Correspondence.

German Bells at St. Louis.

To the Editor of the SCIENTIFIC AMERICAN:

I was much interested in your description and illustrations of the German national pavilion at the St. Louis Exposition, especially in your reference to the bells. You are in error, however, in saying they were purchased by an eastern city, as they were purchased for St. John's German Lutheran Church, of Reading, Pa., the Rev. Dr. J. J. Kuendig, pastor. F. S. WERTZ.

Reading, Pa., November 18, 1904.

Indian Summer.

To the Editor of the SCIENTIFIC AMERICAN:

The author of the article on Indian summer in the SCIENTIFIC AMERICAN is in error when he supposes the Northern States and Canada have a monopoly of that delightful phenomenon. Earth has no more beautiful scenes than are beheld in the Southern and Gulf States in the Indian summer periods, especially in the region of the Blue Ridge Mountains. As I write this in a Southern Gulf town, the indescribable Indian summer haze hangs over town, prairie, and bay, although summer verdure is still unscathed.

ALEX WILLIAMS.

Port Lavaca, Texas, November 17, 1904.

HENRI BECQUEREL.

BY DANIEL BELLET.

Henri Becquerel first came prominently before the public when he began the investigation of phosphorescent and fluorescent substances shortly after the discovery of the X-rays, for the purpose of ascertaining whether their phenomena might not be attributed to causes similar to those which give rise to the properties of the Crookes tube. He found that they projected emanations entirely different in character—emanations which have been fittingly named "Becquerel rays."

Prof. Henri Becquerel is the grandson of a celebrated physicist, Antoine César Becquerel, and the son of an equally illustrious physicist, Alexandre Edmonde Becquerel. At present Henri Becquerel is professor of applied physics. When he first began his course of lectures in 1892, at the Museum, with characteristic modesty he never once referred to his own name in passing in review work of his predecessors, despite the fact that these predecessors were his father and his grandfather. His educational activities are not confined to the Museum, for he is actively engaged at the Conservatoire des Arts et Métiers, and is also one of the Chief Engineers of the Department des Ponts et Chaussées.

Born in 1852, Henri Becquerel entered the Ecole Polytechnique at the age of 20. The three years from 1874 to 1877 were spent at the Ecole des Ponts et Chaussées, a preparatory school in which the construction of roads and bridges and civil engineering in general is taught. Although an engineer by training, Becquerel was soon attracted to the study of pure science, following in the footsteps of his eminent grandfather and father. In 1878 he entered the Museum of Natural History, an institution with which the name of Becquerel will be ever linked. Since 1895 he has filled a professor's chair at the Ecole Polytechnique. He has been a member of the Academy of Sciences since 1889.

I did not have the pleasure of knowing Prof. Becquerel personally when I received the commission of interviewing him for the SCIENTIFIC AMERICAN. What struck me most when I first met him was his charming personality. He lives in one of the most aristocratic streets of Paris, in the Quartier des Champs Elysées, quite near the Arc de Triomphe et de l'Etoile. When I stepped into the reception room of his house, I marveled not a little at the artistic surroundings in which I found myself. And the reception room is but a counterpart of every room in the house. Every chamber through which I was conducted by Prof. Becquerel had its old furniture, its quaint bric-a-brac, its walls covered with pictures—many of them heirlooms and family relics handed down by Antoine César Becquerel. Although a scientist to his finger tips, Prof. Becquerel assured me that he takes a lively interest in the beautiful surroundings of his home, and the contemplation of pictures and statues is a diversion and a rest from the arduous work of the laboratory.

In person Becquerel is short. His face is wonderfully expressive and mobile. His diction is choice. Every word is selected with the care habitually given by a man of culture to literary form.

His laboratory work is admirably systematic. For weeks he experiments and observes the results of his experiments in accordance with a well-defined plan. Probably it would not be impossible for him to state far in advance what particular phase of scientific research would receive his attention on a certain day a year hence. And this systematic plan, which he has followed more or less throughout his entire career, may be considered a continuation of the work of his father and grandfather. Despite the fact that there is hardly a branch of pure science in which he has not made some important discovery, he has occupied himself chiefly with the problem of those mysterious luminous phenomena which his father before him had studied, and the solution of which his grandfather had dimly foreseen. It is this continuity of scientific purpose and investigation that lends so peculiar an interest to the labors of the Becquerel dynasty.

Henri Becquerel labored long and faithfully in the fields of electricity, magnetism, optics and meteorology; but the researches which he has carried on in these fields are really part of a well-defined system having for its object the study of electro-optic phenomena such as the invisible infra-red spectrum and the absorption of light. All his investigations have been carried on in the physical laboratory of the Museum of Natural History which was the scene of the labors of his father and grandfather before him. Starting with Faraday's splendid discovery of the relation of electro-magnetism to light, Becquerel succeeded in showing the existence of a fundamental relation between the rotary magnetic power of bodies and a very simple function of their index of refraction. The limitations of this article prevent me from following in detail the interesting development of Becquerel's theories. Hundreds of observations were made which lead to the conclusion that the phenomena of electro-magnetism are intimately connected with the speed of propagation of luminous waves, and to an inter-molecular magnetic action. Negative rotations in the plane of rotation of light were studied minutely, and clearly and simply explained. The Faraday phenomena were discovered in gases, an entirely new domain, by means of wonderfully ingenious and sensitive apparatus. The magnetic influence of the earth as part of this systematic plan of investigation was likewise studied, and the results obtained have fully confirmed the conclusions which have been inductively drawn by scientists. So far, indeed, were these investigations carried, that a method was devised for determining the rotary magnetic power of a body, and of ascertaining by simple optical measurements the absolute intensity of terrestrial magnetism. Naturally Becquerel was ready to approach from an entirely new standpoint the phenomena of atmospheric polarization, with the result that he had made discoveries that are ill described by the simple word "startling."

Becquerel's study of invisible infra-red radiations is not the least interesting work which he has accomplished. Here he followed directly in the footsteps of his father, who had discovered that these thermo-rays cause the phosphorescence of a substance which has been previously rendered luminous. This may be said in a measure to be the starting-point of the discovery of the radio-activity of matter. By projecting on a phosphorescent surface discontinuous spectra of incandescent metallic vapors, he discovered a series of rays, the existence of which had never been suspected. He was thus led to examine the invisible vapors of different metals. This opened up an entirely new field in spectroscopy.

Becquerel's interesting investigations of the absorption of light by various bodies brings us nearer to the subject of radio-activity; for the compounds of uranium were used in studying the phenomena of phosphorescence. He proved the variability of the spectra with the direction of the luminous vibrations by which they were traversed. All these researches led to a new method of spectrum analysis, based on the independence of the various substances of which a single crystal is composed, and rendering it possible to determine the structure of the crystal without fracture. It was this work that earned for him a place among the members of the Academy of Sciences. While continuing his studies of phosphorescence and light, he still found time to investigate fluorine.

Each discovery that he made seemed to foreshadow the next; for he seemed to sow the scientific fruit which he was to garner at a later day. Although in 1896 he began his interesting communications to the Academy of Sciences on the radiant properties of the salts of uranium, and although for two years he patiently made experiments on the emanations of uranium and its salts, it is somewhat remarkable that at the beginning of 1898 not a word is published in the reports of the Academy of his labors. The reason is to be found in the fact that he did not wish to publish immediately the discovery of phenomena which formed but a part of still vaster discoveries—discoveries which are now in course of publication, and which are concerned chiefly with Faraday and Zeeman phenomena.

It is impossible in the brief space at my disposal to enumerate all the discoveries which have been made by Prof. Becquerel. A modern scientific bibliography, however, would be very largely composed of studies bearing his name; they would include monographs of all kinds on radio-active substances and radio-activity.

It must not be forgotten that the work of M. and Mme. Curie, strikingly original though it may be, was nevertheless suggested by, and may be said to be an outgrowth of, Becquerel's investigations of uranium. Prof. Becquerel himself has only very recently published a voluminous treatise on the spontaneous radio-activity of matter, to which he has given the suggestive title "Researches on a New Property of Matter."

Results of the Annual Automobile Hill-Climbing Contest at Eagle Rock.

The fourth annual hill-climbing contest of the Automobile Club of New Jersey was held on Thanksgiving Day, November 24, at Eagle Rock hill in Orange. The cars were classified according to selling price, and also by weight. The fastest time was made by Bernin, who, on W. Gould Brokaw's 60-horse-power Renault racer, covered the mile up an average grade of about 12 per cent in 1 minute, 20 seconds, or at a speed of 45 miles an hour. William K. Vanderbilt, Jr., on his 90-horse-power Mercedes car, made the climb in 1 minute, 20 3-5 seconds; and two 90-horse-power Fiat racers, driven by William Wallace and Paul Sartori, secured third and fourth places in 1:22 and 1:22 1-5 respectively. These records were made in the contest for cars weighing from 1,432 to 2,204 pounds. In the contest for light cars, weighing between 851 and 1,432 pounds, Guy Vaughn, on a 40-horse-power Decauville, took first place in 1 minute, 37 1-5 seconds; while a 7½-horse-power Prescott steamer and a 15-horse-power White steamer made the second and third best times in 1:37 3-5 and 1:48 respectively. The same White machine made the best time in the contest for stock steam cars, this time being 1:23 3-5.

In the contests for gasoline machines of various prices, an Oldsmobile made the best time (3:06 1-5) for machines selling under $850, a Cadillac coming second in 4:33 2-5. The winner in the $850 to $1,250 class was a 22-horse-power Buick car, which made the climb in 2:18 2-5, and was followed by a 12-horse-power Duryea in 2:33 2-5 and two 15-horse power Elmores in 2:41 4-5 and 2:45 3-5. In the $1,250 to $2,000 class, first, second, and third places were secured by a 14-horse-power Columbia, a 12-horse-power Franklin, and a 16-horse-power Rambler in 3:14 2-5, 4:03 3-5, and 4:13 2-5. A 40-horse-power Thomas, representing machines in the $2,000 to $3,000 class, covered the mile in 2:42 4-5; while in the $3,000 to $5,000 class a 24 to 30-horse-power Walter car secured first in 1:54 2-5, and 24-horse-power Pope-Toledo and Matheson cars second and third in 2:15 4-5 and 2:21 4-5. It can thus be seen that some of the moderate-priced cars are just as good or even better hill-climbers than those of the larger and more expensive type. Of the cars valued at over $5,000, the best times were those stated above for heavy machines. It will be noted that all of these are foreign machines. The records for electrics were 4:22 3-5 by a 3-horse-power Torbensen machine and 5:23 2-5 by a Columbia. In the 551 to 851-pound class for gasoline cars, a Franklin did the climb in 2:26, and a Cameron in 3:07 1-5, both of these machines being of the air-cooled-motor type. The hill climb was the most successful one ever held at Eagle Rock, and it furnished an ample demonstration of the climbing ability of both American and foreign stock cars.

The Oldest Self-Striking Clock in the World.

In the north transept of Wells Cathedral, England, may be seen the oldest self-striking clock with a count-wheel in the world, having been constructed by Peter Lightfoot about 1320. This timepiece contains many devices which testify to the ancient horologist's ingenuity. Several celestial and terrestrial bodies are incorporated in interesting movement and relationship. They indicate the hours of the day, the age of the moon, and the position of the planets and the tides. When the clock strikes the hour, horsemen fully armed dash out of two gateways in opposite directions, and charge furiously. They strike with their lances as they pass, as many times as corresponds with the number of the hour. A little distance away is seated upon a high perch a quaint figure, which kicks the quarters on two bells placed beneath his feet, and strikes the hours on a bell. The dial of the clock is divided into twenty-four hours, and indicates the phases of the moon and a map of the heavens. Outside the transept is another large dial and two bells, on which two armored knights strike the quarters, each with his halbert, and are said to be actuated by the mechanism of the clock inside.

The National Mosquito Extermination Society.

The second annual convention of the above society is to be held on December 15 and 16 next in New York and Brooklyn. There are to be participants from abroad and all over the United States. Important measures are to be considered in reference to the extermination of the mosquito in the various States, and much interesting information is promised.

The society has recently issued its first annual Bulletin, which is full of useful facts and historical data relating to the work done during the past year.