GEORGE Q. CANNON. ROITOR AND PUBLISHES. Saturday, . - - . January 28, 1971. UNIVERSITY LECTURES. ASTRONOMY. BY PROF. ORSON PRATT, SEN.

LECTURE II. Ellipticity of the Earth - Mausurement of Meri tional Ares .- Figure of the earth Changed by Rotation .- Influence of the Contribuyed Fo es on the Weight of Bodies - Influence of Distance from the Centre on Weight -Intensity of Gravity in different Latitudes determined by Pendulum Experiments .-Consequences of Increased or Diminished Rotation .- Causes of the Trade Winds .- Weight of the Whole Earth. -How Ascertained,-Densily of the Earth .- Density of the Interior Compared with the Surface.

In our former lecture many evidences were examined which demonstrate the rotatory movement of our globe. Its dlurnal rotation may also be proved to exist from a careful consideration of its true figure. When we loosely speak of its figure, we represent it to be a sphare a globe, because it so nearly approximates to such a figure: and it is only by the most careful observations and measurements that we find any deviation from a sphere. Indeed before the days of Newton, the earth was generally supposed to be a perfect sphere. But that great philosopher demonstrated that a globe composed in part of fluid materials, could not have a rotation upon an axis without changing its figure, Ly having its polar diameter shortened and its equatorial diameter increased. His calculation showed that the earth, if it rotate, must be flattened in its polar regions in the shape of a turnip, or an orange. Subsequent observations have verified his calculations and theory to be true; and the earth is no longer, in strictness, considered a globe, but an oblate ellipsoid or spheroid, having the diameter which coincides with diamotor

THE EVENING NEWS. do.; and the worn off fragments and parti-cles would eventually be scattered over the bed of the oceans in the form of pebbles, over the equatorial. sand and mud, which would, like the fluid

portions of the earth, seek their own level in the deepest portions of the polar seas; and in this manner the flattened portions of the solid spherold would become rounded, and the whole earth, both solids and fluids, would assume the spherical form; and thus, in the course of millions of ages, under the present laws, if no rotation existed, the solid portions of our spheroid would become covered with a spherical ocean of uniform depth. Geological facts are said to afford abundance of evidence that the existing continents and ialands have all undergone changes as great as the nave all undergone changes as great as the one which we have just described; they appear to have been, more than once, torn into fragments, reduced to powder, sub-merged in the great deep and then by some process re-constructed and made new. Let us next consider the case of a per-fect globe of the magnitude of our earth,

covered with an ocean of water of uniform depth, composed of materials of uniform density or, at least, of a density increasing at a uniform rate from the surface to the centre. All the particles of such a globe, if at rest, would be in a state of equilibrium. if at rest. would be in a state of equilibrium. Now let such a globe begin by degrees to rotate upon an axis; let the rotation be accelerated until it shall perform one revo-lution in 23h. 56m. 4a; is will then have a vetocity equal to the earth. When this rotation commences, each particle, situated without the axis, would have a contrifugal force, or a tendency to recede from the axis, varying in proportion to its distance from

Near the poles where the centrifugal force at the surface of the globe is the weakest, it sole at nearly right angles to the force of gravity; the watery fluid under the influences of these two forces would be the intensity of gravity at the equator is to urged towards the equator; as the water proceeded upon its journey, its distance from the axis of motion would be increas-ed and its centrifugal force would comethe intensity of gravity at this city as the square of 86,400 is to the square of 86,495; or as I to 1.0022; or in other words, a mass of matter weighing 10,000 lbs at the equator will weigh at this place 10,022 lbs. Great numbers of experiments of this

quently be more powerfal, though it would act at a disadvantage in bonsequence of its being more in opposition to the central force, that is, forming a greater angle with it than when near the poles; but still the direction of the resultant motion would be towards the equator. The obtuseness of experiments of this direction of the resultant motion would be towards the equator. The obtuseness of the angle under which these two forces operate would continue to increase from the pole to the equator, at which place the centrifugal force would act in direct opculate, without any further observation, the difference of the weight of bodies in ifferent latitudes; and by knowing the difference of the intensities of this force at different latitudes, we can calculate the true figure of the earth, and the degree of position to that of gravity, and consequently the particles would have no more tendency to proceed either to the north or south; but the whole effect of the its oblateness without measuring an arc of the meridian. Who could have supposed centrifugal force now would be to render that by the simple oscillations of a clock all bodies specifically lighter by their up-ward tendency from the centre. Under these circumstances it is easy to pendulum, mathematicians could sit in their chairs, and determine the proportions between the equatorial and polar diperceive that the globular form of the ocean

ameters of our earth? But this is only one among ten thousand wonders opened to us would not any longer be the form of equiby the skillful application of that grand librium, and that the ocean surrounding the two poles must, in obedience to the key called Mathematics. It is highly satisiaws of motion, proceed towards the equa-tor and there form a protuberance of a suf-ficient elevation to counteract any further motion of the fluid particles, arising from the centrifugal force of rotation. The form the centrifugal force of rotation. The form thus assumed by the fluid ocean would be an oblate spherois, which would be a per-manent form of equilibrium as long as the rotation continued uniform. And it is also easy to conceive that the solid nucleus of the earth for thousands of miles around the solute spheroid, we know that it must have a rotation upon its axis in order to preserve the spheroidal form, so the earth for thousands of miles around the solute spheroid processes the axis 1-300 shorter than the equatorial each pole would be laid bare, forming two face are concerned.

the axis 1-300 shorter than the equatorial great polar continents, while the ocean is not interval and the oblateness is so belt or sone several thousand miles in perform. If a pail, partially filled with their velocity of rotation is much greater fater, be suspended by a long string, and made to revolve swiftly around, the water the midst.

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this surface would have a greater velocity of rotation towards the east than the current of air has which has come from the polar reigons; hence this current would appear to come from the east with a velocity equal to the differencies of the velocities of their rotations.

This cause alone would produce an eas wind, which combined with the velocity towards the equator, would, in the northern hemisphere, change it to a north-east wind, and in the southern hemisphere, the same two causes would give a south-east wind. That these are the directions of the trade winds near the northern and southern tropics is a fact abundently confirmed by observation. Were it not for the rotation of the earth, these trade winds, as we have before stated, would be simply northerly and southerly winds; but by the unequal velocities of rotation between the surface of the earth and these currents passing over them, they are deflected into north-easterly and south-easterly winds.

In this waythis way there will be formed an equatorial belt where the air will be comparatively calm and on each side of this, there will be formed two tropical belts, encircling the whole earth where the trade winds will prevail. These trade winds constantly blowing

in a direction contrary to the diurnal rotation of the earth, would by their friction upon its surface retard that rotation and finally destroy it altogether, were it not for the compensating effect of the upper ourrents of the atmosphere.

These upper currents in the equatoria regions have a rotatory velocity of over 1000 miles per hour; and as they proceed

its surface. If the earth were hollow, or any great internal cavity existed, as some have supposed, then the density of the materials composing the interior strata surrounding the hollow would be increased then broke up in groups and returned to their miserable homes or wandered about the dark city like birds of ill omen till daylight. At noon yesterday, in accordance with this pledge, about

strain surrounding the hollow would be increased still more, not only to make up for the want of weight at the surface, but to counterbalance the entire absence of weight in the cavity. The increased density of the earth towards the centre is presumptive evidence that there does not exist any great cavity in the interior. Who can contemplate understandingly the wonders evolved by the skillful application of mathematics to terrescrial phenomena, without being inspired with the most profound admira-tion for those Godlike powers with which the human mind has been endowed? Before its po-tent energies the complex machinery of nature discloses its beautiful harmonies, and proclaims, with inspiring tones, the Divinity of its Author. ing rufflans in the city, including a large number of soldiers and 181 of the war battalion of the national guards, marched in a body to the place in front of the Hotel, uttering revolutionary cries and calling upon the citizens to arm.

[SPECIAL TO THE DESERET NEWS.]

By Telegraph. VERSAILLES, 25 .- Jules Favre returned to.Paris yesterday. BORDEAUX, 27 .- A correspondent has Per WESTERN UNION Telegraph Line had a personal interview with Gam-betta. He says: "I asked whether the AFTERNOON DISPATCHES.

**Political**<sup>\*</sup> Prisoners released!

**Riet in Paris** !

**Hotel** de Ville attacked!

FRANCE.

Gambetta on the situation.



MR J C GRAHAM MR A THORN Miss Eliza DAVE Martha wiggles.

> BOX OFFICE open for the sale of Tickets on the day of performance, at 11 o'cleck.

Will soon be produced, the Great Spee tacular Drama, entitled, THE

ICE

THE FROZEN HAND! Which has been over two months in

war would be continued if Paris feli?" active preparation. He replied, with great earnestness: "The fall of Paris will have no effect whatever in stopping the war, if the LONELY MAN OF THE OCEAN Prussian conditions of peace are: still maintained; Paris will capitulate. I W. H. GUMERSELL & CO. believe that the people themselves would barn her like a second Moscow, Importers of before they would allow the enemy to take possession." "But, supposing she does capitulate," I asked, "what then?" "In that case," said Gambetta, "we **URESS AND CLOAK TRIMMINGS** must fight in the provinces. We have LACES, EMBROIDERIES, now, without the army in Paris, half a million men in the field, and a quarter French Corsets, Kid Gloves, of a million ready to join them without touching a levy in 1871 or the enrolled HOSIERY. he former will give 300 Zephyr Worsteds, Fancy Goods, &c., nd the latter 2,000 000 Ve have arms pouring No. 307 N. Fourth SL. ST. LOUIS. rters." In regard to Eng-Special attention given to orders. spoke with some bitterd157:1y hat country made a fatal she allowed fear and revent her interference **ORIENTAL POWDER Co** nce to be dismembered Manufacturers of England has lost the e continent, and has vir-Sporting, Shipping and Blasting ver the balance of power GUNPOWDER se close and secret alli-Office, No. 127 N. SECOND STREET, ia is unquestionable. No SAINT LOUIS. s can doubt that in ten e Russia at Constantino-PUTNAM PURLEY, General Agent West of ple and Prussia in Holland, Belgium and Trieste, and the whole of Central Eu-Shot, Bar Lead, Percussion Caps, and Cartldges for Sale. rope delivered over to those powers. A hanomus It. The Czar looks further eastward, towards the English possessions, and, "I believe, 'myself,'' said Gambetta, "that the English people now see the error, and will hold the ministry responsible CO-OPERATIVE NOVELTY WORKS Jordan Street, 17th Ward, Special Aotices. Half a block west of the Taternacie SALT LAKE CITY. HAVING the latest improved Machinery for working in ters at the NATIONAL HOTEL, seven doors east of the Post Office and balf a-block west of IRON, WOOD & BRASS the Theatre, convenient to the market, wood Can manufacture all kinds of yard and hay corral, and hopes to receive their continued support. The table, in the future, as Machinists' Tools, Turning Lathes, Fan Blowers, Gear Cutting and Bolt Screwing Machines, Cheese Vals, Cotton, Woolen and Grist Machine d56 3 w52 8 ery, elc., etc. PERSONS desiring to make a speedy, safe OUR FOUNDRY and comfortable fourney from Ohicago to Has, at present, been the most successful in this Territory, and we can turn out Cast-ings from the thioness of a Stays Plate up to massive ones for Smelting and Grashing Works, at Low Figures. New York cannot do better than procure Pennsylvania Central and New Jersey Railroads. Those roads are in excellent condition. WE HAVE AN

sphere. If we held in our hand a wooden model of our globe, whose diameter at the equator was 15 inches, the Polar diameter would lack only 1-20 of an finch of being the same length-a quantity so small that it could not possibly be detected by the eye, but would require very nice, delicate measurements to show its deviation from a globs.

For the purpose of determining the ellipticity of the earth, commissioners of various nations have been sppointed by their respective governments, and furnished with the best of instruments to measure ares of the meridian in different latitudes in various parts of the earth. By a comfound that the length of a degree increases with the latitude, being the least at the equator and the greatest at the poles; there-fore, the curvature of the earth's surface must be greatest at the equator, and must decrease with the latitude, and be least at the number of the solution take place before the solids had with the latitude, being the least at the the poles. These meridional sections which pass through the poles, cutting the equator at right angles, are ellipses; and the geome-tright angles, are ellipses; and the geome-formed in different lititudes which in trical properties of an ellipse are such that we are enabled to assign the proportion be-tween the lengths of its major and minor axes, corresponding to any proposed rate of variation in its curvature; and having of continents and islands. We do not predetermined the proportion of the two axes tend to state that this is the way that the or diameters, we can still further determine continents and islands of our earth have retheir absolute lengths by knowing the length of a degree in any given latitude. Mr. Airy, by a combination of 13 different area, measured in different parts of the earsh, has determined its ellipticity and given the diameters as follows:

Equatorial diameter	-1	1.1		7008.044
Polar Diamotor -	74	1.4.1	С.,	THER.170
Polar compressions -		1.81		108-473
Proportion of diameter	3.8	200.30	1 10	296.33.

Mr. Bessel has more recently calculated the same from a combination of ten of the measured ares, and his results do not differ from the diameters as given by Mr. Airy the 1-16 part of a mile.

From a comparison of the above diame-ters, it will be seen that the equatorial regions of our earth are about 13 miles higher or more distant from its centre than

These polar continents, as we observed within will'be seen to arise around the sides concerning the equatorial continent, would of the pail, while the centre will be proin the lapse of many ages become worn portionately depressed; the greater the revo-down and reduced to pebbles, sand, lution the greater will be the depression of lution the greater will be the depression of the centre, and the higher will the water mud, dc., and be submerged beneath the ocean where, under the same laws of force arise around the interior sides of the pail; and motion which govern the fluid elehere then, in this simple illustration, we can ments, it would be carried towards the equator and arrange itself in a spheroidal form similar to that of the ocean with see how water can be made to run up hill from the centre of the pail; and when it has once ascended, how its surface may be maintained in the form of a steep declivity by the continued rotation. As the water which it would be enveloped. Thus the whole earth would be covered with an ocean of nearly uniform depth, and both around the sides of the pail is maintained the solid and fluid portions would be in at a greater elevation than at the centre or equilibrium, having a degree of oblateness axis of the rotation, so is the water at the sufficient to balance the combined effects of equator maintained at an elevation of thirteen miles above the water at the poles, the centripetal and centrifugal forces. If by any means the rotation should be inmerely by the earth's rotation. As the rotation of the pail gradually diminishes, the water gradually descends from the sides creased, the oblateness would be increased; the finids upon the surface would first yield parison of all these measurements, it is to the impulse and afterwards the solids of the pail towards the centre, which may would, by a slower process, arrange them-selves in the form of equilibrium accomobe termed the pole of the axis around which the pail revolves. So, in like man-ner, if the rotation of the earth should be gradually diminished, the waters of the ocean would gradually descend from the equator and raise up the depression around the poles until the highest mountains in the northern and southern regions were completely inundated. On the other hand, if the rotation of the earth should be gradually increased, the water at the poles would become more depressed, while the protuberance at the equator would be propor-tionately increased. If the rotation should secome a little over seventeen times faster than at present, the water and all bodies at the equator would entirely lose their weight, the centrifugal force or tendency to recede from the centre of motion being equal to the centripetal force of gravity; ceived their present form and position; but wemerely state that such would be the ha-tural tendency, were the earth to receive an addition or diminution to its velocity of rotawhile the polar gravity would be greatly increased by the increased eccentricity of the ellipsoidal form of the earth. Under such a condition of things, a mass tion before the solid nucleus had time to fully accommodate itself to the different of lead which now weighs 1,000,000 tons, of lead which now weights 1,000,000 tons, could, with the greatest of ease, be picked up and carried upon our heads. Indeed, if our earth revolved upon its axis once in eighty-three minutes and twenty-two sec-ouds, a mountain of lead or any other sub stance placed 19 feet in the air above our heads at the equator, would have no ten-dense to fall or records from the earth, but

forms of equilibrium, corresponding to its different states of velocity. Whether the velocity of rotation has ever been greater or less than at the present time, we have not as yet discovered any means of ascertaining

The fact that dry land and mountains do exist near the equator, elevated several thousand feet above the sea, would seem to indic te that the velocity of rotation has, at some former period, been greater than at present; otherwise there must have been some sudden convulsion sufficiently great to

regions of our exit is are been in the exit is the problem of the section of the sectin the section of the sect upheave from the bosom of the great deep the solid portions of the earth to the present

The control of the series and average of the series and ready to the point of the series and average of the series average of the series and average of the series average of the series average of the series and average of t <text><text><text><text><text><text><text><text><text>

than the rotatory velocity face nearer the poles.

The consequences are, that these currents, as they are sucked down and come in con-Gambe tact with the earth's surface, have a tendency to out-run it, producing a strong westerly wind, which combined with its original direction towards the poles, forms in the nerthern temperate and frigid zones a south-westerly wind. It will be observed that the courses of these currents are in direct opposition to the trades; therefore they have a tendency to accelerate the earth's rotation as much as the trade winds have to rstard it. In this way the diurnal rotation is still maintained at a uniform

The direction of these general currents is in different parts of the earth's surface more or less influenced by local causes, by which their permanent character is in measure weakened, and, in some places, entirely destroyed. But where these causes do not interfere, the permanency of their directions is abundantly established by observation. And, therefore, these pheno-mena are conclusive evidence of the diurnal rotation of the earth in a direction from west to east.

Having ascertained the true figure, dimensions, and rotation of the earth, we shall next point out the method by which its whole weight is determined.

material, as for instance, lead, or water, or any one species of rock, it would be an easy matter to determine its weight by knowing its dimensions. For by knowing theorem Genetic the formation of the species of rock is the species of the species of the species of rock is th its dimensions. For by knowing the num-ber of pounds contained in one solid foot of such material, and multiplying the same into the number of solid feet in the whole earth, the product would be equal to the number of pounds which the whole earth would weigh. The earth, however, con-sists of a great variety of substances of different weights; and if we know the exact proportional bulk of each of these

tances which enter into the earth's composition, it would still be an easy matter to determine the weight of the whole by determining separately the weight of each proportional part. But ingredients the interior strats of our earth heads at the equator, would have no ten-dency to fall or recede from the earth, but would keep its position, standing, as it were, upon nothing. If the rotation were stiff increased, all the waters of the ocean, to-gether with the mountains, rocks and all other substances, composing the upper stratum of the earth's surface pear the equa-tor, would recede from the earth upwards, or rather in the direction of the tangent. We shall now offer another conclusive stances. Therefore, all hopes of determin-ing this problem from such data is forever

The problem to ascertain the weight The problem to ascertain the weight of enson Hinnon, to be collector of customs the earth was not solved until towards the for the District of Oregon, was sent to the Pittsburg, FortWayne and Chicago Railway, the Senate to-day. close of the last century, when two emin-ent and celebrated philosophers achieved

its solution by different methods; and the results obtained were such as to give us an We shall first give Dr. Maskelyne's

In the year 1773, this great man, being then as-tronomer royal in England, in connection with several other scientific gentlemen, was engaged

northern hemisphere, from the north east and in the southern from the south-east. The causes of these two great currents are, first the high temperature of the torrid sene, compared with that of the temperate and frigid zones; and second, the tendency of the air to expand by an increase of tem-ighter and arises; while the vacancy thus occasioned is supplied by a current from the colder regions. These currents, pro-duced by the unequal temperature of the atmosphere surrounding the earth, are modified in their direction by the rotation

In this way the proportion of the mass of the mountain to that of the whole earth may be determined. Prof. Pinyfair some thirty years afterwards by numerous measurements and observations, de-termined the solid contents of the mountain, and also the nature of the strata of which it is com-posed. From these data in connection with these obtained from the plumbline experiments, the density of the rocks composing that moun-tain was found to be a trille more than 1-2 times the density of the whole earth and about 9 i-2 times the density of water; consequently the density of the earth must be about five times the density of water ; consequently of the earth must be about five it water, that is, the earth as a whole about five junes more than a globe of he same dimension ; in other words, al obes of water of the same size as the eweigh about five illness more than a group of about ter of the mame dimension ; in other words, about five globes of water of the same size as the earth would just counterpoise the carth. The method adopted by Mr. Osvendish, for the solution of the problem, was altogether of a

	married men. T 000 recruits an
tta's views on the Situ- ation !	of able men. V in from all quan land Gambetta ness. He said t
General News !	mistake when selfishness to pu in allowing Fra and destroyed; only ally on the tually handed o
WASHINGTON.	to Prussia, who ance with Russi one in his sense years we shall se

WASHINGTON, 27 .- Schurz holds the floor at one o'clock to-day, on civil service reform, notice having been given that he will offer a bill which he has drawn up as a substitute for Trumbull's bill now before the Senate.

James Brooks will not attempt to get the tariff reform question before the House until after the 4th of March, at which time he will propose a general

reduction of duties. The revenue reformers are not so con-

fident of success now, as they were in H. L. SOUTHWORTH announces to his the fall, but seem determined to make former friends and old customers and the public at large that he has returned to his old quar-

denies officially, that there is any truth in the report so extensively circulated during the San Domingo debate in the Senate, that Prussia is anxious to se- in the past, will be supplied with the best beef. cure a foothold in the West Indies, by pum puddings, roast turkeys, boiled chickens purchasing an island there. Prussia is fresh salmon and "sich" like articles. not desirons to obtain any territory which would be so open to attack, in case she should become involved in an-other foreign war.

WASHINGTON, 27.--All the members of the Cabinet, excepting Creswell, But were present at the regular session to- their tickets per Chicago, Fort Wayne, t is impossible for us to ascertain of what day. Secretary Fish explained at the meeting that he had received no official is composed, and still more so, to learn the dispatch from Minister Washburne, and their officers are noted for their urbanity proportional volumes or bulks of those sub- which would probably have been at and courtesy. Thos. I. Kimball, Esq., Chicago, which would probably have been at and courtesy. Thos. I. Kimball, Esq., Chicago, hand had the surrender of Paris been communicated. The nomination of Al-enson Hinnon, to be collector of customs

## NEW YORK.

New Board of Directors for the U.P.R.R. Attack on the Hotel De Ville.

NEW YORK, 27 .- The Evening Post says: "We have good reason for saying that arrangements have been completed to-day whereby the following gentlemen will go into the board of directors of the Union Pacific Railroad Company at the next election, in March: J. Ed-Scott, Vice President of the Pennsylthe Pullman Car Company, Chicago; Andrew Carnagle, President of the tacles, etc. on hand, d305 3m Union Iron Works of Pittsburg. Thos.

A. Scott is to be the President of the Company, who, with the above named gentlemen, will become members of the executive committee.

The World has a cablegram from London, which states that the negotiations at Versatlies still continue with but doubtful result.

and that five rioters were killed and

eighteen wounded.



LUMBER! LUMBER !- Cheap for Cash. Common from \$3 to \$3.50; Clear, \$4 per hundred feet. Mill running winter and summer, dit Sm J. J. THATNE, 1st Ward, S. L. City

Monis, 50c.; Lodgings, 50c.

Animais to hay, 75c. a span,



For the finest G. ese, Turkeys, Ducks, Chickens, App 65, Grapes and every kind of Fruit

The Tribune has a cable dispatch, which states that in the attack on the Hotel De Ville by the national guards of Main Street, about a third of a block. and Vegetable in the Salt Lake market, go to the mobiles defended it successfully, north of the "Eagle Emporium"

DRUNS.-Big and Little Bass and Snar Drums have arrived in good supply, and can be



LYMAN, PAGE & Co.,

## CREAT BRITAIN.

Empress depressed-Riot in Paris-Politient prisoners given freedom-Death in Parls-Vinery succeeds Trochu.

FOREIGN NEWS.

this city as yet, have no confirmation of the telegram to the Times relating to the proposed capitulation. Vinery has accepted the command in place of Trocbu. The deaths during the last week, in Paris were 4,465. A dispatch from Ver-sailles, on Thursday, states that Favre returned to Versailles on Wednesday evening. Firing is still continued. Advices from Paris to the 28d have been received this evening. Yesterday, the 128th day since the commencement of the slege, witnessed, for the first time since the investment, a scen which all have been dreading, more c

ing of the diament of which is bendulating more the surface of the in such a position that the paint of a directed toward its centre is war in a borizontal plane units the same mechanics loomition as the common clock pendetium which and passing through the centre of the same and the set





Importers, Manufacturers and Jobbers of MILLINERY & STRAW GOODS, And PANCY GROOMBERS, ada ha 47 Michigan Ave., CHIGAGO.

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