COSMOSOLAR RAYS

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The present report gives additional information on the newly discovered evidence obtained during 1929 and 1930 showing this powerful penetrating radiation to be of a shorter wave-length and harder than previously disclosed. A continuation in the measurements of these high frequency COSMOSOLAR RAYS is the subject of the present discussion. The remarkable hardness of these rays has drawn the attention of foremost scientists who agree with us on the forces that are ejected from the sun and converted into radiation of various wave-lengths. The different wave-lengths have given us astounding values which are being gradually submitted to science and we hope that the importance attached to this phenomena will be appreciated and the truth respected so far as nature permits.

This new evidence indicates that the Aurora Borealis is always present but weak in radiation when non-visible. The data from the brilliant Auroral displays of the five following sets of dates March 10-11-12; 15-16-17; April 16-17 and June 1-2-3, 1929 and May 4-5, 1930, will herein be mentioned.

Our main purpose was determining whether, in the high altitudes on and around Mt. Everest, our ionization curve would divulge anything new from that found in America. This curve in the succeeding article will show extremely accurately measured values in America and the highest regions and lakes of the Himalayas. We are also including our high altitude sounding-balloon tests.

Under Water Tests on Mt. Everest. The highest lake on Mt. Everest chosen as most suitable for under water observations was about 1,064 feet deep lying at an altitude of 23,257 feet, and 7,512 feet higher than lake Ngantsi-Tso. This high altitude fresh water lake divulged our shortest wave-length recently obtained.

The zero readings of five electroscopes corresponded to depths of immersion of 1,064 feet, which were 59.6 for electroscope No. 1, 62.7 for electroscope No. 2, 65.4 for electroscope No. 10, 63.1 for electroscope No. 11, and 64.3 for electroscope No. 12. The accompanying table shows the results of our latest experiments.

Location	Altitude Feet	Ions Per ccm/sec.	Depth Reached in Feet
Mt. Everest Lake	23,257	63.4—0.0012	3.5—1,064

On the above dates and up to the present time, other experiments were conducted in this high altitude lake on Mt. Everest. Here we obtained an average reading of 63.4 ions at a depth of 3.5 feet below the water's surface and at a depth of 1,064 feet the ionization reached 0.0012 ion. Observations in the Himalayan mountains, in America and in parts of Europe are continuously being made at all hours of the day.

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The values given in the table were those obtained during the peak of the strong Auroral displays which appeared in 1929 and in 1930. The usual readings gradually increased from about 24 hours before the peak of the Auroral storms which remained for 42 minutes, and in the next 29 hours gradually diminished to the regular normal daily value of ionization. On all other days the normal daily ionization, in this high altitude lake reached a steady value of 35.2 ions. Here we found that the atmospheric absorption coefficient is equivalent in absorbing power to about 17 feet of fresh water. The difference in ionization between this high altitude lake and lake Ngantsi-Tso, elevation 15,745 feet was 39.1 ions, while at sea-level in Bengal Bay near Calcutta, India, a reading of 4.2 ions per ccm/sec. was noted during the visible Aurora on each occasion. All readings taken in Saranac Lake, New York State elevation 5,000 feet, showed 12.7 ions while in the Hackensack River, Secaucus, New Jersey, an ionization of 2.3 ions per ccm/sec. was observed during all of the past Auroral displays. The ionization in America is lower than in the upper regions of the Himalayas.

High Altitude Tests with Sounding Balloons. Since we have disclosed the ionization at sea-level and at an altitude of 23,257 feet in the high lake on Mt. Everest our high altitude balloon tests in the upper regions of the Himalayas and America will now be briefly described. Observations made with 3 sounding balloons each equipped with special self-recording electrometers furnished us with excellent reliable data. It was interesting to know how large a change of the ionization at high altitude corresponded to a small change in the value of wave length. This however, will be shown later in our ionization curve. Our sensitive instruments recorded a value of 987.2 ions at the highest elevation reached by the balloons, showing the wide contrast from the sea-level reading of 2.3 ions.

The carefully arranged investigations were based on fair weather conditions during normal day Aurora radiation and when the Aurora Borealis appeared extremely brilliant. The very latest experimental data has repeatedly confirmed our previous findings.

In 1921 we sent up 2 sounding balloons each equipped with small electrometers to an elevation of 15½ miles above New Jersey. On May 14-15-16 of the same year a very brilliant and powerful Auroral display appeared from which important data were gathered. The electrometers exhibited a varying ionization in the upper atmosphere at different elevations. The data disclosed a more intense ionization during the visible Aurora Borealis than in normal daily radiation. This wide change in ionization attracted our attention and in order to study the different instrument readings we made many other balloon surveys. Our former electrometers, in 1927, however, were replaced by new instruments having greater precision. The data obtained from later balloon tests confirmed all of the former high altitude values. Other experimental investigations were carried out in the Adirondack mountains in New York State and in the past two years on the Himalayan mountains, India.

All data gathered above New York and New Jersey continued to show a low varying ionization throughout normal daily radiation and during each visible Aurora. The high altitude readings obtained at 15½ miles were 227 ions during visible Aurora storms. In normal daily observations the readings varied from 27 to 112 ions. Our data taken in the Himalayan mountains is more uniform and steady which tends to show that high altitude ionization is more intense.

Owing to rarefied air conditions on and above these mountains, some of our high altitude tests were carried out by suspending a special self-recording electro-

meter from an aeroplane for the purpose of checking the instrument readings in the 3 sounding balloons. These balloons ascended to heights reaching about 17 miles. The research associates had to use extreme precaution in their limited altitude flights in order to apprehend the sounding balloons, from which were suspended the delicate instruments to insure their safety upon descending to earth. The balloon-instrument readings taken during each visible Aurora showed an ionization of 474.2 for balloon No. 1; 473.1 for balloon No. 2; and 473.2 for balloon No. 3 at an altitude of 47,200 feet. These readings were carefully checked on many other balloon flights and all agreed. After the Auroral storms subsided and for all other daily observations the instrument readings diminished to 127 ions for similar altitudes. This low steady value is the normal daily invisible Aurora radiation and is known to reach no lower ionization for this height unless there is a variation in sun-spot activity. With high sun-spot eruptions a great change in radiation occurs. This radiation which comes from the sun has recently been named Cosmosolar Rays and will be used in our future papers by this title.

For altitudes of 87,120 feet an increase in ionization over the lower elevations has continuously been observed. At this high altitude our balloon-instruments recorded a higher ionization during the brilliant Auroral storms, which were 987 ions for Balloon No. 1; 987.1 for balloon No. 2; and 987.4 for balloon No. 3. The latter instrument was occasionally adjusted to agree with various atmospheric pressures.

All Auroral storms are accompanied by strong electromagnetical disturbances, which are definitely known to affect all commercial electrical transmission systems. The visible light from the Aurora Borealis is due to excitation of certain atmospheric gases by electrified corpuscles, which under gravitational forces enter the atmosphere from the sun. According to our pioneer electrodynamics these Cosmosolar ejections move in spiral paths elastically along the earth's magnetic field and continuously bombard us at all hours of the day and night. Very recent evidence indicates that this converted radiation is composed of high speed wave-particles acting similar to ultra-gamma and beta-rays, which appear as free electrons moving at high velocity, or alpha particles that are stripped nuclei of hydrogen or helium atoms, or possibly a combination of one or more elements of higher atomic weight. According to our observations and acculmuated data these particles are apparently transmitted under some peculiar wave influence of an elastic nature. It is rather difficult to interpret how the charged particles are ejected from the sun at such terrific speed unless certain commotions incident to wave action underlie the ejections. The assumption is that there is a unification of the two related phenomenon, (the charged particle and the wave), so that the corpuscular and the wave theory of light evidently appear to be true.

Average Life of Ion in Air. Intricate measurements were made at different altitudes for determining the average life of ions in the air over land and the sea and of the number of condensation nuclei. The instruments showed that when the wind was from N. NW., thus coming from land-free polar regions, the average life of mobile ions was from 150 to 400 seconds. This life is 3 to 6 times greater than for ions over land. For such polar air an extremely small value was found for the number of condensation nuclei, or 400 to 1,600 per ccm. while in the ridges on the Himalayas, values were always obtained of 4,000 and at certain times as high as 22,000 nuclei per ccm. When the wind was from S. SW., the

average life of the ions was from 200 to 310 seconds, while from the E. NE., the life was 40 to 250 seconds.

General Factors Affecting Absorption. Estimates show that about 32 percent of the solar energy is wholly lost to the earth, leaving about 68 percent directly absorbed in approximately equal amounts by the earth and the atmosphere. It follows that about 60 percent of the incident solar energy ultimately heats the atmosphere. For instance atmospheric absorption of radiation, whether solar or terrestrial, obviously is due mainly to water vapor, carbon dioxide and ozone. Since the approximate amount of carbon dioxide in the atmosphere is always known and the quantities of water vapor and ozone at least often determinable, it frequently is possible, by the aid of laboratory information to know offhand the actual absorption in any portion of the spectrum due to all of these substances, either singly or jointly.

In the presence of moisture at ordinary temperatures, ozone soon reverts to ordinary oxygen, the probability of why only traces of it are found in the lower atmosphere. In the stratosphere where there is but little moisture and where the usual temperature is about −55 degrees C., in mid-latitudes, and even lower in the tropics, it obviously is far more stable. Ultra-violet radiation on passing through cold dry oxygen converts much of it into ozone and exists in sufficient amounts in the upper air. The absence of the spectra of hydrogen and helium does not disprove the presence in minute amounts of these elements; in fact helium is always present. The result is that our knowledge of the atmosphere becomes rapidly more speculative with the increase of height beyond 30 kilometers, evidently most all compiled tables and diagrams representing it are therefore correspondingly uncertain to facts.

With varying latitudes, the amount of ozone is least near the equator and greater towards the magnetic poles, while the seasonable variation increases largely towards the poles. Solar radiation is not responsible for ozone formation, since the amount at the poles is greatest at the end of the long cold, dark winter season. Observations have been compared from spectrographs taken at the bottom and near the top of mountains which confirm our previous findings. A report on our findings will be published later. The observational results show the effect of the origin and composition of the atmosphere on its transparency for solar radiation. The effect of molecular scattering increases much more rapidly than that of absorption, as the water-vapor content increases, and the wave lengths transmitted obviously will have varying values. Thin air layers will weaken the long-wave more than the short-wave ultra-violet radiation, but for thicker layers the shorter waves are absorbed, and relatively more long-wave radiation is transmitted. The ultra-violet radiation is, however, considerably weaker in penetrating power than the ultra-gamma radiation. The ultra-violet are known to travel down from the sun directly, while the ultra-gamma rays follow the earth's magnetic field of force where they are converted at the magnetic poles into a very high frequency penetrating radiation. These rays are extremely far shorter and harder than ordinary radium rays. The effect of radium rays in the earth has been observed to reach an altitude of 2,400 feet in various parts of the world at which height they finally diminish to zero in value. This also bears out our contention that the sun contains vastly higher radiant-elements than found on earth. Another fact is that no primary gamma-radiation has been observed which can be attributed to polonium, iron or aluminum.

Permanent Magnetic Field of the Sun and Earth. Our conception of the quantum of light is like a corpuscle and many investigations support the former supposition that light is composed of waves. The former theory connecting frequency and energy, or in other words connecting the length of the waves with the momentum of the particle has recently been proven by Dr. L. de Broglie of the University of Paris. The importance of this fact can be realized that all energy, both potential and kinetic is really contained in the ether, and that it can only travel from one place to another by means of waves. Electrical energy is transmitted in that way, and there is so great a unity about all forms of energy that no other way can energy travel except in the form of etheric waves. The belief is that waves exist of all possible length which undergo transformation in passing through certain substances. The energy as observed in radioactivity does not really exist in the atoms, which are radioactive but is merely made manifest by the transformation of waves traversing these atoms.

Of all astronomical bodies it is only the sun and the earth that have recently been observed to possess electromagnetic fields. The magnetism of the earth has been the subject of considerable study for several generations, and it may be mentioned that Dr. E. G. Hale of the Mt. Wilson Observatory about a quarter of a century ago detected the magnetical effects of the sun. All that was then known about the sun's magnetism came from this high observatory. The magnetism at that time acted indirectly upon certain recording instruments but recently that of the sun was finally obtained by specially designed instruments, which required years of perfection in order to measure the electromagnetical radiation distributed over the solar orbit.

Formerly it was believed that this indirect influence depended upon the "Zeeman Effect," which the magnetic field exerts on atoms emitting or absorbing light. Since it is understood that certain spectral lines in the solar spectrum are broken up by an amount which indicates the magnetic intensity at the surface of the sun, it is possible to calculate the assumed maximum intensity of the sun's magnetic field near the earth. Now, however, this magnetic influence has recently been discovered to be of an electromagnetical order that can be measured by very precise instruments. The direct results recently found show that the sun acts similar to other solar systems which naturally must also possess electromagnetic fields. The importance thereof is, that, since our sun possesses these qualities, other distant suns must produce similar effects which are closely related with universal gravitation. Therefore up to the present time cosmical magnetic phenomena are strictly limited to our sun and the earth. Our specific investigations are now being carried out in order to digest some very peculiar observations which show a close relationship between spectral radiation and gravitation.

According to recent and known determinations the polarity of the earth and the sun are similar with relation to their directions of rotation but do not coincide. The sun has not only a general electromagnetical field but also local magnetic storms associated with sun-spots where the intensity is extremely high. The sun-spots generally appear in pairs of opposite magnetic polarity and are strongly noticeable in every eleven-year cycle. Very precise measurements show that the magnetic field of the earth is due to the electric currents flowing inside and around its magnetic axis. These currents are kept in motion by a continual potential energy supplied from the sun. A number of sun-spot observations have indicated the permanent existence of a stream of matter or wave-particles in the sun.

According to our verified conception of physics, the study of the nature of gravitation is beset with unusual difficulties due to the fact that it is an ever present phenomenon of a strong influence. From the inception of our experimental investigations, we directed our efforts toward finding some evidence of the postulated ether waves aside of radiation itself. It now shows that such evidence has not alone proven the possible existence of an ether medium but, also has convinced us that postulated gravitation waves are not confined to one frequency, but to a wide range of frequencies as do the well known X-rays and the recently discovered powerful penetrating Cosmosolar Rays.

During two recent solar eclipses, another highly important fact that was first observed and later confirmed is the coincident instrument readings. Intricate measurements made on these two occasions showed a slightly lower fluctuated reading on all of our instruments when the sun was totally eclipsed. During partial eclipse, no differences were recorded. During total eclipse, we observed a reduction of 4.2 ions per ccm/sec. from the usual normal daily readings taken at high altitudes.

In considering the qualities of these high frequency Cosmosolar Rays at different places, we have found that the most reliable results were obtained in the upper regions of the Himalayan mountains. The much sought evidence obtained from our latest experiments has confirmed all of the former high altitude readings taken in Europe and America. The greatest depths explored in the rivers and lakes were 131 feet of sea-water and 1,064 feet of fresh water. Measurements made in deep ridges near and on Mt. Everest agreed and the readings were similar to those obtained near Lake Ngantsi-Tso for the same elevations. Our very latest evidence discloses the corresponding wave-lengths of this radiation that ranges from 0.00057 A. to 0.0000023 A.

Conclusions. Our experimental results and final conclusions will be disclosed as soon as the entire details are obtained from new experiments now conducted in the high altitude fresh water lake on Mt. Everest, India, and in Saranac Lake on the Adirondack mountain, New York State. The latest experimental evidence discloses a shorter wave-length in the high frequency range of the Cosmosolar Radiation than was formerly mentioned. Our latest under water readings and the high altitude instrument values obtained with the balloons are the most rangeful derivations ever recorded during Auroral storms and in normal daily radiation. We have finally discovered that the Cosmosolar Rays vary for different altitudes and our experimental values reached their highest intensities on and above the Himalayan mountains. The depth of the lake on Mt. Everest where our shortest wave-length in the spectrum was obtained is greater than any other body of water explored by us. Other forthcoming papers will thoroughly revolutionize many branches of physics.

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