into consideration the existence of thorium, uranium, and other radio-active substances discovered and undiscovered.

Curiously enough, Strutt's theory necessitates an assumption of the internal structure of the earth, that is quite in harmony with the prevailing views of geologists. Strutt finds that the inside nucleus, heated by the crust of radium-containing material, must be at a uniform temperature of 1,500 deg. C. throughout, just as a loaf of bread, which has been in an oven long enough, acquires a steady temperature equal to that of the walls of the oven. Strutt's crust would contain about one thirtieth of the earth's volume, and if throughout it the radium heat energy were of the average of that exhibited by many samples examined by him, the temperature of the earth could be maintained until our stores of uranium suffered sensible depletion. Such an assumption would lead to the conclusion that the whole of the central portion of the earth consists of non-radioactive substances at an approximate uniform temperature somewhat below the melting-point of platinum. Prof. Griffiths has examined the proofs of this supposition at our disposal, and we here present a summary of his findings.

Prof. George Darwin has stated that the rigidity of the earth is at least as great as that of steel. Hough arrived at substantially the same conclusion by a different method. To Oldham's mind the evidence pointed to a central metallic core and to the existence of marked differences in the physical constants of the core and the surrounding crust. Prof. Milne's recent investigations have led him to the conclusion (based on the difference in the rate of propagation of earthquake waves) that the material below a depth approximating to thirty miles is of a uniform nature, and that the change in physical constitution is abrupt. Geodetical observations conducted by means of plumblines and pendulums have convinced Col. Burrard that we are not justified in asserting the non-existence of deep-seated variations in density, but that we are justified in believing that the variations in density which have been discovered are apparently superficial.

The agreement of results drawn from such dissimilar sources is certainly striking. It is possible that the evidence from each source, considered independently, might be regarded as inadequate, but the cumulative effect is sufficiently strong to justify the belief that some marked physical change in the constitution occurs at a depth of some thirty to fifty miles. At all events, we have indications that, with the exception of a comparatively thin crust, the earth consists of a non-radio-active substance with a rigidity approaching that of steel, with an average temperature in the neighborhood of 1,500 deg. C.

RESULTS OF THE FIRST INTERNATIONAL BALLOON RACE.

The Aeronautic Cup contest for spherical balloons has proved to be one of the leading events of the season. It was organized under the direction of the Aero Club of France for September 30, with the large space of the Tuileries Gardens, in the heart of Paris, as the starting point. The cup offered by Mr. James Gordon Bennett for the longest distance covered by a balloon is a handsome work of art in massive silver having a value of $2,500. It is to be held by that club whose representative is the winner. The other prizes are as follows: For the first prize, the sum of $2,500, also one-half of the engagements, or for this year $400, making a total of $2,900. The second prize includes one-third the engagements for 1906, or $246; and the third prize the remainder, or $133. Among the other prizes are a silver medal offered by the Aero Club of the Southeast, the medal of the journal L'Auto, the prizes for meteorological work offered by the scientific commission of the Aero Club, and the Meteorological Association of France, etc., also a series of medals from the Aero Club. At the same time a balloon can compete for the Santos Dumont prize of $800 for the first trip of 48 hours in the air.

Of the sixteen contestants, three each were English, French, German, and Spanish, while the remaining four consisted of two Americans, one Italian, and one Belgian. Seven of the contestants succeeded in crossing the English Channel and landing at various points in Great Britain, while the remaining nine were content with landing in France without attempting the trans-channel journey. The race was won by Lieut. Frank P. Lahm, of the Sixth United States Cavalry. Lieut. Lahm and M. Santos Dumont represented America, and the former, who was accompanied by Major Hersey, of the United States Weather Bureau, covered 485 miles in about 23 hours, and finally landed 7 miles south of Whitby, on the east coast of England, at 3 P. M., October 1. This distance in a straight line from Paris was about 415 miles, although the course actually traversed was some 70 miles longer Although both Lieut. Lahm and his companion were amateurs at ballooning, they were able to take advantage of the latter's knowledge of meteorology and, by a careful study of the weather maps, to know what course to pursue when they were once in the air. The balloon trip was fairly rapid, as an average speed of 21 miles an hour was maintained. The balloon rose at first to an altitude of 3,000 feet, and was carried by a fair breeze in the direction of Havre. After a while the air current lessened, and the aeronauts dropped to about 1,500 feet in order to obtain a better current. Upon nearing the English Channel, they descended still lower, and crossed the latter with the trail rope dragging in the water, and at an elevation of not over 300 feet. The crossing of the Channel occupied four hours, from 11 P. M. until 3 A. M. the following morning. France was left at Caen, and England was reached near Chichester. The average speed while crossing was 25 miles an hour. Not until noon of the following day did their balloon, the "United States," ascend to any very great height. At this time the aeronauts threw out ballast, and allowed it to ascend to an elevation of nearly 10,000 feet. The wind carried them in a northwesterly direction, and finally brought them to the east coast, near which the landing was effected. This was Lieut. Lahm's fifteenth ascent, and it was a most successful trip. His balloon was of French manufacture. It had a capacity of 22,500 cubic feet, and was constructed of varnished cotton cloth. The other American balloon, "Les Deux-Amériques," manned by Santos Dumont, met with an accident and got no farther than Broglie, some 80 miles northwest of Paris. The noted experimenter had his balloon equipped with a 6-horse-power gasoline motor arranged to drive two horizontal propellers mounted in a frame on the side of the basket. The propellers were intended to serve the purpose of the usual ballast, and to raise or lower the balloon as the aeronaut wished.

While starting the motor in order to send his balloon to a higher altitude, M. Dumont caught his coat sleeve in the machinery, ripping it and slightly lacerating his arm. Consequently, he landed and returned to Paris.

The balloon which went the second greatest distance was the Italian aerostat manned by Alfredo Vonwiller. This balloon, the "Elfe," covered about 370 miles and landed in England near New Holland, a small town on the river Humber opposite Hull.

The balloon which covered the third greatest distance was the "Walhalla," the large aerostat of that experienced amateur aeronaut, the Count de la Vaulx. This balloon landed at 1:30 P. M. October 1 in Walsingham, near Norfolk, England. The distance it covered in a straight line was about 285 miles, but the actual distance traversed was about 435 miles, and the highest altitude reached about 7,500 feet.

One of the English balloons, the Hon. C. S. Rolls's "Britannia," of 78,000 cubic feet capacity, remained in the air the longest of any of the air craft, its record afloat being 26¼ hours. The landing was made at Sandringham at 6:30 P. M., October 1. The "Britannia" was fourth in the contest. Another English balloon, the "Zephyr," of Prof. Huntington, was 8 hours in crossing the Channel, but it finally landed safely at Sittingbourne, Kent, and obtained sixth place.

The third English balloon, piloted by Frank H. Butler, went only as far as Blonville on the north coast of France. This balloon, the "City of London," like its two English mates, was of 78,000 cubic feet capacity. It obtained twelfth place in the contest.

M. Jaques Balsan's French balloon crossed the Channel and landed at Singleton, Isle of Wight, at 4 A. M., October 1, thus obtaining fifth place.

Capt. Kindelan in a Spanish balloon was seventh, he having landed at Chichester, England. Eighth place was obtained by Herr Scherle, representing Germany, who landed at 11:30 P. M., September 30, at Dieppe. Another Spaniard, Emilio Herrera, was ninth. He landed half a mile from the coast between Cabourg and Dives-sur-Mer at 10:38 P. M., September 30. Tenth place was secured by Capt. Von Abercorn, of Germany, who landed at Villers-sur-Mer at 11:15 P. M., September 30. Signor Salamanca, of Spain, was eleventh. His balloon came to earth at Blouville-sur-Mer at 11 P. M. Count de Castillon de St. Victor was thirteenth. He also landed at Blouville-sur-Mer at 11:30 P. M. He stated that the wind was too uncertain for him to attempt to cross the Channel. Fourteenth, fifteenth, and sixteenth places were gained respectively by Baron von Hewald, of Germany (who landed at Conde-sur-Lisle, near Point Audemer, at 11 P. M.), by Santos Dumont, and by Van den Dresche, representing Belgium, who landed in Brittany.

The contest is remarkable from the fact that no serious accident occurred to any of the balloons. Santos Dumont's aerostat was the only one which was at all out of the ordinary as regards its equipment, and it was due to the slight accident mentioned above that this daring aeronaut found it necessary to give up the contest. The Italian balloon of Alfredo Vonwiller had some difficulty in alighting, as a gust of wind drove the balloon at a high rate of speed over a number of fields before the anchor caught. Finally, however, the anchor caught in the garden gate of a country house, bringing the balloon up suddenly against the side of the house and damaging the chimney and roof slightly. Fortunately, no one was hurt.

That sixteen balloons, carrying twice that number of aeronauts, could make such successful flights seems to show the safety of ballooning as a sport, provided the aeronauts are sufficiently experienced. The chief result of the race, however, and the one for which Americans should congratulate themselves, is that the race was won by an American and that, consequently, the next race will be held in this country. It has been officially stated at the Aero Club of America that the race of 1907 will be open not only to balloons proper, but also to dirigible balloons, aeroplanes, and other types of flying machines. Thus there will be presented a grand opportunity for American inventors to perfect their apparatus in time for the next race which, in view of what has already been accomplished in this country, will doubtless be won again by America.

LEVAVASSEUR'S GLIDING BOAT.

A new form of gliding boat has been constructed at Paris by Messrs. Levavasseur, the well-known motor manufacturer, and Lein. In its main points the new apparatus consists of a front boat of light and pointed construction which contains the motor and its accessories. Connected with the rear of the boat by a short, light wood frame about two feet long is a large flat construction in the form of a tail, which extends for some thirty feet back in the water. The rear end of the tail is almost submerged, while the front end, and also the boat, appears to float on the surface and is almost lifted out of the water under the action of the propeller. The latter is placed in the tail portion and a shaft runs back from it to the motor in the front boat. The motor is the new 50-horse-power 8-cylinder "Antoinette" motor, of the Levavasseur construction. The present system is claimed to have the advantages of a sliding boat as well as those of an ordinary boat, that is, it is able to run in rough water, at moderate speed. In calm water it glides very rapidly on the surface.

SCIENCE NOTES.

There is no more important group of questions demanding attention from the chemist at the present time than those connected with the production of India-rubber or caoutchouc. An enormous increase in the demand for India-rubber has taken place in the last few years, and last year the production was not less than 60,000 tons. Until recently the supply of rubber came chiefly from two sources—the forests of Brazil, which contain the tree known as *Hevea brasiliensis*, furnishing the Para rubber of commerce which commands the highest price, and the forests of Africa, where climbing plants, generally of the Landolphia class, also furnish rubber. The increased demand for caoutchouc has led to the extensive planting of the Para rubber tree, especially in Ceylon and in the Federated Malay States. Systematic cultivation and improved methods of preparation are responsible for the fact that the product of the cultivated tree, which begins to furnish satisfactory rubber when six or seven years old, is now commanding a higher price than the product of the wild tree in Brazil. It is estimated that within the next seven years the exports of cultivated India-rubber from Ceylon and the Federated Malay States will reach between ten and fifteen million pounds annually, and that after fifteen years they may exceed the exports of the so-called wild rubber from Brazil.

Some valuable natural history acquisitions have recently been secured by various zoological institutions in Great Britain. An extensive collection of chimpanzees, two of which were brought from Africa, are of more than passing interest. One belongs to a hitherto unknown species, the face being cream-colored, while the other, which is of a rare species, is known as a "koolokamba." It has a shaggy coat jet black in color, with the hair hanging over the hands like mittens. The head is quite bald, and its size is somewhat abnormal for this race. It receives its curious name from the peculiar guttural sound it makes and which signifies "the animal that speaks." The London Zoological Gardens have received twelve specimens of the "leaf insect," so called on account of its curious and striking likeness to a leaf, which it resembles in every respect—shape, color, veining, and texture being identical. This strange insect comes from a damp climate, and in order to keep the specimens moist, they have to be continually sprayed with water. These gardens have also been presented with two specimens of the white ibis, which is rapidly becoming extinct. These were secured by Lord Crawford during his recent seven months' cruise round South Africa and the Mozambique Channel, by permission of the Hon. Walter Rothschild, from Aldabra, who some time ago secured a lease of the island from the government, in order to preserve these rare birds. During the same voyage Lord Crawford collected about five hundred specimens of rare birds, which have been presented to the British Museum, to be mounted for the national collection.