the area—the accidental as well as the intended area—of mining operations and risks.

A WORLD'S CONGRESS OF ACADEMIES.

The first meeting of the General Assembly of the International Association of Academies was held, it may be recalled, at Paris in 1901, under the presidency of M. Gaston Darboux, permanent secretary of the Académie des Sciences. That gathering, by a unanimous vote, decided that the next triennial Congress should take place in London, the prospective date being of course coincident with the present year. Subsequently, Whitsun-week was decided upon as the most convenient period to call the assemblage together in England, and the arrangement was made that the gathering should be under the presidency of Sir Michael Foster, the distinguished physiologist.

The establishment of this important association was not, it may be said, trumpeted among the nations; on the contrary, its birth was accomplished in so quiet a fashion that some may feel surprise when reminded of the circumstance of its foundation. However that may be, it is the fact that the subsequent progress of time, though comparatively short, has secured for the organization a unique power and influence, amply justifying the early hopes that centered around its initiation, and the original efforts to launch it as a cosmopolitan undertaking. Once ushered in, it sprang into prominence, and is now a notable force in movements affecting the progress of science and learning.