THE

INTERNATIONAL STANDARD

A MAGAZINE

DEVOTED TO THE DISCUSSION AND DISSEMINATION OF THE WISDOM CONTAINED IN THE

GREAT PYRAMID OF JEEZEH IN EGYPT

JULY, 1884.

ISSUED BIMONTHLY. PRICE 35 CENTS

TERMS OF SUBSCRIPTION AND MEMBERSHIP, $2.00 PER ANNUM IN ADVANCE

The International Institute as a body is not responsible for the facts or the opinions put forth by any of the writers for this Magazine.

All in favor of advancing truths most absolute, as portrayed in the revelations of the Great Pyramid of Egypt, and of the success of the Society in preserving inviolate the Anglo-Saxon weights and measures, will kindly communicate with the President, by whom also subscriptions, donations and communications will be gratefully received.

THE INTERNATIONAL INSTITUTE

FOR PRESERVING AND PERFECTING THE ANGLO-SAXON WEIGHTS AND MEASURES

CLEVELAND: 64 EUCLID AVENUE

BOSTON: 345 TREMONT STREET

WILLIAM OSBURN,

Author of the "Monumental History of Egypt," "Israel in Egypt," etc.

INTERNATIONAL INSTITUTE FOR PRESERVING AND PERFECTING WEIGHTS AND MEASURES.

FOUNDED NOVEMBER 8, 1879.

CHARLES LATIMER, President, Cleveland, Ohio.
J. S. F. HUDDLESTON, Vice President, Boston, Mass.
LUCIAN I. BISBEE, Secretary, Boston, Mass.
G. R. HARDY, Treasurer, Springfield, Mass.

OHIO AUXILIARY SOCIETY.

CHARLES LATIMER, President. WM. H. MCCURDY, Treasurer.
A. M. SEARLES, Vice President. G. W. CROSSETTE, Cor. Secretary.
MARY B. SANFORD, Recording Secretary.

PUBLISHING COMMITTEE.

CHARLES LATIMER, C. E. } Editors. J. H. DOW. J. W. REDFIELD, M. D.
H. C. THOMPSON, } W. W. WILLIAMS. J. A. BIDWELL.
MRS. A. M. SEARLES. MARY B. SANFORD.

COMMITTEE ON STANDARD TIME.

REV. H. G. WOOD, Chairman of Committee, Sharon, Pennsylvania.
PROF. PIAZZI SMYTH, Astronomer Royal for Scotland, F. R. A. S., F. R. S. E., etc., Edinburgh.
M. L'ABBE F. MOIGNO, Canon of St. Denis, Paris, France, editor of *Cosmos Les Mondes*, and author of "The Splendors of the Faith."
SANDFORD FLEMING, C. M. G., M. Inst. C. E., F. G. S., F. R. G. S., Ottawa, Canada.
WILLIAM H. SEARLES, C. E., Elyria, O.
JACOB M. CLARK, M. Am. Soc. C. E., New York.
PROF. STOCKWELL, Astronomer, Cleveland, Ohio.
CHARLES LATIMER, C. E., Cleveland, Ohio.

WILLIAM W. WILLIAMS, PRINTER,
145 and 147 St. Clair Street, Cleveland, Ohio.

THE

INTERNATIONAL STANDARD.

JULY, 1884.

THE HISTORY OF THE GREAT PYRAMID.

III.

In 842 A. D. Al Mamoun died at Bagdad, and for many years the Great Pyramid stood under the cloudless sky, and amid the desert sands of Egypt, just as it had stood for so many ages before, undisturbed by the hand of man—its white slopes, in all the beauty of perfect geometric form, gleaming daily in the noontide sun. The wild, barbarous peoples which writhed or rotted in the valley of the Nile hard by knew and could know nothing concerning it. And could they, or those as regardless of it as they, have ruled in that land till now, well would it have been for the pyramids, and for whatever of message they bore to the generations of men which were to come after. But the deluge period came at length to this mightiest work of man, as indeed it seems ordained to come to his every work soon or late. And this is how the deluge came, so far as a record has come down to us.

A century and a half, or more, after Al Mamoun quarried out his ragged way into the Great Pyramid, and first of men in historic times made known the interior structure of the edifice, that is about the year 1000 A. D., the Caliphs of Cairo began

the systematic pillaging of all the pyramids, as suited their turn. They wished to enlarge and adorn their capital city; and it seemed to them a great deal more reasonable to take the stones with which to effect their designs from what appeared to their conceit these useless monuments of the folly of the ancients, which were only six miles away, rather than to go one hundred and twenty miles away, to the quarries where the original workmen got them. They were incapable of the slight modesty of thinking that perhaps the men who knew enough to construct such immense masses in perfect geometric forms might have uttered in their work thoughts of corresponding worth, which some generation might yet arise that would be competent to understand and interpret. So in their high conceit, at it they went, and attacked the pyramids nearest them, being the three of which the Great Pyramid is the chief. Thus it came about that for ages the pyramids were the quarries for all builders in Cairo, and so continued until not a stone was left in sight which builders could use, save only a cluster which forms the point of the second one, which, for some reason that cannot now be guessed, the despoilers left like a bunch of fruit on a topmost bough in air. Thus the pyramids came to ruins. But the night wore on, and day drew near in due time.

The morning star of modern times for the Great Pyramid arose when Professor John Greaves of Oxford, England, visited it in 1638. Clearly he was the first of moderns who had any adequate sense of what that vast edifice might be. Himself a mathematician of exceptional excellence, and having the spontaneous instinct of mathematical forms in his soul, he was the first man, apparently, in historic times who felt the real force and meaning of the Great Pyramid's geometric shape, and as the first one built, and so the one that set the type saw that the only rational theory concerning it was that it had a corresponding, that is a mathematical, origin. Certainly he was the first person mentioned in history who approached it with a scientific spirit and brought suitable instruments to measure it with. And until since Mr. John Taylor's publication of the clue to the construction of the building, no more choice measurements than his were made. But as his good work has received full

notice in a former number of this Magazine, we omit further comment. And what historic facts we mention further will be only the more important incidents, which are of distinct value in Pyramid history.

Visitors and measurers, few and of little value, came to the pyramids from time to time; but it was a hundred and twenty-five years after Professor Greaves' epoch-making visit before any thing occurred that calls for notice here. But in the year 1763, a notable Pyramid event occurred: for in that year a Captain Davison, of the British service, dug his way through from the top of the upper (*i. e.* the south) end of the grand gallery level to the space over the king's chamber, and found the lowest of the five chambers of construction. And this was of value not only because it added to our knowledge of the structure of the building, but also because it led to the discovery of the other chambers of construction with all the important knowledge they disclosed.

The next event of note was the advent of the French under Napoleon, in 1799. Save only Professor Greaves, these were the first men in historic times who approached the building in the true scientific spirit; and brought to bear upon the investigation of it that disposition for accuracy and acute examination, which are the glory of modern science and which render correct knowledge possible. They especially observed with what extraordinary accuracy the Great Pyramid is oriented, or set true to the four points of the compass. They also measured many parts with great care; but their only discovery was that of the two northern corner sockets, which they dug down to and so disclosed. This was of great importance, however, as it showed that the size of the building on the ground originally was considerably greater than moderns had known, and led the way to the discovery of the other two sockets, and the final ascertainment of the true base.

The next event of importance was the work of Signor Caviglia, who in 1818 cleared out the descending passage from where the ascending passage branches off to the lower chamber, which until this date was unknown to moderns. On the contrary, the downward passage and chamber therefrom were all that

were known to the ancients, the whole system of rooms and passages in the upper part of the building having been carefully concealed by the builders, so that all knowledge of them was soon lost.

And now we come to one of the greatest events in Pyramid history. In 1837, Col. Howard Vyse, a man of large means from England, spent seven months and a fortune in exploring at the pyramids, not only at the Great Pyramid, but at the others also. He found and cleared out the ventilating tubes of the king's chamber. Also, starting with Captain Davison's chamber of construction over the king's chamber, he dug out upward and discovered all the other chambers of construction, showing with what elaborate pains the builders had protected this room from the pressure of the superincumbent mass, and so showing that this room was the chief thought and care of the builders. In the upper of the four level chambers of construction, on the under side of the granite beams which form the ceiling, Col. Vyse found in the rude quarry mark of the workman who wrought the stone the name of the Egyptian monarch under whom the building was erected; and it is the same as that given by Herodotus, though it is of course in the Egyptian form, Shoufou, instead of the Greek form, Cheops. In some respects this is the most important disclosure or revelation that has been made. But in other respects his greatest discovery, and in fact the most important of all that have been made, was that of the two casing stones *in situ*. It was from these two stones standing side by side, that the angle of the slope was derived, from which the clue to the whole geodesical problem of the building was obtained. He himself had no idea of the importance of the angle of those stones, and gave them a fair measurement only, but not a most refined measurement to the tenth of an inch as the case required. But to the measurements, such as they were, was due more than to any other one fact the subsequent discovery by Mr. John Taylor of the geometric proportion embodied in the very form of the edifice. And to this man's most memorable and precious work we now come.

Early in December, 1859, there appeared in England the most

extraordinary work which, up to that time, had ever been published concerning the Great Pyramid, it being the first attempt to explain the building upon a scientific basis which had ever been made. The work was entitled 'The Great Pyramid; Why was it Built? And who Built it?' The author was a Mr. John Taylor, till then unknown to fame, though of high esteem in the important position which he held. He was publisher to the London University, and had been for at least a quarter of a century. He was then eighty years old, and had been studying the subject thirty years. In this book was given the condensed results of his thirty years of study, namely, the clue to the whole problem of the building, with some parts of the solution.

The two fundamental propositions of Mr. Taylor were one concerning the nature, the other concerning the structure of the Great Pyramid. Concerning the nature of the building, Mr. Taylor taught that it was a strictly scientific structure, containing the elements of a system of weights and measures in terms commensurable with the earth, stated in geometric proportions. Concerning its structure he taught that it was so shaped that its height was to twice its base as the diameter of a circle is to its circumference. He also gave many reasons to show that there was an intimate and organic relation between our English system of weights and measures and the Pyramid itself. This book fell into the hands of C. Piazzi Smyth, astronomer royal for Scotland, who was thereby drawn to Mr. Taylor as his especial and chosen pupil, and to whom he finally left the whole subject in charge.

In the spring of 1864, Mr. Smyth published a book entitled, 'Our Inheritance in The Great Pyramid,' a most significant title indeed, and declaring that our whole system of weights and measures was inherited by us either from that building or from those who built it. This work made so much impression that a gentleman provided a sum sufficient with his own means, so that Mr. Smyth was able to go to the pyramids that winter, and spend four months examining and measuring. He was the first of men in historic times who approached the building having the certainty of what it was, and the clue to work by in

studying it. Never was it so thoroughly and accurately measured. And so excellent was his skill that the most of his measures are not questioned, but are accepted as undoubted data to work from; and those that are questioned are mostly so because he had not sufficient means to make all his work sufficiently thorough. The results of this work he published in three stout octavo volumes entitled 'Life and Work at The Great Pyramid.' The French had found two corner sockets. He uncovered them and found the other two also. He found also the long trenches in which the builders had laid out the angles, and a place in the rock where the trial form of the ascending and descending passages had been worked out.

Upon his return the whole subject became open to large and earnest discussion; and in addition to the scientific features, a deep religious movement making the building a divinely ordained, prophetic record of God's great Messianic work, both before the advent of our Lord and after, including a distinct announcement of that event has been developed. This brings us to such recent times that a further account does not seem to be required.

JESSE JONES.

THE REFORM OF THE CALENDAR.

The INTERNATIONAL STANDARD for May has been received and read with deep interest.

Not being very well versed in the higher mathematics of Pyramid lore, and only a novice in the new Pyramid-faith, I do not fully understand all I read, nor can I accept all I believe to understand, but I can appreciate the sincerity of each writer, can feel the truth and catch the enthusiasm manifested on nearly every page, and am in full accord with the general aims of the International Institute, a membership in which I consider a great honor.

How strange that, with all our present facilities of communication and dissemination of news, a regular reader of the daily

papers like myself should have remained ignorant of the existence of our Society for more than five years, and become acquainted with it only a few months ago by sheer accident or—the design of Providence?

Of old it has pleased Jehovah Jireh, among whose wondrous works I now count the Great Pyramid of Jeezeh, to select obscure and lowly instruments to work out His designs; and now I verily believe that He has chosen me to become a disciple of the new faith and science of applied religion which has already claimed its martyrs in Czar Alexander II and President Garfield.

It therefore looks to me like design rather than accident that we should have remained strangers so long and worked independently in different directions for the same end; but now that I have found you, and you have accepted me as a co-worker, I deem it my privilege and duty to assist you in the unveiling of Isis and some of the great problems of life propounded by the Sphinx before that venerable "altar and pillar to Jehovah," and enduring monument of Liberty "guarding historic right" in the midst of the house of bondage.

With a hearty hand-shaking and cordial greeting to all members of our Society, I will at once assume my special place therein and enter upon my special work, which is to earnestly labor with you for *the substitution of the Pyramid calendar for that of Julius Cæsar and Pope Gregory XIII*, as a first and most feasible step toward a universal adoption of all the other just weights and measures, the eternal and unalterable standards of which Jehovah Jireh has provided and preserved in the Great Pyramid of Jeezeh.

I claim this as my special mission, entrusted to me by divine Providence about a year before the memorable meeting at noon of November 8th, 1879, in the old South Church at Boston, the time and birthplace of the International Institute.

It did not come to me in a vague dream of the night, nor in a burning bush under the thunders and lightnings of Sinai, but is the gradual outgrowth of years of hard personal experience and quiet observation of natural and social phenomena.

Discouraged by many failures of honest endeavor, and de-

barred from the consolations of religion and Christian fellowship, I had plunged into the study of astronomy, seeking refuge from the disorders and confusion round about me in the grand order of the universe, and the sure testimonies of the Lord whose glory the heavens declare.

While thus engaged, a friend brought me Professor Simon Newcomb's new book on popular astronomy, one day in the fall of 1878, in the perusal of which I became at once deeply interested.

One morning thereafter I went to town, a few miles distant from my home, musing over the last sentence on page 50 of that book, which is as follows: "As the end of the century approaches, the question of making 1,900 a leap year, as usual, will no doubt be discussed, and it is possible that some concerted action may be taken on the part of leading nations looking to a return to the old mode of reckoning."

By old mode of reckoning Professor Newcomb evidently meant the "old style" or Julian calendar still in use in Russia, in which calendar every fourth year, including every secular year, is a leap year of 366 days, whereas according to the Gregorian reform thereof, which dropped ten days from the month of October, A. D. 1582, and suppressed three out of four secular leap years, thus adding only ninety-seven instead of one hundred days to the common year in the course of four centuries, the year 1900 should be a common year of 365 days.

By this reform the vernal equinox was restored from March 11, 1582, to March 21st, in 1583, and the average length of the calendar year was reduced from 365.25 days to 365.2425 days.

Arrived at the Fort Dodge Postoffice, I got a Chicago *Tribune*, as usual, and strange to say, the very first paragraph which attracted my attention was a telegram from St. Petersburg announcing that a congress of savans had been called by Czar Alexander II, to meet at some early date in 1879, to consider, among other proposed reforms, the question of adopting the Gregorian calendar.

It struck me at once as exceedingly strange that our superintendent of the Nautical Almanac and Czar Alexander should both be dissatisfied with their respective calendars and propose

THE INTERNATIONAL INSTITUTE.

64 Euclid Avenue, Cleveland, Ohio;
345 Tremont St., Boston, Mass.

President, CHARLES LATIMER, C. E., Cleveland, O.
Secretary, LUCIAN I. BISBEE.

Please find enclosed TWO DOLLARS, annual subscription for THE INTERNATIONAL STANDARD, commencing with

The.....*Number.* *188*

☞ **Write Plainly.**

Name.....

Street.....

Post Office.....

County.....

State.....

NOTE :—Subscribers to the Magazine are immediately eligible for membership with the Society, and will be so received without further fee or payment of any kind (unless voluntarily offered), upon application to the President, 64 Euclid Avenue, Cleveland, O., when a beautiful chart (43 inches by 28 inches) of the Great Pyramid of Jeezeh, in sectional views, and other literature of the Society, will be forwarded post free to the member's given address.

Covering as they do a vast area, the aims of the Society are purely cosmopolitan in character. The benefits to be derived by and through the success of its efforts, are of in calculable importance to the Nations, and the commercial world in particular, hence it should receive the undivided attention and support of every thoughtful and scientific mind in the land ; while its main work in stemming, and ultimately destroying the fallacy called the French Metric System, is succeeding beyond our most sanguine hopes. See letters from Piazzi Smyth, Astronomer Royal of Scotland; Abbé Moigno, Canon of St. Denis Cathedral, Paris ; many important Scientists in England and Ireland, and in our own land.

All in favor of advancing the truth, as portrayed in the revelations of the Great Pyramid of Egypt, and for the success of the Society in preserving inviolate the Anglo-Saxon Weights and Measures, will kindly communicate with the President, by whom all subscriptions, donations and communications will be gratefully received.

Copies of the first number of the INTERNATIONAL STANDARD, with President Garfield's portrait, in steel, frontispice—will be forwarded free to inquirers and all earnest seekers after absolute truth, as exemplified in the inseparable conditions of all Science and Religion.

☞ Please fill up the above order without delay, when the Magazine will be forwarded immediately.

A portrait of a distinguished discoverer, worker or author in this field will appear in each Magazine.

THE FIRST NUMBER OF THE MAGAZINE WAS ISSUED MARCH, 1883.

All profits, if any, go to the Institute.

All Contributions of Papers are Free to the Institute, and we rely for support upon the people who have the matter at heart.

to swap horses instead of trading off their jaded studs for something new.

The Pyramid was then unknown to me, but one of the fundamental thoughts of its architect then and there began to loom up dimly through the mists of ages above the horizon of my mind.

The relation of the calendar to the general laws and customs of society involving the problem of finding a better way of equating unequal measures of time and space, as well as unequal conditions of life, began to possess and perplex me.

Any sudden and violent change was clearly not desirable. The Republican calendar with its *sanscullotites* at the close of the year, and its three decades of each month abolishing the week and Sabbath day, had been tried and condemned by history, but that other *enfant* terrible and universal levelling rod of the French revolution, the metre, was still marching on triumphantly, conquering nation after nation of the old world as well as the South American Republics, and was then just getting ready to capture us too.

I felt that something ought to be done to arrest the spread of French ideas of equalization upon this continent, but what could I, an obscure private citizen, do single-handed in a matter of such magnitude and far-reaching consequences?

Well, I could write to our member of Congress and to the editors of our local papers, and so I did—but I am anticipating my story.

Not the metre, but the calendar was then uppermost in my mind, and various suggestions presented themselves. Professor Newcomb's proposed return to the Julian calendar involved nothing more serious than the addition of a single day to the year 1900, while the Czar's proposed adoption of the Gregorian calendar necessitated the dropping of twelve days, which, in the then existing temper of the Russian people, might lead to more serious riots than those accompanying England's passage from the old to the new style in 1752; the change, therefore, if made at all, should be made gradually. I thought, for instance, by dropping one day from each month of the year 1880, instead of dropping all twelve days at once; or better yet—why not

drop the additional day of the leap years only, and thus effect the desired transition in fifty years, instead of one year or one day?

With this thought in my mind I reached home again that same day, read a few more pages of Newcomb's Popular Astronomy, and, before retiring to bed, took up once more my much-neglected Bible, and as I was sometimes wont to do in more credulous bygone days, when in perplexity and doubt about anything, I opened the Word of God haphazard for direction. The very first verse my eyes lit upon was the tenth of the twenty-fifth chapter of Leviticus: "And ye shall hallow the fiftieth year, and proclaim liberty throughout all the land unto all the inhabitants thereof; it shall be a jubilee to you, and ye shall return every man unto his possession and ye shall return every man unto his family."

Preoccupied as my mind then was, my eyes dilated as I read these words. I read and re-read the whole chapter, and every line of it came down on me like a new and direct revelation from on high. Turning over to the New Testament, my finger pointed to this most significant verse: "There remained therefore a rest to the people of God" (Hebrew iv, 9), and with this I retired to bed at a late hour of that eventful day toward the close of the year 1878.

The next morning everything was clear to me, and I formulated my new commission as follows:

Be it enacted, etc.:

I. That from and after the first day of January, A. D.——, all years shall be counted at 365 days, except each fiftieth year, which shall be counted at 377 days, and shall be called a year of jubilee, and except each tenth jubilee, or five hundredth year, which shall be counted at 378 days, and shall be called the great jubilee.

II. That the year shall be divided into twelve months, of which the third, sixth and ninth shall have five full weeks of seven days each, the twelfth month five full weeks and one day, and all the other months four full weeks each, except in each year of jubilee, in which one day shall be added to each month

of the year, and in the great jubilee, in which an additional day shall be added to the last month of the year.

III. That the twelve additional days of each fiftieth year, and the thirteen additional days of each five hundredth year shall all be Sabbath days, and that in these years each month shall begin and end with a Sabbath day.

On the 3d day of January, 1879, I sent a copy of the above bill to the Hon. Addison Oliver, M. C., in a letter concluding as follows: "It is not likely that our present Congress will pass this bill, nor desirable that the proposed change, if adopted at all, should take effect before the first day of the twentieth century, which begins with a Monday and a new moon, but for the simple purpose of calling timely attention to this important subject, I beg you to present it to the House, have it read, printed, and referred to the Committee on Coinage, Weights and Measures, which, I am sorry to see, has recently reported in favor of the adoption of the French metric system. Last year an attempt was made to establish a common ratio between gold and silver as a uniform measure of value. This year Russia is moving to reform the Julian calendar, and hence a proposition on the part of the United States to reform the Gregorian calendar seems to me opportune, as a uniform measure of time is the most important and fundamental of all measures."

In the same month of January, 1879, Hon. Addison Oliver did present the above bill to the lower House of Congress. It was read, printed, and referred, duly ridiculed by the daily press and pigeon-holed by the Committee on Coinage, Weights and Measures. But my preliminary object was accomplished, my bark was fairly launched upon the great ocean, and now that I have become a member of your Society and a reader of the INTERNATIONAL STANDARD, I rejoice and am exceedingly glad to have been permitted to do what I then did, and with your aid I now hope to accomplish my stated mission and live to see the Pyramid calendar a duly enacted law of the United States of North America and of the whole civilized world. I call it the Pyramid calendar because it is plainly annunciated in the base of the Pyramid, iterated in the queen's chamber and grand gallery, reiterated and emphasized in the king's chamber and

in the chambers of construction, and will yet prove to be the passport out to all other as yet undiscovered chambers, as I now believe and hope to demonstrate in some future letter.

But for a rainy day this letter would not have assumed the formidable proportions it has, and yet my tale is not yet half told, but for the present I must defer its continuance.

F. HESS.

THE ALTAR AND PILLAR TO JEHOVAH.

V.

Every aspect of the Great Pyramid, though involved in every other, is of sufficient importance to demand separate consideration. This has been accorded the view of it as an altar, and as a tower, and must now be accorded it as a treasury, notwithstanding the much that has been said on this subject incidentally in my identification of the Great Pyramid with the Great Tower. By virtue of its interior, and of the treasures deposited therein, a pyramid constituted a treasury; by virtue of the refuge found therein it constituted a hold or stronghold; and by virtue of the presence therein of the deified hero to whom the treasures belonged, including his body, the most precious treasure of all, it became a sacred shrine, a memorial altar, a house of God, a gate of Heaven, a temple of the Holy Spirit. For the sake of clearness, let us take up, in the order of succession, the steps of progressive development here indicated, and see to what conclusion they will lead us in regard to the greatest of the Great Pyramids of the world, that of the pastoral Prime Minister of Cheops and Cephren.

In the first place, the primary object of a pyramidal tower being a treasury, the entire structure was subservient to its interior; and this being called in the Old Testament "the secret place," the structure which encompassed it as the guardian of its treasures was sometimes called "the secret place," as well as sometimes "the treasury." A case of this kind occurs in

the twenty-fourth verse of the fifth chapter of Second Kings, where the word translated "tower" in the text is translated "secret place" in the margin. Here "the tower," in whose "secret place" the servant of Elisha bestowed his ill-gotten treasures, was clearly a treasury. According to the translation he "bestowed them in the house," but anyone can see that this means a chamber in the tower and not the residence of his master. The profanation of depositing these ill-gotten treasures in the secret place was similar to that concerning which it was said by the Levites to the people, "Cursed be the man that maketh any graven or molten image, an abomination unto Jehovah, the work of the hands of the craftsman, and putteth it in a secret place." (Deut. xxvii, 15.) Therefore Elisha said to his servant, "the leprosy of Naaman shall cleave unto thee, and unto thy seed forever"; and Gehazi went out from the presence of his master "a leper, as white as snow." Apparently of a treasury consecrated to Jehovah, in the figurative sense of the language, Jehovah says to Israel, "As for the beauty of his ornament, he set it in majesty; but they made the images of their abominations and of their detestable things therein: therefore have I set it far from them. And I will give it into the hand of the strangers for a prey, and to the wicked of the earth for a spoil: and they shall pollute it. My face will I turn also from them, and they shall pollute my secret place: for the robbers shall enter into it, and defile it." (Ezek. vii, 20–22.) To some extent in the literal, but chiefly in the figurative sense of the language, God said to Cyrus, "I will give thee the treasures of darkness, and hidden riches of secret places, that thou mayest know that I, Jehovah, who call thee by thy name, am the God of Israel." (Isa. xlv, 3.) And under the figure of the Great Treasury, the Great Pyramid itself, if I mistake not, the Psalmist says, "He that dwelleth in the secret place of the Most High, shall abide under the shadow of the Almighty. I will say of Jehovah, He is my refuge, and my fortress: my God; in him will I trust." (Ps. xci, 1, 2.)

This leads me to my second position—that by virtue of its interior as a refuge a pyramid constituted a hold or stronghold. Of this the Psalmist had sufficient literal experience to furnish

ground for the lofty figurative language just quoted, in which he appears to recognize the Great Pyramid as a symbol of Jehovah. From the cave of Adullam, which in the fifty-seventh Psalm he calls a "refuge," symbolizing "God Most High," David fled to a similar refuge called "the hold," in the capital city of the King of Moab; and what could this "hold" have been but the interior of a tower, like the cavernous interior of a mountain? After this "David abode in the wilderness in strongholds, and remained in a mountain in the wilderness of Ziph." (1 Sam. xxiii, 14.) The passages showing the likeness in character and use between a cave in a mountain and the hold in a tower, justifying the old designation of the pyramids of Egypt by the term "Pharaoh's mountains," are numerous and striking. "Because of the Midianites the children of Israel made them the dens which are in the mountains, and caves, and strongholds." (Jud. vi, 2.) That the artificial mountains of the ancients were like natural mountains in offering their cavernous interiors for the concealment and safety of refugees, as well as of precious treasures, is exemplified in "the tower of Shechem," from whose interior, called "the house of Baal-Berith," the men of Shechem took the "three score and ten pieces of silver" for Abimelech, the slayer of the "three score and ten sons" of Gideon, wherewith he "hired the vain and light persons who followed him"; for in the same chapter (the ninth of Judges) this treasury stronghold is spoken of as "an hold of the house of the god Berith," into which "the men of the tower entered" when they heard that Abimelech and his followers had already slain the inhabitants of the city and were approaching the tower. The city appears to have encircled the lower section of a wooded hill in a wide part of the valley, between Mount Ebal and Mount Gerizim, while the citadel occupied the summit, and was built of timber rather than of rocks; for it is said that Abimelech and his men, in their ascent, cut down boughs, with which they "set the hold on fire, so that all the men of the tower of Shechem died also, about a thousand men and women." Nevertheless, it is evident that the fighting place of the tower was its outside, and this requires us to believe that it was "built in steps, battlement-wise," like the Great

Pyramid. The fate of the men who entered into it to escape the vengeance of the man whom they had expelled from the city illustrates the fatality of trusting in a false god. In contrast with it is this in Nahum: "Jehovah is good, a stronghold in the day of trouble, and he knoweth them that trust in him," (1, 7); also this in the Psalms: "Lead me to the rock that is higher than I; for thou hast been a shelter for me, and a strong tower from the enemy," (lxi, 2); and this in Proverbs: "The name of Jehovah is a strong tower; the righteous runneth into it, and is safe," (xviii, 10). If in all the world there is a more fitting basis for these figures of speech than the Great Pyramid, what is it? In Jeremiah the true God, in contrast with false gods, under the symbol of what seems to me the Great Pyramid, as being now revealed to the Gentile world, is presented as the true object of confidence, in a single paragraph, which is this: "O, Jehovah, my strength, and my fortress, and my refuge in the day of affliction; the Gentiles shall come unto thee from the ends of the earth, and shall say, Surely our fathers have inherited lies, vanity, and things wherein there is no profit. Shall a man make gods unto himself, and they are no gods? Therefore, behold I will this once cause them to know mine hand and my might; and they shall know that my name is JEHOVAH." (xvi, 19–21.) "There be gods many and lords many," but only one Jehovah, and this we are to learn once for all from the Great Pyramid.

It is said that the word Baal "means *Lord*, but not so much in the sense of Ruler as in that of *Master*, *Owner*, *Possessor*"; also that Beri means *son*, and Berith *covenant*. I therefore think it highly probable that "Baal-Berith," to whom the Shechemites dedicated their treasury-stronghold, and who was worshiped by the Israelites after the death of Gideon, was the deified builder of what may be regarded as the oldest treasury-stronghold in existence, that of Cain, which he built in the desert "on the east of Eden," and "named after his son Enoch." For reasons to appear hereafter, I think he built it on the top of a mountainous rock in Arabia Petrœa. Good Hebrew scholars say that what Cain built was not "a city" but "a citadel." As such, it was the nucleus, and in a manner the representative, of the

city that was to gather about it, beginning at the base of the conical hill, and growing upward and inward toward the summit, on which stood the center of attraction. That this is not a purely gratuitous assumption, in respect to the principles involved, is seen in the parallel case of "the stronghold of Zion," taken by David from the Jebusites, concerning which it is said that he "dwelt in the fort, and called it the city of David," and "built round about it, from Millo and inward." (2nd Sam. v, 9.) In the days of Abraham, and long afterward, the mountainous land of Canaan was chiefly divided up into petty kingdoms, each consisting of little more than a fenced city on a conical mountain, growing from the circumference towards the citadel in the midst; so that the great majority of the inhabitants of a kingdoms were "citizens," in the literal sense of the word, and not in the conventional sense, as now. Civil governments, therefore, not excepting the great empires of the world, such as Egypt and Assyria, whose vast alluvial valleys and plains favored both the ambition and the power to merge many diverse kingdom into a complex kingdom, are in the prophets referred to under the symbol of mountains, while the ecclesiastical governments, inseparable from the civil in the theocracies of those days, are referred to under the symbol of cities clothing the mountain sides. The artificial mountains of the ancients, *i. e.*, the citadels, had the same significance as the populous, natural mountains on and in the midst of which they were situated, just as the capstone of the Great Pyramid had the same significance as the Pyramid as a whole. We may therefore readily admit that citadels nominally represented cities in the case of Pi-Thom and Ra-Amses, as a citadel represented "the city of David" in the case of "the stronghold of Zion." On the same principle the Great Citadel, the "altar to Jehovah in the midst of the land of Egypt," represented Egypt, the populous kingdom or city in the midst of which it was situated; so that by the "coffin in Egypt" may reasonably have been meant the coffer in the Great Pyramid. The occupation of this coffer in the pyramid "Aramœus" by the body which "such a man" as Joseph had once occupied, like the occupation of the new sepulcher of Joseph of Arimathea by the dead body of the Christ, did not

profane it, but rendered it all the more sacred. It changed the stronghold of the man present in the body, and that of his treasures of gold and silver and precious stones, into a memorial altar, a shrine sacred to the memory of his heroic virtues and achievements, and to the preservation of his precious remains, his sacred relics, the ruins of that noble temple which had been the revered abode and beloved manifestation of the spirit.

The fact that natural mountains preceded the artificial in offering their places of refuge for places of sepulcher, we see in the tombs of the patriarchs. Sarah and Abraham, Rebekah and Isaac, and Leah and Jacob, were buried near Hebron, probably on the side of "the mountains of Judah," in the cave of Machpelah, or the double cave which Abraham bought of Ephron, the Hittite, for "the possession of a burying place." (Gen. xxv, 10, and xlix, 29-31.) "And the bones of Joseph, which the children of Israel brought up out of Egypt, buried they in Shechem, in a parcel of ground which Jacob bought of the sons of Hamor, the father of Shechem, for a hundred lambs, and it became the inheritance of the children of Joseph." (Joshua xxiv, 32.) It had belonged to "the sons of Hamor" in the sense that Hamor had intended it for a primogenital burial place, under a law like that of the Hebrews, I suppose; but no doubt the business transaction was between Jacob and Hamor. And I think that this "parcel of ground" was not a *plot* of ground such as a man purchases for his family burying ground in a cemetery, but a literal "parcel," in the sense of a *package* composed of a mass of earth and containing a treasure of some sort, or enclosing a vault for the reception of a treasure, like a certain style of tomb in our modern cemeteries, packed about with earth, in the form of an Indian mound or diminutive teocalli, overgrown with grass on all sides except the stone facade with its door for entrance. Joseph being such a pre-eminent type of the Saviour in his humiliation and exaltation, in his forgiveness of his enemies, in his return of good for evil, in his spotless purity, in his wisdom and love, in his deep and overflowing sympathy, and in the wonderful salvation from death wrought through his instrumentality, I must think that the "parcel of ground" bequeathed him by his father contained

"a sepulcher hewn out of a rock" in imitation of a cave in a mountain, "wherein man never was laid," not even Joseph, but his bones, to prophesy the resurrection. This "parcel of ground" had been purchased by Jacob from Hamor and recaptured by Israel from the Amorites nearly three hundred years before its appropriation to the final and sole use for which Providence intended it; and on no other theory than that it was set apart for sepulchral purposes, and that the Shechemites were half Israelite, being the descendants of Shechem and Dinah, can we account for its having been preserved inviolate for so long a time. "Jacob's well" and "the parcel of ground that Jacob gave to his son Joseph," where Jesus met the "woman of Samaria," were side by side, and the woman who "had had five husbands, and the sixth was not her husband," was just the sort of woman to have descended from the loving but unlawful relationship between Shechem and Dinah, on account of which Simeon and Levi, in their zeal for purity, so treacherously and cruelly murdered both Shechem and his people. The fact that the Shechemites were of such a loving and forgiving disposition as not to avenge so foul a murder and such a dishonorable breach of a solemn convent, explains the character of "the good Samaritan." And but for the adultery with which the tribe of Dinah, so to speak, was tainted at its fountain head, and with which it was pervaded throughout, as represented in the woman of Samaria—but for this, in connection with the preliminary commission of the Christ to his disciples, "Go not into the way of the Gentiles, and into any city of the Samaritans enter ye not, but go rather to the lost sheep of the house of Israel"—I might think that the fourteenth tribe of Israel, prophetically represented by the top stone of the pyramid of whole stones, is the tribe of Dinah, as suggested by a lady correspondent of our Society, instead of believing it to be the tribe of Joseph by the "issue" to be born to him after Ephraim and Manesseh, which I take to be the Coptic population of Egypt, whose ancestors of the days of the Apostolic Church, besides being among the first to embrace Christianity, were first and foremost in carrying its principles of purity to the extreme of celibacy and monasticism.

The privilege of burial in a pyramidal tomb was so evidently a birthright inheritance that I challenge proof to the contrary. But for the decree, "In Isaac shall thy seed be called," Ishmael, rather than Isaac, would have been buried in the mountain cave with his father Abraham; but for Esau's sale of his birthright to Jacob, he, rather than Jacob, would have been buried in that cave; but for Laban's dishonorable substitution of Leah for the promised Rachael, Rachael, rather than Leah, would have been laid in the cave which was to receive Jacob; but for Reuben's forfeiture of the birthright by his incest, he, rather than Joseph, would have been the inheritor of the "parcel of ground" intended for sepulchral purposes; and but for Jacob's adoption of Ephraim and Manasseh for his own sons, Joseph would not have been the first and last occupant of that precious parcel, but Manasseh, his first-born, would have shared it with him.

Israel, in his bequest of this "parcel of ground" to Joseph, calls it "the one portion" (in the original "the shoulder," probably, say the commentators, on account of its shoulder-like figure,) "above his brethern," and refers to it as having been taken by himself from the Amorite with his sword and his bow (Gen. xlviii, 22), implying that after his purchase of it from Hamor, the prince of the Hivites, it had been captured and garrisoned by the Amorites as a stronghold at some period of the fourteen years between the date of Joseph's being sold into Egytian bondage and the date of his removal of his father and brethren to Egypt from the famine in the land of Canaan—an interval of time exclusively occupied by the sacred historian in narrating the story of Joseph. The circumstance of its capture and recapture by force of arms, shows how easily the place of sepulcher could revert to its original use as a treasury-stronghold, and how easily it could be reconverted into a sacred depository of the mortal remains of the inheritor of the birthright. In the eleventh chapter of First Chronicles is mentioned "a parcel of ground full of barley," evidently not a field of growing barley, but a depository of grain in the form of a pyramidal hill, "in the midst" of which stood the mighty Eleazar and his men, as it were "in the midst of Mars' hill," to prevent its capture by the armed Philistians, who were bent

on plundering it of its contents. Naomi's "parcel of land" (Ruth iv, 3), the property of her dead husband Elimelech—and after him the property of her childless sons, Chilion and Mahlon, all of whom died in the land of Moab—was evidently of no value for cultivation, but was a birthright possession, dedicated to the burial of the first-born son in a limited series of generations, and therefore requiring to be "redeemed" by the marriage of the childless wife of the deceased Mahlon to his nearest kinsman, to raise up to him the lawful inheritor of his inalienable possession. From this redemption of a birthright inheritance, involving, as it did, the espousal of Ruth to Boaz, came the Great Redeemer, the Lamb of God, who hath purchased with his own blood, and by "the marriage of the Lamb" to "the Lamb's wife" will seal "the heathen for his inheritance and the uttermost parts of the earth for his possession." To this "the only begotten and well-beloved Son of God" humbled himself; for his is the great birthright by the law of primogeniture, the inheritance of the world by the right of "the first-born among many brethren," prefigured by the inheritance of Isaac and Jacob in the cave sepulcher of Abraham, and more especially by that of Joseph in the hewn out sepulcher bequeathed him by Israel; and why not prefigured by the inheritance of the children of Joseph in that symbol of the world of matter and of mankind, the "altar of Jehovah in the midst of the land of Egypt?" This world is a great "whited sepulcher, full of dead men's bones, and all uncleanliness," of which Christ Jesus is "the Resurrection and the Life;" and why need any one feel shocked at the idea that the Great Pyramid, in order to represent such a world more perfectly, once contained in its sarcophagus, in its most interior and wonderful apartment, the dead body of its inspired architect?

In keeping with the idea that "the parcel of ground" in which Joseph's bones were interred was a sort of teocalian mountain, or huge altar of earth, is the fact that their interment therein is mentioned between that of the body of Joshua "on the north side of the hill Gáásh" and that of the body of Eleazar "in a hill that pertaineth to his son Phinehas," as if to indicate the inclusion of art in nature, as being her means to the

fulfillment of her end in the attainment of her final perfection. For Shakespeare does but echo Nature's children of the early ages when he says, "Nature is made better by no mean, but Nature makes that mean; over that art which you say adds to Nature, is an art that Nature makes; and art itself is Nature."

Before purchasing "the parcel of ground," Israel pitched his tent upon it; and there, probably in the midst of its commanding height, he erected the altar which he called "El-Elohe-Israel" (God, the God of Israel.) No doubt the sons of Israel, as well as Israel himself, worshiped at this altar on the great "shoulder" of ground; and to this, it seems to me, rather than any temple on Mount Gerizim, the woman of Samaria referred when she said to Jesus, "Our fathers worshiped in this mountain; and ye say that in Jerusalem is the place where men ought to worship." For the two places then present to Jesus and the woman, *i. e.*, "Jacob's well" and "the parcel of ground given by Jacob to his son Joseph," were the subjects of their conversation, in their literal character on the part of the woman, and in their spiritual signification on the part of Jesus. To the Samaritan preference for the older place of worship, as compared with the temple at Jerusalem, which the Samaritans ascribed to Medes and Persians, rather than to Israel, Jesus replied, "Woman, believe me, the hour cometh when ye shall neither in this mountain, nor yet at Jerusalem, worship the Father. Ye worship ye know not what; we know what we worship, for salvation is of the Jews. But the hour cometh, and now is, when the true worshipers shall worship the Father in spirit and in truth, for the Father seeketh such to worship him. God is a Spirit, and they that worship him must worship him in spirit and in truth." As the great Teacher had previously unfolded the spiritual meaning of Jacob's well, at the foot of the mountain, where they sat and conversed, did he not here, in what he said of the mountain as a place of worship, unfold the spiritual meaning of that consecrated spot, "the parcel of ground given by Jacob to his son Joseph" for a possession of a burying place? In connection with Jacob's allusion to it as taken from the Amorite with his sword and his bow, it is altogether reasonable to believe that "this mountain" and "the

parcel of land given by Jacob to his son Joseph" were one and the same. If this be admitted, the teocalian sepulcher of Joseph, at the foot of which the King of the Jews and the woman of Samaria held their conversation, was indeed a "house of God," a "gate of Heaven, "a temple of the Holy Spirit." "Joseph's bones," supposing them represented in the bones of his skull, the dome of thought, the temple of the soul, "were visited" in his life time by an inspiration of the Spirit of Truth, and after death "they prophesied" of the resurrection. (Eccle. xlix, 18). The Jews, especially the Levites, so hated and despised the Samaritans, and perhaps so feared a rising up in judgment against themselves for their cruel hatred and contempt, as to deny that they could have any part in the resurrection from the dead. As if in anticipation of this predjudice, the bones of Joseph were deposited in "the parcel of ground" purchased by Jacob from the sons of Hamor, making "the valley of Achor a door of hope" by their prophesy of the resurrection of the dry bones of the Shechemites slain by Simeon and Levi, and making these bones a symbol of "the whole house of Israel," who had fallen victims to the adulterous mixture of idolatry and the worship of Jehovah practiced by the Shechemites, with whom, as being chiefly the descendents of their sister Dinah, they resided on terms of fraternity and good will. When the "Son of Man" shall prophesy to the dry bones of the valley of Shechem, or of Achor, "O, ye dry bones, hear the word of Jehovah," and to the breath, "Come from the four winds, O, breath, and breathe upon these slain, that they may live," the Jews will see "the publicans and harlots," the "lost sheep," and the Samaritans, "entering the Kingdom of Heaven before them," in the form of "an exceeding great army," with Joseph at its head manning his teocalian mountain and "pressing into the Kingdom of Heaven" in a manner seeming to "take it by force." With the resurrection the great charnel house, which this earth is seen to be, will be reconverted into that great treasury-stronghold, heaven on earth, in the form of the holy city, New Jerusalem, against which "the gates of hell shall not prevail."

The Great Pyramid is called a symbol of this earth, but it is

not so much this as it is a symbol of heaven on earth, such as the world was "when the morning stars sang together, and all the sons of God shouted for joy," and such as it will be again when the New Jerusalem shall descend "from God out of heaven, prepared as a bride adorned for her husband." For not only Job's description of this world as it was before the fall, but John's description of it as it will be when its redemption shall have been completed, is that of a pyramid. (Job xxxviii, 3-7, and Rev. xxi, 1-27.) In the resurrection, when the redeemed "shall be as the angels of God in heaven," the "altar of Jehovah in the midst of the land of Egypt" will no longer be a shrine sacred to the memory of "the tree of life in the midst of the garden," and no longer a prophesy of its reappearance "in the midst of that paradise of God," the New Jerusalem, but will be lost in the realization and fulfillment of its own significance, as at high noon in midsummer its shadow is lost in its substance. Heaven on earth will then shine forth as the great treasury-stronghold and temple of the Holy Spirit, where they who have laid up their royal diadems and priestly robes in heaven will find them free from moth and rust, their hearts there also, redeemed from corruption "by the precious blood of the Son of God," and they themselves "kings and priests unto God and the Lamb."

J. W. REDFIELD.

LONG OR SHORT FRACTIONS FOR GREAT NATIONAL STANDARDS.—EARTH'S AXIS OF ROTATION.

In the two last numbers of the "American School of Mines Quarterly Journal," the learned President Barnard, of Columbia College, New York, has involuntarily opened a question of far wider interest than the particular one with which he set out. For on his page 120, there appears the following remarkable statement:

"The length of the polar axis of the earth is a quantity

which may with strict truth be pronounced to be, up to this time, absolutely unknown!"

Now if that really be so, the people of every civilized country on the face of the earth, who have been taxed during the last hundred years to the extent of millions and millions for the support of magnificent arc-of-the-meridian measuring establishments, have some right in common sense to rise with revolutionary wrath and demand how the enormous sums of their money, given to determine the size and shape of the earth, have been expended. And when shall we know the far greater distance of the sun?

But the statement can only be true on some private interpretation, which is needless to inquire into; for when we take the various lengths of the earth's axis of rotation as determined in modern times, and collected by President Barnard himself from very diverse sources indeed, we find them all to be coincident down to four places of figures at least. And considering that for some other most important national standards the world is apparently content with a certainty of two places of figures only, the officers of the several trigonometrical establishments (including the United States coast survey) of all the countries of Christendom deserve high praise, rather than condemnation, for the results they have thus far succeeded in bringing out.

The mean of their last five measurements, as given by President Barnard for the axis of the earth, is 500492732.8 British inches; the ten-millionth part of which is evidently 50.04927328 British inches, though he has chosen to bring it out as a very different quantity indeed, viz: 49.273 British inches.

But the really important point now to be discussed is whether in practical use as a standard of measure, either on paper or for mechanical work, we should attempt to realize, or wait through ages for the improvement of that long fraction; or may we at once be content with the 50.05 British inches, at which, as quoted by the President, I had years ago ventured to assume the said ten-millionth of the earth's axis of rotation.

In place of merely, and perhaps somewhat vainly, *theorizing* on the subject, let us look to the growth of modern opinion on a much older question, but connected with the same axis of ro-

tation, viz:—the number of solar days in the tropical year, reckoned now to be 365.2422414 ±; but assumed in the old Julian year = 365.25.

Pope Gregory's reformation of the calendar, by introducing the former—or something like it—in place of the latter quantity, caused sufficient disturbance to all the ordinary affairs of men in every nation when it was first accepted, and has some arguments which may be alleged in its favor still.

But if I read aright a recent tract by so consummate a physical astronomer as Professor Simon Newcomb, he holds that the Gregorian alteration has done so much more harm than good, being quite a needless refinement, and is so totally unsuitable to calculations in physical astronomy compared with the Julian year, that civilized nations should, and will, he says, presently return to that kind of year and its "old style" reckonings, leaving a few curious computers, whom it may concern, to prepare tables of corrections where they are absolutely required for their own abstruse and recondite purposes.

15 Royal Terrace, Edinburgh.

C. Piazzi Smyth.

P. S.—"Nature" journal just arrived, has inserted my letter on the length of the ten-millionth of the earth's axis of rotation, and President Barnard's differing value for the same; and the case forms a good illustration of the importance in applied mathematics, after the existence of anything whatever has been asserted, of asking "how much."

Now, agreeing so far with the President that the mean of five of the best and latest arc-of-the-meridian measures, give for the earth's actual axis of rotation, =500,492,732.8 British inches, then accepting that as the truth, the error of my assumption in all my Pyramid books for the ten-millionth of the earth's axis of rotation, viz: 50.05 of the same inches, is evidently 50.05—50.04927328=.0007 + &c., or only sensible in the 4th place of decimals of an inch.

But if you take President Barnard's value (page 214 of the "School of Mines Quarterly Journal") of the earth's axis of rotation length, viz: 49.273 British inches, the error of that is

50.04927328—49.273=.776 of an inch, a terrifically large quantity.

So if he has called my Pyramid work a disgraceful break-down in accuracy, what words can be found strong enough to describe his error 1000 times greater?

C. P. S.

GLEANINGS FROM PETRIE'S NEW BOOK,

'THE PYRAMIDS AND TEMPLES OF GIZEH.'

Several years have passed since our Society began to look about for means to send a surveying expedition to Egypt. We have had the conviction that only by a thorough remeasurement of the Great Pyramid could some of its disputed dimensions be settled, particularly the length of its base. But thus far we have been unable to fit out the expedition.

Meanwhile Mr. W. M. Flinders Petrie, a competent English engineer, has made a thorough triangulation at the Pyramid, and elaborate measurements of its parts, and his work has received the stamp of approval by that self-appointed and world-accepted autocrat of modern science, *The British Royal Society*; for we find immediately following the title page of his new book, this sentence standing conspicuous and alone:

Published with the assistance of a vote of one hundred pounds from the Government Grant Committee of the Royal Society, 1883.

The high reputation of Mr. Petrie, enhanced by the masterly manner in which he has made and recorded this survey, the indorsement of the British Royal Society, and especially the pronounced opinions of both the Society and the individual surveyor against our interpretation of the Great Pyramid, combine to give the highest possible weight to any favorable testimony which Mr. Petrie's survey may give us.

What then is the significance of the following gleanings from his report?

THE EGYPTIAN CUBIT CORRELATED TO THE BRITISH INCH.

Mr. Petrie says that "unquestionably" the Great Pyramid

"takes the lead" of all the other pyramids "in accuracy and in beauty of work, as well as in size"; that the king's chamber "is the most accurately wrought, the best preserved, and the most exactly measured, of all the data that are known for determining the value of the usual [Egyptian] cubit." On page 81 we read: "Probably the base of the chamber was the part most carefully adjusted and set out; and hence the original value of the cubit used can be most accurately recovered from that part. The four sides there yield a mean value of $20.632 \pm .004$, and this is certainly the best determination of the cubit that we can hope for from the Great Pyramid." But on page 179 we find, "But taking the king's chamber alone, as being the best datum by far, it nevertheless contracts upwards, so that it is hardly justifiable to adopt a larger result than $20.620 \pm .005$."

Now, if we take the mean of Petrie's two values, viz.: $\frac{20.632+20.620}{2}$, we get 20.626, which harmonizes as nearly as three decimal places will approximate to Mr. Skinner's British inch theory, as interpreted by my π formulæ for dimensions of king's chamber, which give width$=\frac{648}{\pi}=206.264806+$ (Magazine, vol. 1, p. 25); and this, Mr. Searles shows to be equal to 10 Egyptian cubits. (See Magazine, vol. 1, p. 45.) Hence, if Mr. Petrie's measures are to be trusted, they prove at least the *fact*, if not the *intent*, that the Egyptian cubit of the Great Pyramid and the present Imperial British inch are correlated, so that for one Egyptian cubit measured on the diameter of a circle, 64.8 British inches will be measured on the circumference of the same circle; or, in a circle whose radius is 10,000 Egyptian cubits, the circumference will measure exactly 1296000 British inches, or one inch for every second of arc; making, thus, a quadruple correlation of Egyptian cubits, British inches, modern circular measure, and our decimal system.

BRITISH INCHES RECORD THE LENGTH OF THE MEAN SOLAR YEAR IN THE BASE OF THE GREAT PYRAMID.

On page 39 we read: "This square [whose corners lie on the diagonals of the sockets] of the original base of the Great Pyramid casing on the platform is of these dimensions: N. 9069.4,

E. 9067.7, S. 9069.5, W. 9068.6—mean 9068.8"; and the mean error given is ±.65. These figures all denote British inches, for in the *Introduction* we read, "All measures stated in this volume are in Imperial British inches."

We are told, too, that the sockets for the corner stones of the Pyramid are at different levels below the pavement, the S. E. socket being the lowest (39.9 inches below the pavement, p. 40); "that the socket corners vary from a true square in proportion to their depth below the pavement, the sockets nearer the centre being higher." "This means that the sockets were cut to receive the foot of the sloping face [of the casing] which was continued right down to their floors, beneath the pavement," and that "the socket corners lie in the diagonals of the Pyramid casing." (See pages 38 and 39.)

Again, as to the angle of slope of the Great Pyramid, we find on page 42:

		WEIGHT.
Casing stone, *in situ*, N. side, by theodolite (to three points on top and three on base), - - -	51°46′45″ ± 2′7″	7.
To three points by goniometer and level, - - - -	51°49′ ± 1′	2.
N. face by entrance passage mouth,*	51°53′20″ ± 1′	10.
N. face by air channel mouth,* -	51°51′30″ ± 20″	5.
N. face, weighted mean, - -	51°50′40″ ± 1′5″	
S. face by air channel mouth, -	51°57′30″ ± 20″	

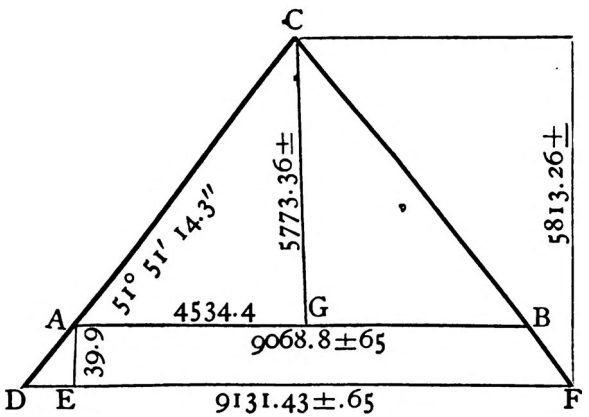
On page 43, the author says: "On the whole, we probably cannot do better than take 51°52′ ± 2′ as the nearest approximation to the mean angle of the Pyramid, allowing some weight to the South side."

Now, if we turn to page xv. of the *Introduction*, we shall find what Mr. Petrie means by the ± error: "The probable error is an amount on each side of the stated mean, within the limits of which there is as much chance of the truth lying as beyond it—*i. e.*, it is one in two that the true result is not further from the

* Of these two measures, the latter of which differs but 15.7″ from the true π angle, Mr. Petrie says: "The datum for the air channel, though far more accurate than that by the passage mouth (being on a longer length), is not so certainly intentional, and is therefore not worth as much."

stated mean than the amount of the probable error." Then, since the *true* π angle of slope, 51° 51′14.3″, does not fall without the probable error of Mr. Petrie's 51° 52′ ± 2′, but lies well within it, we see that his measurements confirm John Taylor's theory of the true π proportion of the Great Pyramid as accurately as their limits of probable error permit them to testify.

Let us now calculate the length of the base of the Pyramid at the level of the S. E. socket floor, using Petrie's data already quoted, but substituting the true π angle of the slope.



Radius : 4534.4 :: tang. 51° 51′ 14.3″ : 5773.36=CG. And 5773.36 + 39.9 = 5813.26. Then 5813.26 × $\frac{\pi}{2}$ = 9131.43= DF=base of Pyramid at level of S. E. socket floor. But the probable error of Petrie's 9068.8 being given by him as ± .65, the socket base DF cannot have a less error than ± .65.

Now Professor Piazzi Smyth's theoretical measure of the base is, numerically, 9131.055, which lies much within the limits of probable error of Petrie's 9131.43±65 ; hence, the whole weight of these data from Petrie goes to confirm, but at the same time, apparently, though perhaps not really, to correct Professor Smyth's year length measure of the base of the Pyramid, for the corrected formula will read:—

$$\frac{\text{Perimeter of base of Pyramid in } \textit{Imperial British Inches}^*}{100}$$

=length of mean solar tropical year, or $\frac{9131.055 \times 4}{100} =$ 365.2422.

Many of our friends have failed to perceive anything more than a mere coincidence in the appearance of the British inch and the modern circular measure in the king's chamber. They have said that my π formulæ † prove ratios only, not dimensions. But what will they say now of the British inch in its record of the year length in the base of the Pyramid? Is it a mere accident that the British inch makes the very record which, of all records, would be the most appropriate one to be made in that most important dimension of the grandest structure ever reared by man?

But we have not yet proved from Petrie that the architect of the Pyramid intended to record the year length to the accuracy of 365.2422 days; yet this must be proved before we can convince the world that the architect was any other than an Egyptian; for authorities affirm that the Egyptians knew the year length to the accuracy of 365¼ days,‡ and Petrie's measures, with their ±.65 error, are not sufficiently exact to discriminate between 365¼ and 365.2422.

Possibly a full mathematical demonstration of the superhu-

---

* Instead of Pyramid Inches as given by Professor Smyth.

† See, *The Argument Condensed*, Vol, 1, page 24 of Magazine.

The formula there given for base of Pyramid is $\frac{180^2}{2\sqrt{\pi}} = 9139.871258 1+$; and Rev. H. G. Wood (in vol 1, page 496 of Magazine) has proved from Petrie's "Table of co-ordinates of marked stations," and his record of socket levels, that this is the true distance from corner of S. E. socket to corner of N. E. socket projected at the arris slope to the level of S. E. socket. Mr. Petrie says, page 38, "When the casing was duly projected down at its angle of slope to the socket floors, it was found to fall on an average 4 inches inside the edges of the socket corners." This would make the casing base about 8 inches less than the socket base; and 9139+ less 8 inches is 9131+, just as we have calculated it in the present article. Perhaps a part of the significance of the socket base, 9139+, lies in its diagonals, which may be intended to mark the precessional period. If so, we escape the improbable theory, heretofore held, that a single square measures the year length, the earth's orbit circumference, and, by diagonals, the precessional period. It is also worthy of consideration that 9139.87 British inches are equivalent to 9131.05 Pyramid inches, and may have been intended to mark the year length in Pyramid inches.

‡ See Smith's Bible Dictionary, Article, Egypt.

man perfection of the Great Pyramid record will very soon be revealed, through the relations of the grand gallery to the Pyramid base. We will consider, therefore,

THE YEAR LENGTH IN THE GRAND GALLERY.

On page 71, the "distance on slope" of the grand gallery from North wall to the "South wall in same line" is given as 1883.6. Now is the following a mere coincidence, or is it intentional?

The corrected base at S. E. socket level, 9131.055, multiplied by the width of king's chamber taken in decimals, *i. e.*, .206264806, (or $\frac{.648}{\pi}$)=1883.415288, or within .2 of an inch of Petrie's measure of the grand gallery floor, and presumably within the probable error which he would allow.†

If the grand gallery is prophetic, and foretells events which are near at hand, expressed in our current chronolgy by means of the modern Imperial British inch, then the course of events may be so distinctly marked, and exactly dated, during this year 1884, as to formulate for us, through this grand gallery floor equation, the exact year length intended by the architect. But I do not care to meddle with questions of unfulfilled prophecy. Let the future decide them.*

CONCLUSIONS.

The builders of the Great Pyramid worked in Egyptian cubits: this is evident from the integral character of their lines, when expressed in cubits, in contrast with the endless fractions which the inches record. I doubt if the Egyptians, or their rulers, ever dreamed of the inch; neither has the British Parliament wittingly correlated the Imperial inch to the Egyptian cubit; ‡ but an overruling Providence seems to have adjusted the one to the other, that the world may have proof, just that scientific proof for which they are incredulously clamoring,

† Petrie does not give the ± error of this measure.

* Mr Baxendell has objected to the British inch theory, that it does not formulate the year length, either in the Pyramid base or in the grand gallery. Thanks to Mr. Petrie, we now learn how it does both.

‡ Yet possibly a duplex system of measures, having two units, the one diametral, and the other circumferential, may prove to have superiority over a single unit system.

"That the Most High ruleth in the kingdom of men and giveth it to whomsoever he will." Hence, I believe that Great Britain is destined to rule Egypt, and the British inch is destined to outrival the French metre.

Thus, in a short paper, I have endeavored to glean a few crumbs of comfort from the recent survey of the Great Pyramid, made with so much skill, and favored with so much success, and published with so much *eclat*, and declared by its author to be so crushing to our "Pyramid theories." We sought in vain, as we thought, for means to send an expedition to Egypt, and Mr. Petrie not only furnished the means but did our work for us. We feared that our testimony would not be accepted, even if we should succeed in making the survey, and Mr. Petrie has obtained for us the indorsement of the British Royal Society.

We heartily thank Mr. Petrie for his work, and we sincerely desire that he will hasten to join our ranks; for we do not follow in that sombre procession in which he depicts us,* but we are marching beneath a banner upon which is blazoned this motto: ANNUIT COEPTIS.—"He hath favored our undertakings."

April 30th, 1884. J. H. Dow.

THE TESTIMONY OF THE SOCKETS AND AIR CHANNELS.

In No. 1, Vol. II of this Magazine, "A Review" suggests a substitute for the computation of socket lines as set forth in a previous paper on the "British Mile." In that paper the opinion was advanced that a settling of the Pyramid has taken place centering at a point south and west of the king's chamber and running in a south-westerly and north-easterly direction. "A Review" repeats the opinion, saying, "There has evidently been a settling down of the whole south side of the Pyramid in a westerly direction, the effects of warping, a result that must have arisen from the action of the sun on the southern side."

* See last paragraph of Mr. Petrie's introductory chapter.

In the computations that follow this statement a deduction of 3.7 inches for warping is made from Mr. Petrie's measure of the south side, and an additional deduction of 1.3 inches, thus assigning to this side an original length of 9118.9 instead of 9123.9 (pp. 52 and 54).

But the south side measure of 9123.9 given by Mr. Petrie is the length of the socket line or distance between fixed points in solid rock which is still covered with about two feet of pavement. How there can have been any extension of the socket lines, I cannot see, except by abrasion of the sockets or fissures in the rock, of which no evidence has been found on the south side.

In assigning to the south and west sides the same length 9118.9, we come in conflict with the best actual measure yet obtained which shows a difference of 4.7 inches in these two sides. However, equality of masonry sides might have originally existed if the builder had left a margin of 2 to 6 inches between the facing stones and the socket sides, but then the sum of the four sides would have been considerably less than 36500. The following table may be convenient for reference and comparisons:

	Level.	Side of Square	Perimeter ÷ 100
S. E. Socket	00.0	9139.871	365.59484
N. W. "	7.1	9128.719	365.14876
N. E. "	11.4	9121.964	364.87856
S. W. " "	16.9	9113.325	364.53300
Civil year	9.4	9125.000	365.00000
Astronomical year	5.6	9131.056	365.24224

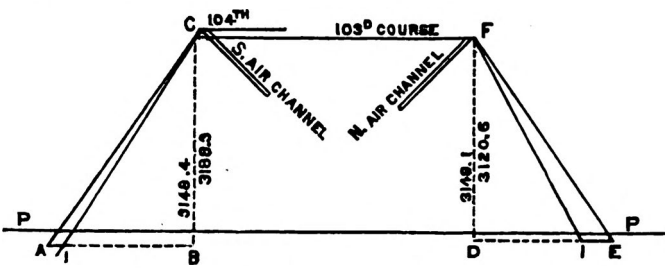
A difference of ½ inch in level makes a difference of .7854 in the length of a side, if the angle of the facing be taken as 51° 51′ 14.3″.

It will be observed in the foregoing table that the astronomical year level is very nearly the mean of the S. E. and N. E. socket levels, and originally it was exactly that if the S. E. corner has settled two tenths of an inch.

It may be interesting to note Mr. Petrie's levels of the courses at the N. E. and S. W. corners. By his table the following courses are pefeetly level at those points, Nos. 5, 23, 25, 34, 38, 39, 46, 68, 126, 127. The average difference in the lower 13 courses is 2.47; from the 13th to the 145th is 67; in the

upper 56th it is 2.4. Mr. Petrie thinks that the levels of the 1st course show the real error of level in the pavement. The S. W. corner of that course is one inch lower than its N. W. corner. But the pavement at the S. W. corner may be out of level even more than this. We would suppose that more care was taken to level the pavement all around than to level the core courses of masonry. In fact the core courses range from 1 to 5 inches out of level. This was of little importance seeing that they were to be covered with facing stones in such a manner that no courses would be observable.

That a tilt of about 6′ in a southwesterly direction has actually taken place, appears to be capable of pretty clear demonstration by the levels given by Mr. Petrie. The following diagram and explanation will show the line of proof.



BIC=51° 57′ 30″ (Petrie) DEF=51°46′16″.
ACB=38° 4′ 4″ " The mean of DEF and BAC =51° 51′ 5″.
BAC=51° 55′ 54″ "

A, corner of S. E. socket. E, corner of N. E. socket. C, exit of south air channel. F, exit of north air channel. PP, pavement, or zero of levels. II, Mr. Petrie's line of casing stones on the socket floors. AI=2.4, IE=7.8.

The problem is to find the mean of the angles BAC and DEF.

Level of south air channel exit at bottom of 104th course,	3148.4
Level of S. E. socket A., below pavement - - - -	39.9
Level of south air channel exit above S. E. socket, BC,	3188.3

Angle BIC, (Petrie), 51° 57′ 30″.

From these elements, IB is found to be 2494.733. To this add Mr. Petrie's margin 2.4 and we have, AB, 2497.133. Hence,

the angle ACB=38° 4′ 4″ and the angle BAC=51° 55′ 54″. By a similar process DEF is found to be 51° 46′ 16″. The mean of these two angles is 51° 51′ 5″. The tilt is one-half the difference in the two angles, ½ of 9′ 38″=4′ 49″. If two-tenths of an inch be allowed for abrasion of socket walls instrumental error, BAC will be 51° 56′ 3″ and DEF will be 51° 46′ 23″ and the mean 51° 51′ 13″, and the tilt would be 4′ 50″, provided that originally the altitude of the north and south sides was the same.

This result seems to confirm the opinion that the facing stones were set close into the corners of the sockets without any margin, and consequently that the time measure of the base sides is not between undefined points on the socket floors but from the very boundary lines of the sockets themselves.

H. G. Wood.

WHAT IS THE PYRAMID INCH?*

I do not know a more pertinent question; probably none has been a greater stumbling block to our Society since its organization, and none has been the handle of so much ridicule of Prof. Piazzi Smyth, astronomer for Scotland, and of all the members of our Society, and many of them, some of the wisest and most technical, the best mathematicians, have succumbed and said that the Pyramid inch is a myth, and that Prof. Smyth would have to recant. He based his whole theory on the assumption that the base of the Pyramid measured 9,140 British inches, and upon the fact that there were certain most remarkable coincidences in time and chronology in the proportions of the Great Pyramid. Assuming that the British inch had become shortened 1,000th part during the last 4,000 to 6,000 years, he declared that the true inch was correlative with the polar axis of the earth, and hence with the measures of the universe, 25 of which should and really did make the cubit of Israel; that the sacred cubit, in contradistinction to the common cubit of Israel, was the Pyramid Inch—25.025 British inches of which

* See page 195, Inquirers' Club.

make the Sacred Cubit of 25 Pyramid inches, and that this was and is the two hundred and fifty millionth of the polar axis of the earth. He claimed that the polar axis, in all probability, is 500,500,000 British inches, and that by lengthening this British inch 1,000th it would exactly agree with the polar axis, so that 50 Pyramid inches would be the ten millionth part of the axis of rotation, and that 25 Pyramid inches would make the sacred cubit of Israel the ten millionth part of the half axis of rotation. It must be admitted that if this be true, there could be no more beautiful, symmetrical and harmonious relation in the universe than such a measure for a standard of length; for there is and can be but one axis of rotation, whilst there is an infinite variety and number of meridians. There is only one other measure on earth that could come near to it as a proper standard, and that is one circular measure, viz.: the equatorial circumference of the earth, unless it be that when a second of arc is symbolized by the inch.

There are, therefore, two plainly marked, unique earth measures which would be adopted by the wise of the earth for a standard of linear measure, viz.: the straight polar diameter and the curved equatorial circumference, unless from certain other cosmical relations, the measure of the earth in latitude 30° should be selected as a correlative, of which I propose presently more particularly to speak. Now, I wish here to go back four years to the publication of my paper on the "British Inch," and before doing so I desire to say that until I met J. Ralston Skinner, of Cincinnati, I was under the impression that Prof. Smyth's theory was correct that the British inch of to-day was the same as that given originally to our race, except that it had become shortened by 1,000th part. Mr. Skinner implored me to dismiss this thought and accept his, viz.: that the British inch of to-day is the original exact length handed down from generation to generation, and preserved, mysteriously, but yet preserved, intact and exact through thousands of years; that Piazzi Smyth's Pyramid inch was a fallacy—had no foundation whatever. I combated Mr. Skinner, and, when we were about to have the chart made, determined to have it constructed in Pyramid inches. So disturbed was he about this that he asked

me as a personal favor not to do it, but to construct it according to the measure of the British inch, with which Piazzi Smyth measured; and I finally consented, and then went to work and convinced myself by writing my paper on the British inch, declaring, however, that the Pyramid inch of Piazzi Smyth would be proven true—a result that I have never doubted. The object of this paper is to endeavor to prove the correctness of that thought and the absolute correlation between the British and Pyramid inches, redeeming a promise I then made, to endeavor to show their relation.

I have been looking in various directions ever since, but never came to any definite conclusion until Rev. H. G. Wood, an Episcopal minister at Sharon, Pa., a valuable member, commenced with his papers upon the "British Mile."

I reproduce here portions of my paper referred to:

EXTRACT FROM PROCEEDINGS PART II., AUGUST, 1880 TO JUNE, 1881, PAGE 102.

It is very plain that the most important, indeed the all-important thing to do in measuring an old monument, is to ascertain the intention of the architect. It is perfectly plain, by examining all of the measures given in the authorities, that there is a small discrepancy, for it is stated that the height of the Great Pyramid is to twice its base as 1 is to π, but when we come to put the figures heretofore given in shape we find that it is so, as close as measurement can prove it, showing the positive intention of the architect, but exhibiting most clearly that we have not found the figures that give the proportion. Now, unless we can give these dimensions to the millionth part of an inch, I shall consider the work incomplete. If this structure be of God it will explain itself to the millionth of a second. Such a test will reveal inspiration.

Without it we have only the bungling work of the common mind.

We shall see as we proceed here how far we may be able to prove by the minute tests referred to, the inspiration of the work.

If the coincidence is not perfect all are at liberty to reject it at once, but if the figures are found to prove to the minutest fraction the assertion made, then I call upon the wise men to take notice.

There are three keys in the Great Pyramid. First, the key of pure mathematics, and if in our additions, multiplications, subtractions and divisions we do not find perfect results, then the key of *pure mathematics* is not found.

The second key is that of applied mathematics, or that which relates to the earth and astronomy.

If the measures do not relate to the earth and to the heavenly bodies, then the second key is not found.

The third key is that which relates to past, present and future history. If the application of the measures in an inch to a year is not proved as related to the history of the race, then the third key is not found.

But if these three keys be found, or if the first one even, viz.: that our British inch is found, what is the inevitable and inexorable conclusion. It is this, that the people who

built the Great Pyramid of Gizeh, were our own forefathers and not idolatrous Egyptians, and that the nation possessing this first key is the British or covenant race.

Now, I propose to confine myself herein particularly to key No. 1, and to all I request, that they make themselves acquainted with the value of π.

I propose in this paper to prove that J. Ralston Skinner, of Cincinnati, has discovered the mind of the architect of the Great Pyramid in relation to the measure used, and that he has absolutely restored the building, as far as he has applied the measure to the original plan to the most minute fractions, and that this measure used is the veritable British inch, in the possession of the Anglo-Saxon race alone.

I also propose to prove that C. Piazzi Smyth, Astronomer Royal of Scotland, the great measurer, has given the theoretical base of the Great Pyramid in British inches, 9,140 inches, upon a certain level from which are deduced the time measures of the Great Pyramid; also that the Pyramid inch is a real thing, but that it relates only to that which is sacred in the Pyramid, hence the sacred cubit, of 25 P. inches, is about one thousandth greater than the British cubit of 25 inches.

I propose to prove that J. Ralston Skinner is correct in his showing that the British measures are related exactly to time and space.

I also propose to show that in forming one scale for measuring the Pyramid, the circle was divided into 360 inches and degrees, and that each degree is subtended by one inch of arc, and that the analytical unit of measure, viz.: 180 divided by π, or 3.14159+, equal to 57.295+, is one of the great keys for unlocking the secrets of the Great Pyramid. And that through this the British inch is made the theoretical unit for measuring the earth and the distance from it to the sun, moon and stars.

In this essay I beg the careful attention of all men, and assert that none, not even excepting the public school children who can add, subtract, multiply and divide, need fail to understand the purport and importance of what I propose to show.

I will take it for granted that I am speaking only to those who know the first rules of arithmetic, and are not acquainted with the terms of mathematics.

Therefore, to begin, I will state that the analytical unit of measure is the arc equal to radius, and is found by dividing 180 by π, and π is simply a term used to denote briefly the proportion of diameter to circumference of a circle, so that if the diameter was 1 inch the circumference would be 3.14159+, or 3 inches and an interminable fraction.

Now, this wonderful number is the angle of 57 plus degrees, the arc of 57 plus degrees or feet, inches or anything else, and the radius 57 plus inches, feet, yards or anything as a measure.

There is no question you will see by what I shall prove that the architect called the arc and the radius British inches; if so, you can see that each inch of the circle of 360 degrees subtends or is opposite to one degree at the centre.

Now, Mr. Skinner has shown that the downward passage from the mouth to the angle is 343.7745+ feet, and that this is diameter to a circumference of 1080, but this downward passage is exactly six times the analytical unit, that is, 57.29575+ multiplied by six equals 343.7745+ (call it feet) and twelve times 343.7746+ feet equals 4125.294+ inches, that is, there are 4125 plus inches in the downward passage. Now, is this the restored measure? and the question is a vital one.

Howard Vyse gives the downward passage to the angle at bottom 4126 British inches; this is remarkably close for so long a distance. One proof of the kind, of course, is not sufficient.

Let us return to the analytical unit; multiply it as degrees, by 60. It gives 3437.745, or three thousand four hundred and thirty-seven minutes and a fraction; and multiplying it again by 60 gives the number of seconds in the analytical unit, or 206264.7+ seconds.

This is a most remarkable number, and plays a most important part in the Pyramid

measures, as shown by Mr. Skinner. It is given in 'Loomis' Astronomy', page 468, as a constant, and it is used for determining the distance to the sun as follows :

Distance to the sun equals 206264.7 divided by parallax of sun multiplied by (radius of earth.)

This being conceded, the analytical unit multiplied by 6 gave the number of feet in the downward passage, and that multiplied by twelve gave the number of inches, that is, 4125.294+.

Now multiply 360 by 360 and we have 1296000.

It will be found that this downward passage in inches is exactly equal to the diameter of a circumference of 12960.

Now, 4125.294 is exactly ten times the length of the king's chamber—or 412.5294+ B. inches. Piazzi Smyth measured it as 412.55 British inches.

This number is exactly the diameter to a circumference of 1296, and this is 36 in. multiplied by 36 in. or one square yard in inches, and 412.5294+ is 7.2 times the analytical unit of measure. Divide this by 2 and we have 206.2647+ the width of the King's chamber in British inches. Piazzi Smyth measured it 206.3 B. inches.

This is diameter to a circumference of 648, and it is 3.6 times the length of the analytical unit.

It is also ten nilometer cubits, as stated by Mr. Skinner.

It seems that one of the meanings of the solid diagonal may be nine times the analytical unit, or 515.66175+, this is diameter to 1620. The floor diagonal, as calculated by length and width, is 461.22 inches.

The end diagonal as measured by Piazzi Smyth is 309.4. This, if an exact measure of the analytical unit, 5.4 times is 309.39705+ inches, and is diameter to 972.

Now, the one-fourth of the king's chamber floor length is 103.132+inches.

This is evidently the restoration of the mind of the architect for the granite part of the ante-chamber floor, but it is rendered certain when we find by calculation that it is diameter to a circumference of 324, thus : 324 divided by Pi equals 103.13235. This granite is measured 103.13 inches. And we notice that 324 is one-fourth of the number of square inches in a square yard, and also is the sixteenth of the characteristic of the thirds in a day ; that is, there are 5184000 thirds in a solar day, and 324 is the 16th part of 5184.

The limestone part of the ante-chamber floor is measured as 13.24 in. by Piazzi Smyth. As the granite part is diameter to a circumference, it is reasonable that this should also be.

In the above I neither accept or reject the value of regular π, or Parker π, but use the latter—viz., 20612 divided by 6561. The propositions are true for any value of π.

This paper, I claim, proves that the British inch is, as stated by Mr. J. R. Skinner, the base of the Pyramid measures, and also that Professor Symth gave the exact theoretical base of the Pyramid as 9,140 on a certain base. Now, where is the Pyramid inch ? This Pyramid inch or sacred measure is by no means a myth, and will be the subject of a future demonstration.

Upon this paper I challenge the criticism of mathematicians and astronomers.

NOTE.—Do not fail to examine J. H. Dow's paper of June 7, 1882, in No. 1, vol. 1.

My concluding paragraph was a rather bold one—that I defied any astronomer to overthrow the accuracy of my conclusions. The main and principle one was that the Pyramid base was exactly 9,140 British inches long, and that the height was 5,818 plus inches, thus sustaining Prof. Piazzi Smyth; another statement made in that paper—that the king's chamber was

askew—troubled me, and I was rapped over the knuckles by Cockburn Muir for making such a statement. This resulted from my using 229,183 inches for the height of king's chamber, and, although it may be inferentially believed that the distance is there, as Mr. Skinner insists, it was not borne out by the best measures for that calculation.

The base line I evolved from the interior was not accepted by Mr. Skinner, who was committed to 9,167.32 or $\frac{2400 \text{ ft.}}{\pi}$ or the measure of the French savants and Howard Vyse, and Davison, who give from 9165 to 9168 inches for base. The beauty, however, of the evolution of a base from the interior from the British measure and from the analytical unit measures, of which he himself was a discoverer, pleased Mr. Skinner. This evolution fixed my faith in his accuracy in relation to his theory as to the British inch, which has been strengthened by examination more and more.

My faith began to waver in relation to the 9,140, as I thought that I discovered an error of something more than the tenth of an inch. To many, and, indeed, the majority of mankind, this variation was nothing, but I had started out with the statement that unless my work could be proven to the millionth of an inch it should not be received or accepted. We yet stand by that statement.

I sent my whole paper to Mr. J. H. Dow to critically examine and after some time he returned it and said that no mathematician could overthrow my argument and conclusion. This was very gratifying, but not satisfying, since I knew the error was there, although I did not discover the formula. So I returned it again to him saying that there was an error of a little more than the tenth of an inch—too great. He soon came and said that he could reconcile the whole if I would change the height and base by a very small amount, a little over a tenth of an inch in base. I accepted it at once after examination, and have no reason to doubt but that $\frac{180^2}{2\sqrt{\pi}}$ represents the base named, 9139.-871258 instead of 9140 and that $\frac{180\ A}{\sqrt{\pi}} = 5818.62287$ represents the height, and then Mr. Dow's formula for the exterior

of the structure was brought into complete harmony with the interior, all relating exactly to the analytical unit, and to the British inch, and to the circle of 360° as shown by Mr. Skinner. And thus, by getting the corrected height and the corrected base, my paper upon the British inch may be considered as representing the Pyramid measures to the millionth of an inch.

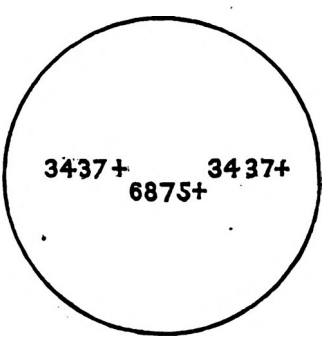
And yet I am inclined to believe that the measure as put in formula by Mr. Skinner, namely $\frac{2{,}400 \text{ ft.}}{\pi} = 9{,}167.32$ inches is also indicated as one of the base measures, although the late measures of Mr. Petrie may not show it, but do show overwhelmingly the 9139.871258 or $\frac{180^2}{2\sqrt{\pi}}$. on level of S. E. socket. But how it is possible that the French savants, the measures of Col. Howard Vyse and others, could have been in error to the amount of over three feet is beyond comprehension and calls for a careful re-measurement undur the authority of the Society, for the question is vital. But, as I shall show, we are not left in doubt as to the ratio or relation of our measure "the British inch" to the circle of 360° even if the measure 9139.871258 could only be inferred from a greater base and a greater height.

As I said before, the papers of Mr. H. G. Wood upon the British mile turned my attention to a new solution of the Pyramid inch question. It will be remembered that he advanced the theory that the British mile of 5280 feet agreed, or was likely to be found agreeing, with a minute of arc in the latitude of the Great Pyramid or 29° 58′ 51″, or say 30° and the whole matter hinges upon the shape of the earth.

Dr. Seth Pancoast wrote me some time ago "You and Mr. Skinner should go for the coffer."

If the earth be an ellipsoid, then the measure of a mile, 5280 feet on the earth, according to Prof. John N. Stockwell, would be equal to one minute of arc at a point about five miles south of the Great Pyramid; but astronomers are at sea as to the shape of the earth, hence it may well be that Mr. Wood is correct in his thought that the architect of the Great Pyramid placed the structure at a point where, if you measure east and west, you would find that 60 minutes or 1 degree of heavenly arc would

subtend 60x5280 feet on the earth; this is yet to be proven. The arguments from the coffer and the Pyramid are much in favor of the correctness of Mr. Wood's theory. If true, it will be a wonderful and beautiful thing. Let us see how the coffer measures bear out this theory. Mr. Skinner has taken 90 inches for the length, 41.25 inches for the height, 34.37 inches for the depth, 78 inches for the inside length, 27 inches for the inside width. With these measures he obtained the thickness of sides, 6 inches, thickness of bottom, 6.875 or $\frac{21.6}{\pi}$ or one tenth of twice the depth of the coffer. The exterior cube exactly half the exterior to the remotest fraction. This is doubtless one of the solutions of the curious problem of the doubling of the cube. Now it will be observed that the height is one tenth of the king's chamber length in inches, and the depth is the tenth of the downward passage in inches for feet, and the bottom is one tenth in thickness of depth of coffer multiplied by two; that $34.377 \times 2 \div 10 = 6.875+$ and Mr. Skinner shows that this last number is diameter to a circle of 21.6. Now let us put these measures of the coffer upon a circle:



$360° \times 60' = 21600$ minutes or miles.

According to Mr. Wood the Pyramid is placed in such a position on the earth that the circumference of the earth on the parallel of latitude of 29° 58′ 51″ equals 21600 English miles or $21600 \times 5280 = 11404800$ feet, or that 1′ of arc subtends 5280 feet, or that the proportion is one minute to a mile. Now we

see that if we take 100 times the depth of the coffer for a radius, taking miles for inches, we have the radius of the earth in the latitude of the Pyramid and the thickness of the bottom of the coffer is just one thousandth of the diameter of the earth in latitude 29° 58′ 51″, taking miles for inches, or 6875+ miles. This is the diameter of the section of the earth in the latitude of the Great Pyramid.

Now this radius 34.377 is also the distance from the north end of grand gallery to the centre of the well, and the king's chamber length 34.377 in feet is the same on the depth of the coffer in inches, and one-hundredth of the radius of the section above mentioned taking miles for feet, and the width of the grand gallery above the ramp is 68.75 inches or ten times the bottom of coffer, and one-hundredth of the diameter of same section of earth through 29° 58′ 51″, miles for inches. Now suppose that Mr. Wood is not exactly correct and that the Pyramid is placed from 5 to 8 miles north of that circle of latitude which gives the above proportions. Do not the measures of the coffer, the king's chamber, the ante-chamber, the width of the grand gallery, the distance from the beginning of grand gallery to centre of well all agree with the measure of the circle and diameter of the earth in British miles? When 5280 feet is subtended by one minute of heavenly arc, and which Prof. Stockwell says is, counting the earth as an ellipsoid figure, correct for the circle of about 5 miles south of the Pyramid.

To recapitulate: You take the length of the coffer, 90 inches, square it = 8100, divide it by half the square root of π, or .886,226,925, you have the base of the Pyramid 9139.871258+ British inches. Divide the base by half the square root of π and we have 100 times the length of the granite of ante-chamber floor or 10313.4 British inches. Now divide this last number by half the square root of π and we have twice the height of the Pyramid or 11637+ British inches, or one hundred times the length of the ante-chamber floor, limestone and granite.

Now all of these circumstances prove conclusively the relation of the British inch to the circle of 360°, and the measures of the earth in latitude 30° or within gun shot of it (we think it will be found exactly in latitude of Pyramid), and that these meas-

ures agree with the British mile and the common cubit of Israel, and overwhelmingly coincide with the measures of the interior and exterior of the Great Pyramid.* We ask all to examine and study these premises. Now what remains, since the relations of the British measures are to the latitude of 30° and 360° and space, what relations have these to polar diameter? Certainly there is an exact relation; what is it? We know that in getting the distance to the sun astronomers use 206265, or the number of seconds in the analytical unit and one thousand times the width of the king's chamber, seconds for inches. Mr. Petrie has shown that the distance from the S. E. to the N. E. socket is 9131.055 inches *British.* Divide this by 25 and we have 365.2422 or the number of days in a year. Now the relation between the diameter through the section of the earth in latitude 29° 58′ 51″ is shown by dividing $\frac{9131055}{91399871}=\frac{1}{999}$.

The British inch has a positive relation to the earth as originally intended connected with 360°.

CHARLES LATIMER.

THE PERIMETER OF THE SIDE WALLS OF KING'S CHAMBER.

The π formulæ for king's chamber, given in Vol. 1, No. 1, of Magazine, bring out a wonderful confirmation of Mr. James Simpson's "2d height" of the walls (their height from the bottom of the lower course, which is about five inches below the floor level). It is as simple as A B C, and yet I have been two years searching for it.

Here it is: Let l=length of king's chamber, *i. e.*, $\frac{1296}{\pi}$, let b=breadth, *i.e.*, $\frac{648}{\pi}$, and let h=2d height. Then, by Simpson's rule, $l+h=\pi\ b$. Multiply both members of this equation by 2, $2\ l+2\ h=2\ \pi\ b$. Substitute the π value of b, and we have $2\ l+2\ h=2\pi\ (\frac{648}{\pi})=1296$. But twice the length plus twice the height is the circuit of the wall, hence:

* See Mr. Wood's papers in former numbers of the Magazine.

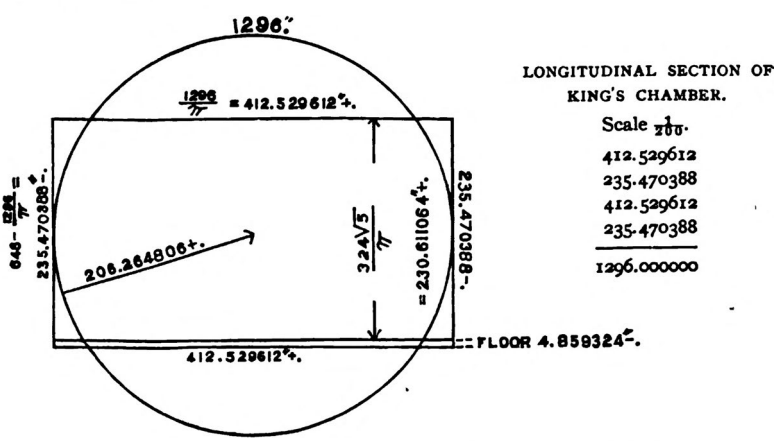
1st. The circuit of each side wall of the king's chamber measures exactly 1296 British inches, and, as Prof. Smyth states in 'Our Inheritance,' the length of the wall is diametral to the circuit.

2d. The circuit of the side wall represents, on a scale of $\frac{1}{1000}$, a circle whose circumference measures one British inch for each second of arc, and whose radius is exactly 10,000 cubits (20.626.48+inches); showing thus the correlation and common origin of the inch and this primitive secular cubit.

3d. The circle of 1,296,000 inches in circumference indicated in the king's chamber suggests the probability that the double accent mark (″) which we now use to express both inches and seconds of arc, may have been used for both purposes 4,000 year ago. If so, the hieroglyphics over the ancient entrance to the Pyramid, which were interpreted to Herodotus to denote onions, radishes and garlic, may really have been our identical degree (°), minute (′) and second (″) symbols, as some writer has already intimated.

The 2d height is obtained numerically by simple subtraction, 648—412.529612+=235.470388—.

It may be of special interest also, that π times the diagonal of side wall is 1492+.



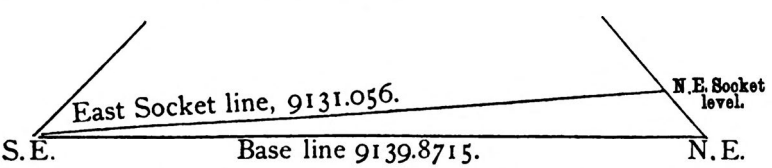
I wish to add here, with emphasis, that the British inch, however firmly it may be established, will not necessarily crowd

out the Pyramid inch. I am beginning to think that the British inch is intended mainly as a legitimate secular measure, but the Pyramid inch is the unit of sacred measure, and that the two units are related in the ratio of 9131.055 to 9139.871258.

When we shall have arrived at the full interpretation of the Great Pyramid, I am convinced that Prof. Piazzi Smyth will have less to retract from earlier theories than any other Pyramid student. J. H. Dow.

PROFESSOR SMYTH'S PYRAMID INCH.

According to Mr. Dow's theory, the geometrical base line of the Pyramid at the level of the S. E. socket is 9139.871258 British inches. Taking Mr. Petrie's measure, 11.4 for the difference of level between the S.E. and N.E. sockets, the east socket line, according to the π theory of slope, would be 9130.89 inches and 365.2367 for the astronomical year. But if we take 11.22 as the original difference of levels, we shall have 9131.056 for the length of the east socket line, which would give 365.2422 for the astronomical year, in accord with the π theory and Mr. Dow's base line of 9139.871258.



I suppose it will not be doubted among Pyramid students that the east socket line, 9131.056 British inches, is a measure of the astronomical year. Now, if we would find a measure of that year in the true geometrical base line of the Pyramid, the unit of measure must be somewhat longer than the British inch, which measures the east socket line 9131.056. How much longer may be found by dividing 9139.871258 by 9131.056? The quotient is 1.000965. Therefore, the geometrical base line 9139.871258 represents the astronomical year just as correctly, if we use 1.000965 British inches for the unit measure, as it is represented

by the east socket line in British inches. We may call this slightly lengthened unit of measure a Pyramid inch if we please. Professor Smyth's Pyramid inch is 1.001 British inches. The difference between this and a Pyramid inch obtained from Mr. Dow's base inch is 1.001 – 1.000965=.000035 or 1-30000 part of an inch. We may truly say that Professor Smyth's Pyramid inch, 1.001, is the astronomical year unit of measure on the *base line*, and Mr. Dow's British inch is the astronomical year unit on the east *socket line*. Strictly speaking, the Pyramid inch of the base line is 1.000965 British inches, but for practical purposes of building it might be taken as 1.001, as the error, 1-30000 arising from the unit of measure could not be detected by instruments.

H. G. WOOD.

SUGGESTIVE NOTES ON PYRAMID MEASURES OF MR. PETRIE AND OTHERS, FROM LETTERS OF J. R. SKINNER TO MR. LATIMER.

FROM LETTER I.

From the exceedingly important and grave aspect which the Pyramid studies are taking with me, I feel impressed to write again upon the subject. You know how very careful I have always been in my investigations, so much so that I have never suffered a haphazard or catch idea, however fascinating, to go forth, but have confined myself strictly to ascertained reliable measures and angles, to obtain their solution in architectural design, if possible. "Catch your rabbit first and then cook it." Show the exact measures first and then test their probable application. The sun's distance is really a disputed quantity by some 500,000 miles, among the greatest authorities; the earth's diameters by some 500 or 600 feet, say 1,000; the elements of the precession of the equinoxes are not as yet determined. By some the earth's shape is a variable, and by some the time of the lunar periods and the earth's yearly passage is a fluctuating measure. Therefore every one can find a support for this or that calculation, and is tempted to warp a real structure, as is the Pyramid, to suit a value or series of values,

as yet indeterminate, so as to make them fixed as standards. The result is confusion worse confounded. To a certain extent I believe we are agreed on certain definite standard data:

1. The British inch.

2. The N. cubit value taken from radius seconds of the circle of 360°.

3. The use on the Pyramid of these in a system of diameter measures exhibiting or indicating circumference values.

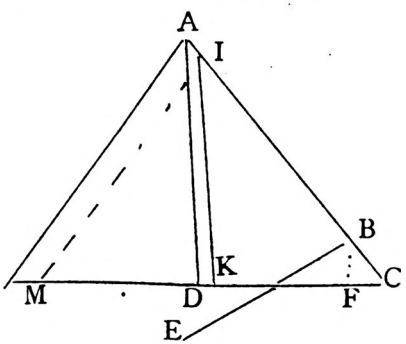
Your acceptance of a series of these measures has been in finding them applying in so many coherent and interrelated ways as to prove, say, incontestably their existence. These measures, so accepted by you, have been found in the upper and interior parts of the Pyramid. The lower part, that is especially the descending passage way, you have purposely avoided committing yourself upon, though in full harmony, correlation and coherence with the upper works, because of the uncertainty *of the length of the base side*, a matter still in question by a comparatively large measure of some 30 inches or 2½ feet, a confounding discrepancy for an exact work. I assent to this as the right course for you and the Society. But for myself it has been otherwise. All the upper measures had to grow out of this lower one of the descending passage. They developed *out of* its *location* and measures, on the π modulus, so that all formed one harmonious whole and many details in a just and interrelated symmetry. Moreover this descending passage was found to point to a most singular relation with respect to the *ground level*, or base of casing stone; for the foot of the passage was found to be 100 British feet or 1,200 inches in vertical depth below that level, which indicates a circumference to a diameter of $381.\underline{971}\pm$ inches, while the half distance between sockets in length shows to be $381.\underline{971}\pm$ feet, or a diameter to a circumference of 1,200 feet. The exceeding harmony of these data, taken as they were *to conform to actual reported measures*, having the highest praise of those whom we esteem authority (among them especially Piazzi Smyth) has been sufficient to make me morally certain that they would finally grow into the approval of the Society.

I have not seen not read Mr. Petrie's book, for I have been

till within a short time exclusively occupied with my Hebrew Bible reading. But I have become greatly interested in some of his measures, as noticed by Mr. Beswick, and which I have already referred to in my last to you. As to the descending passage way: If you will refer to page 132 of 'Source of Measures,' you will see how I made use of Vyse's and Smyth's measures down this passage to find a coinciding objective point with them. Smyth commenced at the edge of *basement sheet*, and measured down 162.3 inches, which length referred to the roof gave Vyse's starting point. Smyth measured down from A′ to C′, a distance of 981.9 inches to the junction of the roof line of the ascending passage, and he made the distance back from C′ to O, or the edge of the break-out 60.0 to 60.3 inches, say 60.2. Then from B, Vyse's starting point, to O is 981.9—162.3=819.6 and 819.9—60.2=759.4 inches. Vyse gives for his measure down to this break-out 758 inches. I took it, therefore, that the edge of this break-out characterized these two measures, viz., of 759.4 and 758, of these two, the chiefest, measurers in and about this structure. The difference I took to be explainable by the ragged edge either of the break-out or the basement sheet. With this foundation and the vertical height of basement sheet above the ground level of 49 feet by Vyse ('Source of Measures,' page 116, foot of page) and Smyth's angles, I made use of Vyse's continued measures, and his restoration of the dilapidated casing to see to what extent either the Turin or the Nilometer cubit measure from the *modulus* would apply. Vyse gave the total as "about 4126 inches." I made it 2062.647×2=4125.294 inches, or just 200 Nilometer cubits, or ten times the length of the king's chamber, but in time measure it was twice the *radius seconds* of the circle of 360°. In feet as 343.7745 it was diameter to a circumference of 1080 feet, while as 3437.745 minutes it was radius minutes of the same circle, and also 34.37745 inches was the inside depth of the coffer. Also, if you add to 343.-7745 its 1-9th, or 38.1971, you will have 381.971+ feet, which I still hold to be the measure in length between the sockets, of N. base side, on the authority of the French, of Vyse, of the Sultan and of Piazzi Smyth. I am thus particular for this reason:

It is now placed beyond question that the angles of the sloping side and of the descending passage way are to all intents identically the same with all measurers, as nearly as any two competent men can give them as the mean of his best efforts. That which is desirable is to determine the angle architecturally made use of; and this can be had from a knowledge of the plan from which the architect wrought. John Taylor, we are satisfied, recovered this as to the elements of the shape of the mass. The location of this passage way with its length of 4125.290 inches, so as to give the bottom of the passage a vertical depth of 100 feet or 1200 inches below the base of casing stone, and a vertical height above this base for the outer and lower lip of the descending passage of thirty-one T. cubits or 638.97+ inches, restores the angle as 26° 28′ 24.10″ which is in contrast with one of Smyth's as 26° 28′ 17″, I believe. Now Mr. Beswick quotes Mr. Petrie as fixing this vertical height above the ground level, of the outer and lower lip of the descending passage as 638.4. I think he mistakes as to Mr. Smyth, for I think Mr. Smyth never has made an estimate of this height, at any rate to my knowledge.

Thus, then, if we have given to all intents a sameness, (1) as to the angle of the sloping side, (2) as to the angle of the descending passage way, and (3) the vertical height of its outer and lower lip above the ground level, with the wonderful measure applying to Col. Vyse's recovery of the length of "about 4126 inches," viz.: 200 N. cubits of 4125.294 inches, then we can say that we fasten the construction as follows:



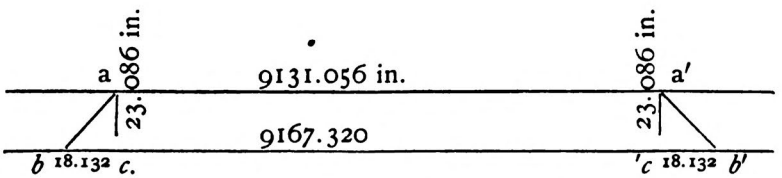
angle ACD fixed; angle EBC fixed; location of EB as

to angle, and intersection of AC in B, fixed. But on this location of EB all the upper interior works *are shown to be in essential location* constructed. *Therefore*, all this work as I have shown it in the Crown Jewels, can be and must be taken as the conception of the architect by his measures, *no matter what may be the measure of the base side.* For, if you determine that base side to be 9131+ inches long, and desire to show this from the above plan, you would accomplish this in effect by shifting the vertical axial line AD to IK, making your vertical section of the entire Pyramid CIM with the base desired, *leaving all the interior work exact and in position* with the exterior slope line.

I have tried to be plain, and think you will see the truth of what I have advanced if you will but give the matter a little thought.

You know I have always thought that Mr. Smyth's 9131+ measure is in the Pyramid, but not as he takes it, viz.: as the mass of the symbol itself, which would symply indicate *sun worship.* I showed you and wrote him how this is shown, and in a much more perfect way than he or any one has shown, of those who are so twisting and racking Mr. Petrie's measures to squeeze even an approximate neighborhood to the value of 365.2422.

The heights of the ramp of the grand gallery are given by Mr. Smyth as a *mean* of 23 inches, on which you can take the measure of 23.086+ inches. The ramp, by my plan, abuts against *the vertical axial line of the Pyramid.* Then a little pyramid with this height will have a base of $18.132 \times 2 = 36.264$ inches. Refer this down to the base, as if you would slide it down there, and it will cut out this from the length of the base side, cutting through the foot of the axial line. Now I say the base (of the north side) is 9167.320 inches long. From 9167.320 take 36.264 and there remains 9131.056 inches, four times which is 36524.224, showing 365.24224 or the tropical year value. Now suppose this same thing was shown by the *pavement covering a portion of the foot* of the base:



a and *a′* are the points of contact of pavement with sloping side. The bases *bc* and *b′c′* equal each, 18.132, or together 36.264. Then the base line of the Pyramid indicated by the top of the pavement would be 9131.056 in. I took the thickness of this pavement as one T cubit, because Vyse gives it as about twenty-one inches. Still it might at *some other point* or in some other way show a depth of 23.086. *I only give it to show a possibility.**

This whole matter has become with me of greater importance than ever, because I find this Pyramid and its measures to be *the burden of the Hebrew Scriptures from the beginning of Genesis through the books of Moses and the entire Bible in fact.* This I can show beyond question and have it down as a reading of Scriptures. This reading is as perfect and coherent in its way as Crown Jewels is in its.

The symbol running through the whole is this great Egyptian Pyramid. This is the reason why I hope you may be led to look more closely than ever into the merits of the construction of the Pyramid by the *modulus measures,* for the matter gets all its superlative importance, in the way of Biblical exigesis, from this modulus.

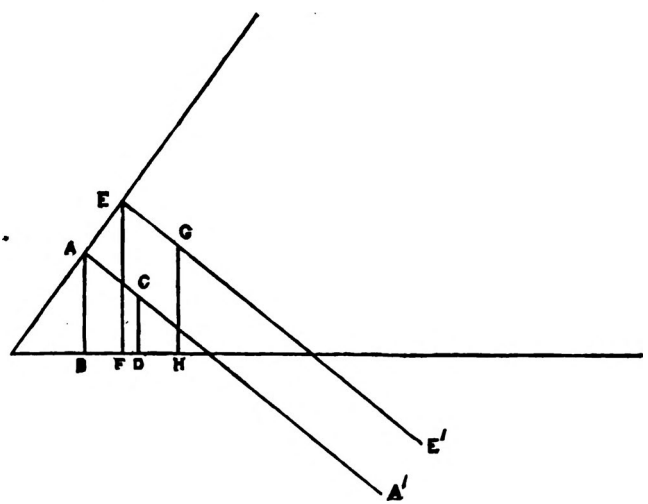
I am indeed glad and thankful that the measures under the modulus are obtaining such strong recognition, as *ex. gr.* Bes-

*NOTE.—Examination of Mr. Petrie's work brings out a novel idea as to this matter. We have been led by Mr. Smyth into the error of including *the thickness of the pavement* in the mass of the Pyramid. To the contrary, the Pyramid is constructed *on the surface of the pavement* (see 'Great Pyramid' by John Taylor, p. 13), which Mr. Petrie gives as from 22 to 27 inches in thickness: In his levelling for height of edge of basement sheet, it would seem that he started from *base of pavement* and not from its surface, making the height 611.2 inches. Vyse measured from *surface of pavement,* or base of casing stone, making the height 588 inches. The difference would be the thickness of pavement or 23.2 inches. The thickness of 23.085 inches would reconcile all conflicting claims, making the base proper of Pyramid on surface of pavement 9131.$\underline{056}$ inches long, while an ideal projection of the slope line through the pavement that depth would give, between socket corners, the distance of 9167.$\underline{320}$, as per Vyse and others.

wick on page 48 of the Magazine. Mr. Smyth himself seems to be yielding, and Bexendell now works in terms of British inches. I tell you there lies the basis of a revolution of thought in this matter.

FROM LETTER II.

Mr. Petrie has had to accommodate the interior to his exterior structure, and has run the vertical axial line of the Pyramid down through the apex of the queen's chamber.



AA′ and EE′ represent *about same* length of floor line of descending passage-way by Vyse and Petrie, 4126 and 4143, with nearly the same angle. The upper edge of basement sheet is *common* to both, and is represented by C for Vyse and G for Petrie; AC by Vyse is, say, 113.8 inches; EG by Petrie is 124.2 inches; AB by Vyse is 638.9; EF by Petrie is 668.3+21 =6893. Now CD the vertical height of edge of basement sheet, is 49 feet above ground level (21 inches under face of pavement). GH, *the same line* as CD, is by Petrie 611.2 inches *above surface* of pavement, or compared with Vyse's measure GH is 611.2+21=632.2 inches in vertical height. Or, relatively, the point C by Vyse is removed by Petrie to G, at a verticle height over C of 632.2—588=44.[2] inches *or nearly* 4 *feet.*

The masonry courses are changed so that whereas by Vyse *c* is in the lower edge of the 16th course (your chart counting the lower course as 2 in 1), G, the same point, is two courses higher up by Petrie.

Now the pavement before the basement sheet was laid bare by Vyse, the thickness of the pavement was before him, and all plain levelling work to obtain the vertical height of the point c, which he gives as 49 feet, or 588 inches.

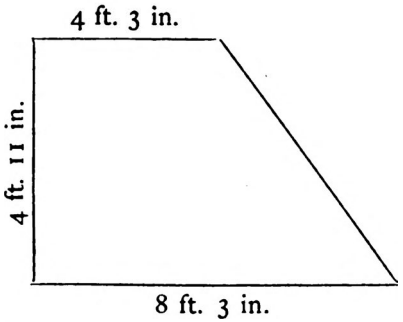
Can it be that Vyse and Smyth have blundered so monstrously as this? 44½ inches or nearly 4 feet in this small altitude?*

I have examined Mr. Petrie's measures with care. As to the interior they serve practically to verify those of Col. Vyse and Professor Smyth, but as to the exterior they are manifestly worthless, and by his own showing make the length of the base side *longer* than do either the French or Vyse.

The data to show this are as follows:

He gives us the professed exact dimensions of the *core masonry* or base sides of the existing dilapidated mass. These were also given by Davison, by the French and by Vyse. As to the latter, Mr. Davison gave the measure of the present north base side as 746 feet, the French "having measured the apparent base of the Great Pyramid twice, viz., from east to west and from west to east, with a good measuring chain, receding for that purpose one hundred feet towards the north, but still keeping on a line parallel with the base, M. Jourard found the length of the Pyramid from one visible angle to the other to be 745.8 English feet," and Col. Vyse measuring the same, found it to be 746 feet, or as he calls it, "the present base." This is the north side of the "core masonry" of Petrie, and is 8952 inches. Col. Vyse found a casing stone *in situ* set up to this core, on the north side with the following dimensions as given, viz:

*NOTE.—Explained and conflicting measures reconciled in preceding note.



Thickness at bottom 99 inches, at top 51 inches, height 59 inches. Mr. Petrie follows Vyse as to general description, and gives the dimension as, thickness at bottom 108±8 inches; at top 62±8 inches; height 58.85 inches; and we may take these respectively, as net, 100, 54 and 58.85, which practically give Col. Vyse's measures.

We now want the "core masonry" of Mr. Petrie, that is, what are we to understand by the term? On examination we find that he intends by this term "the present base" of Col. Vyse, the French and Mr. Davison. He says: "The form of *the present* rough core masonry of the Pyramid is capable of being very closely estimated." Then giving his means, he states his results as follows: "Case plane sides, N., 9002.3; E., 8999.4; S., 9001.7; W., 9002.5; inches. Socket sides, N., 9129.8; E., 9130.8; S., 9123.9; and W., 9119.2 inches." He gives a mean of arriving at the same result in another way, and by a more detailed method, shown in "Plate X," where for "the core plane on pavement" for the N. side, he gives: N. side of Pyramid base, on the level of the surface of the pavement, 9069.4 inches. Deduct from this 29.4 inches on the E. side, and 27.7 inches on W. side, or together 57.1 inches and there remains for length of present rough core plane 9012.3 inches. It is true this differs from the above same measure by 10 inches, but it is nevertheless Mr. Petrie's arrival to practically, by him, the same measure of the same length, by another co-ordinating process. To show this, he gives E. side as 9067.7 inches, with 22.4+23.1=55.5 inches to be deducted, leaving 9012.2 inches; S. side 9069.5 inches with 35.5+32.3=67.8 inches to be deducted, leaving

9001.7 inches for core side length, which in this instance agrees with the result of the same measure as above given. The W. side he gives as 9068.6 inches, with 36.1 to be deducted, leaving 9032.6 inches for core side. Thus, there is no mistake as to the meaning of the term "core masonry" and the measure given of it. It is the *present existing* base, identical with that measured by Col. Vyse. It is "the present rough core masonry" of Mr. Petrie.

Now being such, and the north side being 9002.3, or 9012.3 inches, then this exceeds the measures of the same length by Col. Vyse, viz: 8952 inches, by 52.3, or 62.3 *inches.* But if we add the thickness of the casing stone, or 100 inches, twice to this, we will have as the restored length of N. base side 9202.3, or 9212.3 inches, or 766+, or 767+feet, as the proper result of Mr. Petrie's measures.

It is well enough to quote from his work as to the mode of obtaining one of the above groups of results. He says: "The form of the present rough core masonry of the Pyramid is capable of being very closely estimated. By looking across a face of the Pyramid, either up an edge, across the middle of the face, or even along near the base, the mean optical plane which would touch the most prominent points of all the stones may be found with an average variation at different times of only 1.0 inch. I therefore carefully fixed by nine observations at each corner of each face, where the mean plane of each face would fall on the socket floors. On reducing these observations to give the mean form of the core planes at the pavement level, it came out thus: Case plane sides, (given above); socket sides, N., 9129.8; E., 9130.8; S., 9123.8; and W., 9119.2 inches."

If one reflects a moment, he will see that this line so sighted, passes over the *present* "prominent" edges of the core masonry, and being projected to the socket faces or floors, gives, as by Mr. Petrie, a length of this line for the N. side of 9129.8 inches. Now this is the line of the entire width, or length of the restored Pyramid by Mr. Petrie, being some 30 inches *within* the lines joining the sockets, reducing the measures from 9159.8, say, to this 9129.8 inches.

So far this is all very plain work, but for exactitude it involves

a remarkable and strange omission, which it is almost incredible that Mr. Petrie should have made. It is this: On referring to the diagram above of the casing stone, it is seen to have a flat top of some 51 inches in depth or thickness horizontally. Now *after the first* course of masonry the casing stone of each succeeding course would be brought out to overlap this 51 inches, *but as to the first course* itself, the core masonry of the Pyramid *would be increased* on each side by this 51 inches, and the points over which Mr. Petrie sighted were 51 inches inside of the true position for the plane which he sought. This is true, I think, and seems to be the inevitable conclusion to which one is driven on the examination of Mr. Petrie's descriptions.

Now let us analyze the measure of the core masonry side by Mr. Petrie, as compared with the measure of Howard Vyse. The latter gives it as 8952 inches, and to this is to be added the 51 inches of top of casing stone, and then the excess of 99 inches, the bottom of the casing stone, over 51 inches, or 48 inches to complete the extension of the restored base for each side; that is, 51 taken twice, and 48 taken twice. Suppose Mr. Petrie saw the necessity also, but instead of adding $51 \times 2 = 102$ inches for the *extended* core masonry, which he really had in contemplation, he, by mistake of omission, only added it *once* to Col. Vyse's measure, making $8952 + 51 = 9003$ inches, which is Mr. Petrie's actually given measure. Here we see the measure which Mr. Petrie really gives, and at once have the key to his confusion. He really was confirming the measures of the existing present base, or core masonry, as by Vyse and others; and then, in his attempt to make the core masonry measures by the flat top of the casing stone, he *omitted to add it twice* for the casing stone on each of two sides. So he increased Vyse's measure 8952 inches by 51 inches, giving his result of the length of the core masonry on the N. side, viz., 9003 inches, whereas he should have added just double this, giving the restored core as 9054 inches. With this new and correct idea of the extension of the core masonry by the depths of the flat tops of the casing stones, his sight lines or planes projected down on to the socket floors would simply have restored Col. Vyse's measure, or 9168 inches; that is, it would result in add-

ing to the core masonry, on each side, the excess of the length of the bottom of the casing stone over that of its top, or of 99+ inches over 51 inches.

This is the main blunder made by Mr. Petrie, but it is fatal to his work, both as to length of base side, as also to his carefully elaborated closing of the mouth of the descending passage way in the thickness of the 19th course of masonry. Indeed, as said, it renders Mr. Petrie's work as to the exterior of the Pyramid worthless.* J. RALSTON SKINNER.

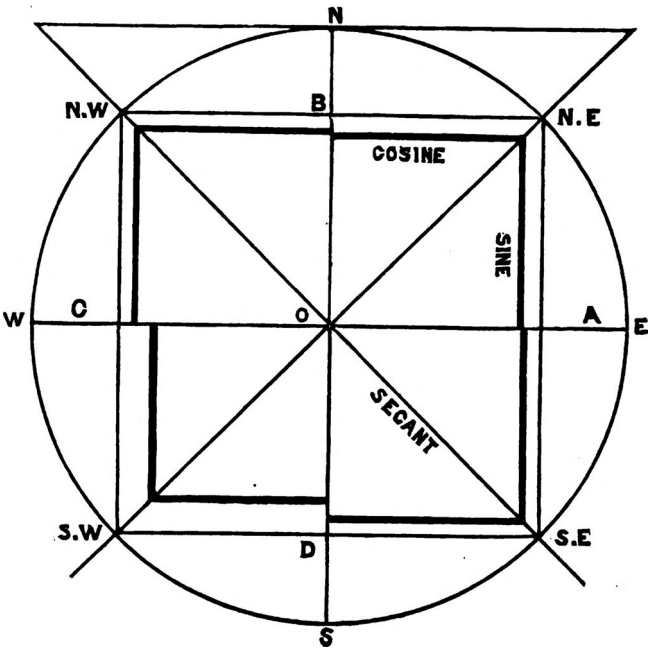
THE STRUCTURE OF THE BASE.

Perhaps the most interesting portion of our review of Mr. Petrie's book will be found in the present culminating article. Having considered the general structure of the base, and the probability and certainty that the architect plotted it and laid it out theoretically on the solid rock, as a sort of trial square, where he proposed to erect his pyramid, we may now consider what that general plan would be, which would form a working plan for the builders themselves, and yet embody all the leading features of the future edifice.

What was that general working plan plotted on the spot where the great Pyramid was to be built? It was neither more nor less than a trigonometrical arrangement of sines, cosines, tangents and cotangents, such as is always used in our common

*NOTE.—On working out Mr. Petrie's measures of the descending passage, and to the intersection of the ascending passage, his own data show *a necessary shortage* of 18 inches on 4143, by which he makes the passage length 4125 inches, which is the same with Vyse. This effectually breaks up his theory as to the 19th course of masonry. This being the fact, both have the same measures and the same angle for this passage. To this is to be added the mode of reconciling the "height of basement sheet," as 588 by Vyse and 611 by Petrie, as shown in preceding note. Then follows the correction of the error of Smyth, viz.: that the Pyramid proper was built *on the surface* of the pavement. By this the "between sockets" of Vyse, being 9168 inches, marked the limitation of the pavement, *on which*, and 18.$\frac{132}{}$ inches inside the socket line, the Pyramid proper was erected with a base line of 9131.$\frac{056}{}$ inches. This would serve to reconcile all conflicting claims of measures, and give a basis for a satisfactory solution of the conflicting statements as to core masonry and casing stones.

text books on trigonometry, and which was probably used by the geometers of the ancient schools when the Pyramid was built, as is exemplified in Euclid's 'Geometry.'



We have embodied this working plan in the above diagram, which every geometrician will recognize at once as a trigonometrical plan of sines, cosines, etc., known as the trigonometrical circle, which is divided into four equal parts by two diameters, perpendicular to each other, and each part is a quadrant. Now the trigonometrical square within the circle is an exact representation of the actual Pyramid base, as deduced from the measurement of Vyse, Ordnance Survey, French Survey, Smyth and Petrie. The latter gives a diagram, Plate X, identical in all its main features with the one here given. Our diagram is in fact, a rough sketch of the working *plan* of *the builder* of the *great* Pyramid, showing, very exclusively, *that the architect* designer or builder used such a system of arcs, sines and cosines in the erection of his building.

Of course, the proof would have to conform to all the requirements of his working plan. And it does conform and agree in every respect. The main feature would be that the core masonry would run out its sides at right angles, forming a system of sines and cosines; each quadrant having its own distinct system. And in such a case the S. E. quadrant would be the initial one. In this case all the quadrants have different sines and cosines, and the core masonry would have four irregular angular points in the middle of each face of the Pyramid, at A, B, C, D. Each face of the core masonry would have a sunken joint in the middle, or hollow at that point of junction. And as the finished faces would be perfectly level, smooth, and having no irregularity or unevenness on the surface like the core masonry, the casing stones on each face would be thicker at its joint on one half of its four faces, and thinner on the other half. On the other hand, if the four sides of the core masonry had been formed of sines equal to the cosines, then the sides would have been equal and form a perfect square, with casing stones of equal thickness all round.

But in the case of the Great Pyramid, the casing stones would begin to be suddenly thick and thin at these middle points at A, B, C, D. In other words the N. E. quadrant would have a thicker casing than the S. E. and N. W. quadrants, and the S. W. casing would be thicker than the S. E. and N. W. quadrants. The thicker casing would belong to the N. E. and S. W. quadrants, and the thickest casing of all would be in the S. W. quadrant. To a person not understanding this structure, the core masonry would have the appearance of being hollowed out at the middle of each face, with thicker casing stones at the middle to fill up the alignment of the face with the corners and angles of the Pyramid.

Now this is actually the case with the great Pyramid. Mr. Petrie detected this fact without knowing its cause, or detecting its significance. The following is what he says, p. 43:

"At the corners, however, the casing was thinned, averaging but 33.7 (difference of core plane and casing on pavement), and this is explained by the faces of the core masonry being very distinctly *hollowed*. This hollowing is a striking feature; and

besides the general curve of the face, each side has a *groove specially down the middle of the face*, showing that there must have been a *sudden increase* of the casing *thickness down the middle.* "The object of such an extra thickness down the middle might be to put a specially fine line of casing carefully adjusted to the required angle on each side, and then afterwards setting all the remainder by reference to that line and the base."

This is a demonstration of our discovery of the true form and significance of the Pyramid base. But it is evident that Mr. Petrie could not understand it, and did not detect the true cause and significance of the hollowing and grooving of the core masonry, and the sudden thickness of the casing at the middle of each face.

From the base we may now go to the general structure of the Pyramid. If this form of base be admitted, the trigonometrical centre of the sines and cosines would be the vertex of the circle, and the radius would be the origin of angles whose vertices meet at the centre of the figure. This brings us to the conviction, that the vertical axis is in the centre of the general figure, otherwise the sines and cosines of the sides would be untrue and unreliable. The whole Pyramid, through all its courses, will bear the same relation to the vertical axis and sides, because every course will practically consist of the same combination of sines and cosines, with the groove in the middle of each side.

A careful inspection of the top of the Pyramid by Mr. Petrie has demonstrated this theory of the upper courses, as clearly as with the lower and lowest courses near the base. Mr. Peytrie says: "The top is, rather strangely, not square." And the casing here also must have been thicker on the S. W. and N. E. quadrants than on the S. E. and N. W. quadrants. But Mr. Petrie did not discover the cause of this singular arrangement.

By way of illustrating this trigonometrical plan of the Great Pyramid base, and for the special purpose of giving it the most obvious demonstration beyond the reach of suspicion or doubt, we will take Mr. Petrie's own figures as data. He says the axis of the Pyramid trends 5′ 16″ from the true north, p. 38, and on page 41 he refers to his own dia-

gram, Plate X, which is almost identical with the one we have given above, in the following words: "The main skew of the core to the base is 1′ 33″, and its mean azimuth—5′ 16″ to true North." With this deviation the sine of the N. E. quadrant will be lessened by that amount, and the cosine also, and the break in the line must of necessity be made at B in the middle of the base-side, where the N. E. cosine ends and the sine vanishes. The break could not happen anywhere else, the hollowing groove could not be made anywhere else, if the base is constructed according to trigonometrical principles. The line might have been a straight diagonal line without any break or hollowing groove anywhere. But the hollowing groove and sudden angle in the very middle of the line, where the cosine touches the northern axis, proves beyond all doubt or cavil that the *two halves* of the north side of the Great Pyramid have been constructed and planned to represent the cosines of a trigonometrical square, which has been divided into four quadrants. And as the cosine is diminished by a trend of 5′ 16″ west of north, the length of the N. E. side will be equal to the value of the cosine in the N. E. quadrant, and will there end exactly in the middle of the north side of the Pyramid.

Let us now test this theory with Mr. Petrie's data. The N. E. socket and corner is 11.4 inches higher than the S. E., with a trend of 5′ 16″ to the west. This would give a line of $\frac{9130.8}{2}=4565.4$ inches for the eastern half of the north side. The western half, with a socket at the N. W.=7.1 inches high would be $\frac{9128.8}{2}=4564.4$ inches, making a total length of

Eastern half, 4565.4 cosine.
Western half, 4564.4 cosine.
9129.8

This is exactly the length of the north side given by Mr. Petrie.

So with the S. E. and S. W. halves of the south side of the base. Mr. Petrie says the axis trends 4′ 58″, which will lessen the sine and cosine of the S. W. quadrant to that extent. The S. W. half of the side, with a socket 16.9 high, will be $\frac{9118.9}{2}$

$=4559.45$ inches in length, and the S. E. half will be $\frac{9128.9}{2}$ $=4564.45$ inches in length, making the total length of the south side 9123.9 inches. This is the length given by Mr. Petrie.

Now comes a *test question.* On the supposition that these two sides, north and south, are actual straight lines, as Mr. Petrie supposes in his calculation of the sides, how is it possible for the length to agree with the hollowing grooved character of the middle of the core masonry, except upon the supposition that the sides of the core were the actual sides of a quadrant, which were increased and diminished by regarding them as lines and cosines of that quadrant; and by making the sides of the two halves even with filling the lower half with thicker casing stones? Hence, Mr. Petrie is compelled to come to the conclusion that the core masonry is askew with the true base. He says: "The main skew of the core to the base is 1′ 33″, and its mean azimuth—5′ 16″ to true north," p. 41. And on Plate X, with the diagram of the base as computed by him, he says: "The *azimuths* of the sides stated are from the *mean azimuth* of the casing on pavement, which is—3′ 43″, *i. e.*, W. of N." But his pavement level has an unknown quantity of probable error in it that makes it unreliable. He says, p. 42: "The pavement levels, excepting that on the N. side below the entrance, are not of the same accuracy as the other quantities; they were taken without an assistant, merely for the purpose of showing that it really was the pavement on which the casing was found to rest on each side." The core-plane on pavement, as given by him, has, therefore, an unknown quantity of error in it. And this item, which ought to have been the most completely established as the zero and datum line of all the levels in the upper courses of masonry, is the least reliable, according to his own showing. We have no doubt that the mean azimuth of the casing on pavement was exactly the mean azimuth of the whole Pyramid, namely, 5′ 16″, west of north, or more correctly, 5′ 12.525″, as we have estimated it, no matter what the main skew of the core to the base might be. It is altogether inadmissible to suppose, as Mr. Petrie does,

that the architect and builder would adjust correctly the casing to the core masonry to make a perfect alignment and smooth face to each side, and do it with the utmost perfection and finish, and not adjust the casing and pavement level with equal alignment, perfection and finish. His diagram is therefore faulty and erroneous in the azimuth of the casing on the pavement. If the corner sides of core masonry were constructed as the two sides, sine and cosine, of a quadrant, as we have already proven, then it would have been next to an impossibility that the mean azimuth of the casing on the pavement could be what Mr. Petrie has given to it. We cannot for a moment admit it; and the more so because he admits that the pavement level on the N. side below the entrance was more accurately taken by Col. Vyse. The fact is, Mr. Petrie had no reliable formulæ to rest on as a guide and key to unlock the mystery before him, and to control his calculations. For this question of base, datum line, zero of levels, or foundation of the great structure, has been with him a matter of speculation rather than actual observation or measurement.

Indeed, this theory of the true trigonometrical structure of the Pyramid base is capable of the most exact demonstration, and of the widest and most fruitful illustration. Its discovery will enable us in future to employ a system of triangulation of a different character, such as has not yet been applied to the Great Pyramid. And I would recommend that the Institute organize an expedition for that purpose at as early a date as possible. I am now certain it will be impossible for that expedition to fail doing more satisfactory work, for the settlement of difficult points and theories, than any yet done. It can be equipped with perfect formulæ for its guidance, such as no other has ever yet possessed. We have the advantage of having tested them by comparing the results they give us with what has been done under the most favorable conditions, with the best appliances, and directed with admirable precision and skill. And we have found those results more reliable, because nearer the best averages, than any results yet attained. We have the advantage of knowing beforehand what the average positive success must be, from what has already been attained

with less effective formulæ as a guide. I cannot use too strong language in urging upon the Institute the immediate organization of such an expedition, and upon its wealthy members and friends the duty of furnishing the means to equip and support it in the work to be done.

We can now say, as we could never say before, that no merchant ever made an investment with more certainty of success.

S. BESWICK.

Strathroy, Ontario, March 1, 1884.

REFLECTIONS CONCERNING THE SO-CALLED "π" VALUE.

BY THEODORE FABER, BROOKLYN, N. Y.

The "orthodox" view of the "relation" between the diameter of a circle and that circle's circumference is, that it is an *infinite* relation. Has this view any *sound* basis?

"Relation" is a word which any reflective mind will readily allow can solely be applied where *difference* exists. If the universe consisted of one absolute infinite formless space, no "relation" could be conceived to exist there. Hence, that word is, geometrically, solely applicable to "form" and its *motion* in space.

The diameter of "a circle" and the circumference of the same *form* are virtually "abstractions" which we *image*, for instance on paper, and apply our minds to define and *measure* their "*relations*"—for what purpose?

Astronomy has been one of the oldest sciences. Man could not help early noticing the regular motions of bright "spheres" in the "heavens," and the influence these exercise on his own being. It became an early object of man's intelligent mind to investigate "nature," and to learn to comprehend as much as possible of the *relations* of *moving forms* in space. Man early *imagined* the *geometrical forms*, such as globe and cube, and their divisons, which soon became permanent objects of special

study. Why? Because it soon became obvious to man that law presides in the Universe, *i e.*, *perfect order* in the motions of all *forms* in space, as if under the control of One Infinite Intelligence. And where man discerns any *true* geometrical relatiou on earth, he may fully rely on its universal validity. If it were not so, of what possible practical use would be to him the study of all nature and her laws?

We *image* the circular motion of small forms round larger, and such for instance as that of the moon round the earth and that of the earth round the sun, by "*circles*," and call the *distance* across—dividing the circle into two equal semicircles—the *diametcr* of the circle; and what the *circumference* of a circle means, any one knows that has ever described a circle with a pair of compasses. We desire, for instance, to know the distance from the earth to the sun, and that of the orbit of the earth round the sun. It soon becomes obvious that we must first clearly understand the true relation between the diameter and circumference of an abstract circle before we can hope to make any approximately correct calculation at all in astronomical science. The orthodox view of the relation between the two objects has hitherto been that it is *infinite*, and the value of "π," what is, the relation between the *diameter* and *circumferencc* of the circle is=1:3. 14159+. . . . . to infinity. The question looms up. "Can this be called *sound* doctrine?" Is it indeed "common sense" to assume the relation between two such elements of *form* as the diameter and circumference of "a circle" as *infinite*? Even though all space could be *imaged* by a circle, the two elements of the *imaged form* would *never* be *infinite*. It is impossible for man to image or comprehend the *Infinite*. Hence, it would seem to constitute actually treason to common sense to call any other relation but *a finite one true* between diameter and circumference of a circle. And unless the relation be universally valid, that is, even identical in the smallest conceivable as well as in the largest possible circle, what reliance could at all be placed in any astronomical calculation soever?

The writer's ratio 9: 8 between circle diameter and square root of circle area and 1:3$\frac{18}{81}$ between circle diameter and circle circumference, discovered after many years of ardent reflections,

finally virtually *prove*, beyond all power of refutation, the solution of the "Grand Problem" as Chambers Encyclopedia calls it, namely the quadrature of the circle, so intensly sought after in vain for so many ages, that two great scientific societies finally, some seventy years ago, were tempted to pronounce the solution "impossible," although such dictum found itself based on no other ground than the fact of its still remaining unsolved.

A thorough explanation of the ways and means which led the writer to final success in making the great discovery of the solution of the famous problem, and this in the face of the dictum of the two great scientific societies, would seem to be due to the world's public at large, but more especially to that of the discoverer's adopted country, a nation which is finally to decide whether there is any value or national honor in the great discovery.

The ratio "9:8" is a more simple expression than that of 2¼:2, which latter was found by analysis of the primary right angle 2:1, in the following manner: Assuming the first following square to the unit "1" namely 2^2, and drawing a straight line from the middle of its summit side to either angle of the base side, the line divides the assumed square into two unequal parts, the smaller of which constitutes a right angle triangle, the two sides of which obviously are 2 and 1. The question arrives, what is the hypothenuse of the triangle? According to the "Pythagorean problem," the sum of the square of the two sides of the right angled triangle is equal to the square of the hypothenuse. Now, what would be that square in given case? The sum of $2^2 + 1^2$ is=5 which is *a surd* or *irrational* quantity, from which no clear *square root* can be extracted, because an irrational quantity is ever only=a^2+2ab, lacking b^2 from constituting *a square*. Hence, if we would have the true hypothenuse of the given right angled triangle, we must add b^2 to the sum "5." The writer himself discovered a rule for finding what he called the "artificial root" of "irrational quantities," as follows:

1. Extract the largest *square* from given irrational quantity.

2. Subtract the extracted square from given irrational quantity.

3. Use the difference for the *numerator of a fraction*, of which *twice* the root of extracted square shall be the denominator.

4. Add this fraction to the *root* of the *extracted square.*

5. Now, *square* the found artificial root, and the result will invariably be = to given irrational quantity—plus square of the *fraction*—and the found artificial root will constitute the "hypothenuse," which in given case is = 2¼.

Now, if we use this hypothenuse for radius of "a quadrant," what will be its relation to the *large side* of the right angled triangle 2:1? Evidently 2¼:2. Now, obviously the relation between the quadrant radius and the large side of the triangle is precisely similar to the relation between the circle diameter and the *square root of the circle area.* But 2¼:2 is = 9:8, which latter is a more simple ratio, more easily handled, and this fact has to be set down as an axiom: whatever ratio is the *true* one in a single circle must necessarily be valid in all circles. But how did the writer arrive at the ratio 1:3 13-81 as between *diameter* and *circumference* of a circle? By the very ratio 9:8! What is the square root of the circle, whose *diameter* is 1? Answer: As 9:8 :: 1:8-9—*i. e.*, 8-9 is the $\sqrt{}$ of a circle of diameter = 2, it will be exactly double of 8-9—that is, = 1 7-9, and 1 $7\text{-}9^2$ = exactly 3 13-81. But what makes the *area* of a circle of diameter "2" exactly = circumference of a circle of diameter 1? Because it is the *law* of harmony between measure and number, which Euclid theoretically discerned, when he declared his proposition, that the product of half a circle's circumference, and the circle's radius, is equal to the circle's "area," although he could not find the numerical ratio between diameter and circumference. Curious enough, by the writer's "Table of Proof" it is distinctly seen that this proposition of Euclid holds good *in every case* exactly, an absolute proof of the correctness of the ratio 1:3$\frac{13}{81}$. The proposition of Euclid is virtually tantamount to the finding of the *circle area* of diameter 2 as exactly equal to the circumference of circle of diameter 1.

The writer finally made the discovery that the circle area stands in an *invariable* relation to the area of the square of the circle diameter, namely in this: as diameter square is $= a^2 + 2ab + b^2$, the circle area is ever $= a^2$ of this formula; but a^2, as its very name indicates, is *a square*. Hence, it follows, that every circle area is equal to *a square*, and thereby *proves* the *solution* of the "*Grand Problem.*" Every assumed circle-diameter will bring us out in this theory with wonderful precision, as per examples here presented.

1. By our ratio 9:8 as between diameter of circle and square root of circle-area—assuming diameter as = 9, the square root of the area will be = 8, and therefore the area $= 8^2 = 64$, while the square of the diameter 9 will be $= 81 = a^2 + 2ab + b^2$.

$$\text{Now } 8^2 = 64 = a^2$$
$$2 \times 8 \times 1 = 16 = 2ab$$
$$1^2 = 1\text{-}81 = b^2$$

2. Let us now assume a circle-diameter = 100, then the square of the same is $100^2 = 10{,}000$. What is the circle-area according to the ratio 9:8? As 9:8 :: 100:88 8-9, therefore the circle-area will be $= 88\ 8\text{-}9^2 = 7901\ 19\text{-}81 = a^2$. The difference between 100 and 88 8-9 is 11 1-9, and this difference multiplied by twice the root 88 8-9 is = 1975 25-81 = 2 a b, and the square of the difference, namely, $11\ 1\text{-}9^2 = 123\ 37\text{-}81$ is $= b^2$. Now, these three amount, namely,

$$\begin{array}{rl} 7901\ 19\text{-}81 & = a^2 \\ 1975\ 25\text{-}81 & = 2ab \\ \underline{123\ 37\text{-}81} & = b^2 \\ \text{are } 10{,}000 & = 100^2 \end{array}$$

and thus in every case of application, thereby *proving* the *absolute truth* of the *circle-quadrature* beyond all power of refutation!

The discoverer himself is filled with wonder every time he makes the application with his ratio 9:8, namely with wonder, that this simple truth had not been discovered before; but he discerns the insidious cause by which even Euclid was misled in the practical carrying out—while he had a correct insight theoretically, demonstrating even the logical necessity of the circle-area being equal to a square. This insidious cause resided

in a false assumption of *universal* validity of the famous "Pythagorean Problem," finally found to be only a special one. The long-prevailing ignorance of "Science" of the fact, that a so-called "*irrational quantity*" can ever only be $= a^2 + 2\,a\,b$, had a great deal to do with the difficulty of "squaring the circle"!

After all, the difference in "value" between the *finite* ratio 1:3 13-81 and the orthodox *infinite* 1:3.14159 + . . . does not much exceed 3-5 %, but, when we come to consider that already 707 decimals have been added to the same infinite ratio, while billions of decimals added to the same would scarcely change the *per centage* of difference, it would seem to be childish to deny the *advantage of the finite ratio*. The ratio 10:9 has recently been proposed. This would change the ratio between diameter and circumference to 1:3 24-100 instead of 1:3 13-81, virtually the difference between the metric and anti-metric system of measurement!

COPY OF TABLE OF PROOF IN SUPPORT OF THEODORE FABER'S TWO RULES FOR SQUARING THE CIRCLE.

Conversion Ratio.	Circle Diameter.	Square Root of Circle Area.	Circle Area.	Ratio between Diameter and Circumference.	Circle Diameter.	Circumference.	Half Circumference.	Radius.	Circle Area.
9:8	1	$(\frac{8}{9})^2 =$	$\frac{64}{81}$	1:$3\frac{13}{81}$	1	$3\frac{13}{81}$	$1\frac{47}{81}\times$	$\frac{1}{2} =$	$\frac{64}{81}$
	2	$(1\frac{7}{9})^2 =$	$3\frac{13}{81}$		2	$6\frac{26}{81}$	$3\frac{13}{81}\times$	$1 =$	$3\frac{13}{81}$
	3	$(2\frac{6}{9})^2 =$	$7\frac{9}{81}$		3	$9\frac{39}{81}$	$4\frac{60}{81}\times$	$1\frac{1}{2} =$	$7\frac{9}{81}$
	4	$(3\frac{5}{9})^2 =$	$12\frac{52}{81}$		4	$12\frac{52}{81}$	$6\frac{26}{81}\times$	$2 =$	$12\frac{52}{81}$
	5	$(4\frac{4}{9})^2 =$	$19\frac{61}{81}$		5	$15\frac{65}{81}$	$7\frac{37}{81}\times$	$2\frac{1}{2} =$	$19\frac{61}{81}$
	6	$(5\frac{3}{9})^2 =$	$28\frac{36}{81}$		6	$18\frac{78}{81}$	$9\frac{39}{81}\times$	$3 =$	$28\frac{36}{81}$
	7	$(6\frac{2}{9})^2 =$	$38\frac{44}{81}$		7	$22\frac{10}{81}$	$11\frac{5}{81}\times$	$3\frac{1}{2} =$	$38\frac{44}{81}$
	8	$(7\frac{1}{9})^2 =$	$50\frac{48}{81}$		8	$25\frac{23}{81}$	$12\frac{52}{81}\times$	$4 =$	$50\frac{48}{81}$
	9	$(8)^2 =$	64		9	$28\frac{38}{81}$	$14\frac{18}{81}\times$	$4\frac{1}{2} =$	64

Rule 1. Convert any given circle-diameter by the raito 9,'8 and you have the exact square-root of the circle-area.

Rule 2. Multiply any given circle-diameter by the mixed number three and thirteen-eighty-firsts ($3\frac{13}{81}$) and you have the exact circumference of the circle.

1. Draw an accurate square.

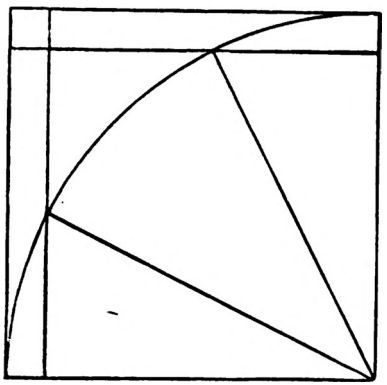
2. From middle of summit side of the square to either angle of the base side, draw a straight line which divides the square into two unequal parts, the smaller of which constitutes a right angled triangle, the two sides of which stand obviously related

to each other, as 2:1, thus constituting the *primary right angle*, the hypothenuse of which is *solely* expressible in a *finite*, and *not* in an *infinite* line, and when the *sum of the squares* of the two *sides* of the right angle constitute "*an irrational quantity*," the "artificial root" of that quantity, as obtained by Faber's rule, constitutes the "hypothenuse."

3. Now, using the hypothenuse for a radius, and moving the same to the left till it fall *in line* with the perpendicular side of the posited square, and moving it to the right till it fall in line with the base side of the same square, we have then "a quadrant."

4. Complement now the *square of the radius*. The question arises; what *relation* does the *area of the quadrant* bear to that of the first posited square? And what is the square of the radius?

Since the arc of the quadrant obviously cuts off a corner from the first posited square, and deposits the same quantity in two equal half arcs between the posited square and the square of the



radius, it becomes self evident that the first deposited square, and the quadrant are of perfectly equal area, and consequently that the quadrant area, in every case, bears the same proportion to radius square, that the first posited square bears to the same, namely, it is $= a^2$ of the $a + b^2$ of the radius ^{2}.

Now, the "quadrant" being simply the *exact fourth part of a circle*, it follows that the identical relations apply to the *whole*, that is: The circle-area is ever exactly equal to a^2 of the square of the diameter, the same as the quadrant area is

exactly equal to a^2 of radius-square. But "a ^{2}," as its name readily indicates, is "*a square*," as much as "radius square" is "a square," and as much as circle diameter ^{2} is *a square*. This fact irrefutably establishes the solution of the "Grand Problem" of the circle-quadrature.

But what makes the 2 a b invariably=to product of twice the *square root* of quadrant area or of circle-area, and the *difference* between radius and square root of area? Because that is the exact content of the two parallelograms between the two squares, and b ^{2} consists of the square of the difference in the square roots of the two squares.

Thus, forever, most beautifully "*harmonizing measure and number*" never before accomplished.

Faber's ratio 9:8 between circle-diameter and square-area, wonderfully facilitates each calculation rendering the use of "*decimals*" fallacious.

WILLIAM OSBURN, THE EGYPTOLOGIST OF LEEDS, 1793–1875.

William Osburn, whose portrait, at an advanced age, we now reproduce for our readers, from a photograph taken and presented to us by a once Sunday-school pupil of his, now a photographic artist in Leeds (W. Hanson), was born in that city in 1793. After having received a good classical education in the local schools, he pursued for himself still further the study of various branches of ancient literature, both Latin and Greek; rejoicing in trials of intellectual strength with the best scholars of his time on the most difficult passages in Sophocles, Æschylees and Euripides. But, without fortune, he must do something more profitable for daily bread; wherefore, much against his own tastes, and the recommendations of those who had taught him, he entered into his father's business, which was that of a wine merchant.

Wearily and not successfully did he plod on at that occupation for nearly thirty years, vexing his friends by his total in-

capacity, as well as want of appreciation for "commerce," and giving himself up greatly to voluntary evening teaching to a large class of young men connected with a neighboring church. There he was most successful, forming them year after year, some into earnest school-masters (who were then greatly wanted in Leeds), and some into most devoted missionaries to carry the gospel into distant regions of the earth: so remarkable and powerful the influence he was gifted with by Nature, to obtain over the ingenuous, youthful mind.

But he by no means confined himself to elementary teaching of the young, for, being of strong evangelical views in religion, and having studied the old ecclesiastical literature deeply in the originals, he felt himself moved, when the High Church Oxford tracts came out under Pusey, Newman and others, to publish a work entitled, 'Errors of the Early and Apostolic Fathers,' in which book, by means of copious quotations from their writings, he was enabled to show the very early introduction of serious corruption and superstition in the Christian churches, both Latin and Greek.

His essay, though, however good in itself, obtained for him through the rest of his life the cold shade of the political leaders and government ministers connected with that Oxford movement. While his following works, 'The Life of Origen' and 'Hidden Works of Darkness, or History of Jesuitism,' so angered the Jesuits, that one of them (whom all scientific men would never have believed capable of such an act) tried to turn the tables upon him by declaring that William Osburn was, himself, that odious thing to free humanity "a dispensed Jesuit."

By this time (1847) William Osburn had not only left the unfortunate wine merchant business in Leeds, but, after having been called to be, and having practised as, a newspaper editor in Manchester, and published on the 'Antiquities of Egypt,' the ancient hieroglyphics of that land and its modern Coptic language—of which he finally produced a dictionary—he was invited by the Rev. Lord Wriothesley Russel (a scion of the politically liberal house of the Dukes of Bedford) to become a private tutor to his two sons. This employment took Mr.

Osburn much away from his own growing family (for he had married in 1829), but was too congenial to his mental gifts to be disregarded. He accordingly became a travelling tutor to these young men, and afterwards to a son of Sir John Dean Paul, with whom he visited not only the chief cities of Europe but Egypt and Ceylon, whence he was enabled to publish his highest researches in both Egyptology and revealed religion in the shape of his 'Israel in Egypt,' in 1853; 'Monumental History of Egypt,' 1854; and 'Religions of the World,' 1855.

The above account is taken with very little alteration or addition by us from an excellent notice in the Leeds *Mercury*, for February 27, 1875, written, we believe, by its editor-in-chief, that able and widely-respected liberal politician and educationist, Mr. Baines. And what follows is taken *verbatim* from the same source, for we believe that it cannot be improved upon, even for our especial purpose of showing why William Osburn's portrait has been introduced into our International's gallery of worthies in science and religion, students of the Great Pyramid.

Thus, then, in winding up his account of the last days of a most striking existence, continues the editor of the Northern paper—

Owing to his long illness (acute and extensive chronic rheumatism) Mr. Osburn had withdrawn for many years from public life; indeed, only a comparatively small circle of surviving friends knew that he was still alive until yesterday. Eight years ago reference was made in the *Mercury* to the fact that the Astronomer Royal for Scotland had then written of the important and difficult researches of the deceased under the belief, then widespread, that Mr. Osburn was dead. Alluding at that time to Mr. Osburn's volume entitled the 'Monumental History of Egypt,' we wrote: "This work failed to take its proper position at the time of its publication, being both reviewed in a most unfriendly spirit by persons who ought to have sympathized in its author's object; and being unfortunate in its publisher, who became bankrupt while the work was in progress. Its detractors doubtless chuckled when Chevalier Bunsen, in his book on Egypt, discredited Mr. Osburn's views as 'of no value what ever.' Ten years more have elapsed, and within the last two

or three of them readers, both learned and unlearned, have been deeply interested by the publications of Professor Piazzi Symth on the Great Pyramid. References to our townsman's slighted work are scattered over 100 pages of this writer's latest volume; and they have not only the weight derivable from the name of the distinguished author, but something like the impartiality of a verdict of posterity, the learned writer being under the misconception that Mr. Osburn no longer lives." It is now due to Mr. Osburn's memory that some portion of this testimony to the importance and value of his labors and their results should be quoted, and we therefore make no apology for extracting the most noticeable passages concerning him from Vol. III of 'Life and Work at the Great Pyramid':—then

"The whole monumental conclusion, formed by combining the quarry marks of the Great Pyramid with whatever is to be trusted, or is tolerably agreed upon among Egyptologists, and both of them with our astronomical date of the building, can be no other than that two of the kings of the fourth dynasty of Egyptian history, Shofo and Nu-Shofo by name, lived through a period including the epoch of 2,170 B. C., when the pyramids were being built. Mr. Osburn, the one historian into the very middle of whose date and duration for the fourth dynasty of Egypt the epoch 2,170 B. C., falls, was only brought to our attention recently, and then by an accident; but, after having experienced something of the earnestness of his manner and thoroughness of his style of investigation, we procured one after another of his works, tracing thereby the growth of his knowledge of Egypt, her monuments, and both ancient and modern language, continually increasing through a long period of years, until it may be considered to culminate in his 'Monumental History of Egypt,' published in 1854.

His grand and abiding purpose appears to have been to ascertain if the unlocking of the written materials of Egypt, by Champollion's method of interpreting hireoglyphics would disclose any trace of the sojourning of the children of Israel in the Nile land, or anything bearing on the Bible records of early events transacted therein or connected therewith. 'Is it not marvellous that they can now read the old Egyptian readily,

and understand its grammar? These Egyptian discoveries are likely to be one of the greatest wonders of our age' had written the late Dr. Arnold; and William Osburn pressed forward in his younger life with a youthful enthusiasm which did not tire during 30 years of devotion to the task, in order to acquire this power of reading and of grammar, that it might be employed on the one chief object of his life. To prepare himself worthily, therefore, for his subject, he appears to have visited Egypt, made himself well acquainted with its physical features and climatic experiences, studied its measurements *in situ*, and copied hieroglyphics with his own hand, over and above the never ceasing task of making himself familiar with all the idiomatic particulars of the Coptic language, the extensions of hieroglyphic interpretation-methods, the works of modern hierologists, and remains of all authors of antiquity who have treated on Egypt.

Hence, while he is often going over the same ground as Gardner, Wilkinson, Rosellini or Lepsius, there is a difference in his manner. With him no dallying by the wayside, entranced by vivid details of private life in ancient times, or the skill of ancient workmen, or the aften intricate details of idol and animal worship; that is, for their own sakes, for he does not neglect such topics altogether, but keeps them in due subservience to his own grander objects of pursuit, and estimates their true value by the light of a more advanced civilization and a purer religion.

To trust no one of intervening time seems to be a notable principle with him; and, after sifting to the utmost all that has came down to us from Alexandrine Greeks, his principal labor begins with unravelling the tissue of fictitious history composed by the ancient Egyptian priests, and recorded by their despotic monarchs on the exteriors of their temples in a land of eternal slavery, where none dared openly contradict what was appointed to be inscribed.

For this remarkable purpose Mr. Osburn makes abundant use of the hieroglyphics found on private tombs sealed up in their own day, and only recently disclosed by excavations; but thereby in their turn unfolding for the first time the opposite side to

the official side of Eyptian history. And delightful is it to observe his astonishing facility in dealing with the hieroglyphic characters of every age, and in either large or small amount."

In other passages of his work, Professor Smyth claims an honorable position for the late Mr. Osburn amongst our philologists of reference, describing him as a man of peculiar talent, high resolve, noble purpose, and magnificent ideas of devotion in a good cause. During long years of solitary and unsympathized toil, the deceased labored in laying down a broader and more secure track over the morass of doubt and dark pits of oblivion which beset man's present knowledge of the affairs of the world as transacted from thousand years ago.

PERSONAL RECOLLECTIONS OF WILLIAM OSBURN, AUTHOR OF THE MONUMENTAL HISTORY OF EGYPT, BY WILLIAM HANSON, PHOTOGRAPHER, GREAT GEORGE STREET, LEEDS.

I was first introduced to Mr. Osburn in the year 1850, and the impression I then received of his personal appearance is that of a portly gentleman of middle height, with a genial expression of countenance, and a manner that was simplicity itself. My sphere in life has not brought me in contact with many persons of eminence, but I well remember speaking to one (Professor Owen) whose singular freedom from affectation, Mr. Osburn's manner much resembled. I never read "Pickwick" without being reminded of some of his *lighter* characteristics.

Mr. Osburn commissioned me to prepare the plans and illustrations for his 'Monumental History of Egypt,' and this work kept me in close communication with him for a long time, so that my first impression was well tested, and I am glad to be able to add that it did not change. After many years of intimate acquaintance he was still the same good natured, sincere, humble, *gentleman* I first saw.

Mr. Osburn looked forward with much hope to the publication of his "history," and often talked about future labors in Egypt, when he was to make fresh explorations and copy more inscriptions. But, alas! the very cold reception accorded to

the said "History" when it left the press, blighted all his hopes, while the catastrophic end of his much trusted former friend, Sir John Dean Paul, left him without further means to realize any of the plans he had conceived, indeed barely enough to live on. For sometime he bore up against the bitter disappointment, but, I am disposed to think that it proved fatal not only to his future Egyptological schemes but to his health and life eventually, his remaining years being passed first in illness and then in helplessness, suffering and neglect, till death put a period to all his troubles here, on Friday the 26th of February, 1875.

From the time of the preparation of his 'History' to the year 1864, I was a constant visitor at his lodgings, when he was not in York or Jersey; and the hours passed in his society are now among the most pleasant and improving of my recollections. His conversation was generally instructive and always interesting, never dull or common place. It was continually enlivened with wit, and frequently graced with fine imagery.

Mr. Osburn was perhaps more of a poet than a scientific philosopher. He seemed often to grasp a conclusion more as by inspiration than by patient labor, owing no doubt to the extreme quickness of his mental faculties, and his strong, animated, even vehement feelings. He had the bitterest hatred of Roman Catholicism, founded on the corrupt practices which he had witnessed at Rome and other places. He held through life steadily to the church of England, yet so liberally that he frequently attended the service at Queen Street Independent chapel during the ministry of the Rev. William Guest, a preacher whom he greatly appreciated and admired.

Mr. Osburn was quite lost to outward things when his mind was bent on any subject; and on one occasion, at the chapel just named, he so far forgot himself, that he attracted the particular notice of an old gentleman who occupied a pew behind him, by assenting to the sermon very freely with nods of his head, and other motions of the body, but which were sadly misunderstood, for the elderly gentleman referred to afterwards proved the pungency of the preacher's matter by telling a party of his friends that evening that it had made a

portly stranger in front of him sit very uncomfortably on his seat.

Mr. Osburn's spiritual life, during his terribly painful rheumatic afflictions was one often of great conflict and trial; but his faith in God's word was steadfast; and he was accustomed to say "great faith shall have great trials."

On one occasion I found him much distressed in mind, and he repeated that remarkable hymn of Newton's, beginning:

> "I asked the Lord that I might grow
> In faith, and love and every grace;
> Might more of his salvation know,
> And seek more earnestly His face."

Never shall I forget the deep, passionate earnestness in which he spoke the whole words of the hymn. His face was upturned, the tears rolled from his eyes, and his whole frame shook under the strain of his intense feeling. For the moment he was a sublime spectacle, but a very solemn one, for he was crippled at the time by his rheumatic sufferings to such an extent that his old age had become like that of St. Peter, his garments bound about him by unsympathizing hands, and himself led to places he did not desire.

On another occasion of somewhat less suffering, he read, from Milton's "Paradise Lost," the expulsion from the garden; but was so overcome that he could not finish the passage. I spoke to him of a bishop who was said to have committed the whole of this grand poem to memory, whereupon he replied: I do not doubt the statement, for if the first book of it were lost I could myself replace it from memory.

Another time I found him just finishing the perusal of Colenso on the Pentateuch. He closed the book and pushed it from him, saying with much vehemence—"I never was more convinced of the truth of this blessed book (the Bible)," and continuing, "Dr. Thompson's answer to Colenso is the best I have seen." About this time he read to me a short poem of his own, on "Simon the Cyrenian bearing the Cross," which greatly moved me.

Mr. Osburn was passionately fond of music, and he particularly admired the compositions of Mr. Bishop. Under the influence of music he used to pace the room and look very ab-

stracted. I think it acted as a stimulant to his thoughts.

Martin Luther found in him an enthusiastic admirer. He loved to read the "Table Talk," and delighted especially in its strong denunciation of the Popes. I should think that in temperament he much resembled the German reformer, at any rate he most cordially reciprocated Luther's detestation of shame and fraud in religion.

Among other things he so heartily hated was slavery. I never heard him speak on this subject without warmth. It moved his whole being to talk about the horrors of bondage. During the struggle between the Northern and Southern States of America he prayed night after night, when he could not sleep, that the former might prevail. So he expressly told me. He always spoke of Abraham Lincoln in terms of praise, and seemed to have a real affection for the good President's simple nature and honest purpose. Speaking of the slavery sometime *before* the war broke out, he said: "That is an account which will have to be settled in *red* ink."

As regards art, Mr. Osburn possessed a highly cultivated taste and sound judgment. He was exceedingly quick to appreciate merits or detect faults in a picture. He made no pretence of understanding the technicalities, but quickly recognized the higher qualities of art when they were present. The works of Raphael, Murills, Velasquez, Van Dyck, Sir Joshua Reynolds and Gainsborough (particularly the blue boy) afforded him much enjoyment. He spoke of John Ruskin as a "wonderful creature," and praised his "Stones of Venice" highly. Still I am disposed to think he loved the rude figures traced on the Monuments of Egypt, whenever he could trace their testimony to the truth of primeval history as given in the Bible, more than all these.

On one occasion he asked me to accompany him to hear the Rev. W. M. Punshon preach. When leaving the chapel, after the service was over, he ejaculated:

> "Weave a circle round him thrice,
> For he on honey-dew hath fed,
> And drunk the milk of Paradise."

Mr. Punshon is a heaven-born orator."

Mr. Osborn had no capacity for public speaking, though he came so near it as to dictate to an amanuensis the subject matter, or contents, of his subsequently most successful books.

In fact his only absolute failing through all his life, excepting those matters of science, mathametical, mechanical and natural, which he did not pretend to go into, was, his total want of business qualifications for the art of making money. A banker in our city once said of him: "He is a great man, but he cannot distinguish between a sovereign and a shilling." This failing of course was a very serious one in the eyes of a trading community like that of Leeds, and was a main cause why his real merits were known to so few.

These fragments may not be much in themselves, but they will serve to show the man as he appeared to me.

WILLIAM HANSON.

Leeds, Nov. 22, 1883.

LIVES WHICH LIVE.

A SERIES OF BIOGRAPHICAL REVIEWS, BY THE REV. TIMOTHY HARLEY, F. R. A. S. LONDON, I. SIR JOHN HERSCHEL.

As we have already published Rev. Charles Pritchard's memoir of Herschel, we will give here some of Mr. Harley's selections from Herschel's works. He says: "We are struck with the versatility of his genius, which, without the least indication of unsteadiness, could turn in various directions, obedient to the currents of truth. What Dr. Johnson wrote of Oliver Goldsmith may justly be applied to Herschel: 'He left nearly no style of writing untouched; and he touched nothing which he did not adorn'"

In a critique of No. 99 of the *Quarterly Review*, on the "Mechanism of the Heavens," after alluding to the possible effects of "other conceivable laws of central force" than the law of gravitation, he finely says, with the humility which marks the highest order of mind:—"We may please ourselves with such speculations, and enjoy the beauty and harmony of their

results, in the very same spirit with which we rejoice in the contemplation of an elegant geometrical truth, or a property of numbers, without presumptuously encroaching on the province of creative wisdom, which alone can judge of what is really in harmonious relation with its own designs. The stability of our actual system, however, rests on a basis far more refined, and far more curiously elaborate. It depends, as we have before observed, on no nice adjustments of quantity, speed, and distance. The masses of the planets, and the constants of their motions, might all be changed from what they are—within certain limits—yet the same tendency to self destruction in the *deviations* of the system from a mean state would still subsist. The actual forms of their orbits are not ellipses, but spirals of excessive intricacy, which never return into themselves; yet this intricacy has its laws, which distinguish it from confusion, and its limits, which preserve it from degenerating into anarchy. It is in this conservation of the principle of order in the midst of perplexity— in this ultimate compensation, brought about by the continual action of causes which appear at first sight pregnant only with subversion and decay—that we trace the master-workman with whom the darkness is even with the light."

In his presidential "Address to the British Association for the Advancement of Science," at Cambridge, in 1845, Sir John Herschel concluded with this beautiful peroration: "True science, like true religion, is wide-embracing in its extent and aim. Let interests divide the the worldly and jealousies torment the envious. We breathe, or long to breathe a purer empyrean. The common pursuit of truth is of itself a brotherhood. In these our annual meetings, to which every corner of Britain—almost every nation in Europe—sends forth as its representative some distinguished cultivator of some separate branch of knowledge; where, I would ask, in so vast a variety of pursuits which seem to have hardly anything in common, are we to look for that acknowledged source of delight which draws us together and inspires us with a sense of unity? That astronomers should congregate to talk of stars and planets—chemists, of atoms,—geologists of strata—is natural enough; but what is there of *equal* mutual interest, *equally* connected with

and *equally* pervading all they are engaged upon, which causes their hearts to burn within them for mutual communication and unbosoming? Surely, were each of us to give utterance to all he feels, we would hear the chemist, the astronomer, the physiologist, the electrician, the botanist, the geologist, all with one accord, and each in the language of his own science, declaring not only the wonderful works of God disclosed by it, but the delight which their disclosure affords him, and the privilege he feels it to be to have aided in it. This is, indeed, a magnificent induction— a consilience there is no refusing. It leads us to look onward, through the long vista of time, with chastened but confident assurance that science has still other and nobler work to do than any she has yet attempted; work which, before she is prepared to attempt, the minds of men must be prepared to *receive* the attempt—prepared, I mean, by an entire conviction of the wisdom of her views, the purity of her objects, and the faithfulness of her disciples."

Mr. Harley concludes his memoir with a selection from Herschel's poems. It is entitled

"MAN THE INTERPRETER OF NATURE."

Say! when the world was new and fresh from the hand of its Maker,
Ere the first modelled frame thrilled with the tremors of life,
Glowed not primeval suns as bright in yon canopied azure,
Day succeeding to day in the same rhythmical march;
Roseate morn, and the fervid noon, and the purple of evening—
Night with her starry robe solemnly sweeping the sky?
Heaved not ocean, as now, to the moon's mysterious impulse?
Lashed by the tempest's scourge, rose not its billows in wrath?
Sighed not the breeze through balmy groves, or o'er carpeted verdure
Gorgeous with myriad flowers, lingered and paused in its flight?
Yet what availed, alas! these glorious forms of creation—
Forms of transcendent might--Beauty with Majesty joined,
None to behold, and none to enjoy, and none to interpret?
Say, was the work wrought out? Say, was the Glory complete?
What could reflect, though dimly and faint, the ineffable purpose
Which, from chaotic powers, Order and Harmony drew?
What but the reasoning spirit, the thought and the faith and the feeling?
What, but the grateful sense, conscious of love and design?
Man sprang forth at the final behest. His intelligent worship
Filled up the void that was left. Nature at length had a soul.

*A SUCCINCT HISTORY OF THE INTRODUCTION AND ESTABLISHMENT OF THE DECIMAL SYSTEM IN FRANCE.

For centuries thinking men in European nations had been dissatisfied with the uncertain character of the units which formed the basis of the various scales of measure, and they desired to discover some invariable principle in nature suitable as a standard unit.

In 1658, the Dutch Astronomer, Huygens, published a work entitled, *Horologium Ascillatorium, Sive de Motu Pendulorum.* He recommended the length of the pendulum of a clock, vibrating seconds of mean time, as an *invariable* unit. This work came under the notice of the celebrated Picard, who zealously advocated the views of his contemporary; but, a short time before his decease, it was discovered that the length of the pendulum varied with the latitude. This discouraged the philosophers for nearly half a century till Cassini suggested that a unit derived from the magnitude of the earth would be more likely to prove invariable than any other. This hint of Cassini issued in the production of the metrical system; it aroused the attention of a French astronomer, M. Mouton, who flourished near the middle of the last century. He proposed that a *minute* of a degree of the meridian should be taken as the *superior* unit, from which all other measures should be derived, proceeding in a subdecuple series. To him belongs the honor of promulgating *the first idea of applying the decimal system to measures of quantity.*

M. De La Condamine, who had been employed in measuring a degree of the equator in Peru, revived the pendulum scheme; his aim was to make the length of this instrument a standard unit of quantity for the whole world, and he recommended the equator as a suitable position whence it might be taken. But

* Abridged from the 'Decimal System' by Jno. H. Felton.

Condamine died, and his scheme lay dormant for forty years. Talleyrand then brought the pendulum theory again before the world. He submitted it to the Constituent Assembly in the year 1790, and procured the appointment of a committee, consisting of Borda, Lagrange, Laplace, and others. They considered the pendulum deficient in those properties required in a perfect standard, and preferred taking a unit from the earth's magnitude. The report of this commission issued in the introduction of the decimal system. It recommended that the distance between the equator and the pole be divided into ten millions of equal parts, and that one of these parts form the length of what should be considered as the grand standard unit of quantity to be called the metre, from which, by decimal multiplication and division, all other quantities on the scale of length should be derived.

To M. M. Delambre & Machain was assigned the office of ascertaining, by actual measurement, the exact length of this important unit, the metre; and the ground chosen for the experiment was between Dunkirk and Barcelona, Delambre taking the northern part, Machain the southern. This great undertaking was projected just before the troubles of the revolution arose, and the seal and signature of the unfortunate Louis XVI. were appended to the instrument of appointment. The document, therefore, only invited persecution. The mathematicians were regarded by the country people with jealousy and suspicion. They were ill-lodged and worse treated. By some they were considered wizards, or lunatics; by others, emissaries of Satan; by all, enemies of mankind. Before their task was half executed they received intelligence from Paris that their names, and those of their associates, were struck off the commission by order of the ruling powers. But they took courage and proceeded on their own responsibility, trusting to the national sense of honor for reimbursement at some more favorable period. In this they were not disappointed.

But, although the tyrants at Paris abandoned the commissioners, they valued the object of their labors so highly that they lacked patience to allow time for its maturity. The Committee of Public Safety, acting under the influence of Robes-

pierre, attempted to effect the contemplated changes by means of a standard, which was afterwards known as the *provisional metre.*

Shortly after the reign of terror had spent itself, the commission was reconfirmed, the names of the mathematicians restored, and they were allowed to proceed with their labors under government patronage. The whole of these important operations were conducted under the general superintendence of numerous commissioners, members of the Institute, together with commissioners from Spain, Italy, Holland and Switzerland.

One singular fact connected with the history of the decimal system is, that two of its earliest supporters seem to have been the very antipodes of each other—we refer to Louis XVI. and Robespierre. The latter had been a zealous patron of the object of our history from its earliest promulgation, but no sooner had he attained a preponderating influence in the Committee of Public Safety than, to the surprise of all, he deprived of their office Delambre and his party. This arose from his deadly animosity to the power from which that committee had received their appointment. He had also observed that the people were favorably impressed with the enterprise, rather from the praises they had heard from his party than from any clear conceptions of their own. Nor had it escaped his notice that the common denominations of weights, measures and coins were in many ways associated with objects of royalty. He, therefore, determined to break up the metrical committee, to divest the language of all names offensively royal, and, at the same time, to gratify the people by the speedy introduction of the decimal system. His first movement—namely, that of directing a death blow at the Royal Committee, as it was derisively termed, was explained by his publicly declaring that he did not intend to forfeit the advantages of the new system, which, he stated, might be much more expeditiously obtained without than with the assistance of the metrical committee. He knew, also, that with a people fond of novelty everything must be done in hot haste; and, since neither time nor money could be spared for geodetic operations, he decided upon hazarding

another stake for popularity by taking a metre of his own devising.

The length of this precocious product of expediency was calculated from data furnished by Lacaille, who, in the year 1758, had computed a degree of the meridian in 45° latitude to comprise 57027 toises.

This took place at the commencement of the reign of terror, when Robespierre, Couthon, and St. Just held a kind of blood-stained triumvirate in the Committee of Public Safety, and used the other members chiefly as instruments to lend a sanction to their diabolical proceedings; and this committee, in their turn, governed the convention. There was, therefore, no difficulty in the introduction of a temporary metre until a more convenient period, when, as was promised, a correct one should be obtained by actual measurement. A decree to this effect was hastily prepared, but a part of its provisions were considered ineligible, until modified by a succeeding one; after which it was finally adopted, and became law on the 18th Germinal (March) A. D., 1794.

The metre, of course, was the grand unit of quantity, from which the units of weight and measure of capacity were to be derived. The nomenclature of this scheme differed from the one now used, by not admitting the denary mnltiples of the various units, but only the submultiples *deci* and *centi*. To supply these omissions, several denominations in each class of measures were used.

This project may literally be said to have been baptized with blood. The law which gave it a being was enacted at the commencement of the "Reign of Terror," but it cannot be said to have been placed in operation until after the conclusion of that horrible era. During that period the country was in a state of commotion that defies description. Nearly every province had its Robespierre, above the whole of whom Carrier, of water-marriage noteriety, held a distinguished pre-eminence as being the most extensive slaughterer of his race. The awful tragedies closed with the sudden removal of the principal actor and his associates from the stage of time, by the same machine which they had so liberally employed for the destruction of others.

One of the most active, influential and zealous friends of the cause was La Reveillere Lepeaux, well known in France by the first part of his name, and abroad by the last. He was a zealous Girondist, and formed one of the party that suffered banishment on the ascendency of their political enemies, the "Mountain." After the execution of Robespierre, Lepeaux returned to Paris, and was permitted to resume his seat in the convention where he arranged himself on the side of the moderate party. Here he labored hard in advocating an improved decimal system. He soon procured a decree for its introduction, which, however, was not put into operation until he was advanced to a higher post of political power.

The provisional government gave place to one in whose creation they had been chiefly instrumental. This formed the third constitution, and was better known as the "executive directory." The leading power was vested in five directors, of whom Lepeaux was one. He seems to have owed his elevation to his fame for learning, and the prominent position he took in promoting the advancment of the new decimal plan; he was, also, one of the few survivors of the preceding massacre, who had taken a part in the condemnation of the late king. His character was a singular compound of philosophy, fanaticism, and infidelity; the chief powers of his mind were concentrated in an attempt to effect two objects: the establishment of a new decimal system, and a new system of religion. The latter he intended to found on the ruins of Christianity. This system seemed to unite two extremes; for while he ridiculed the Bible, he admitted, admired, and taught absurdities that would have sparkled in the pages of a jest book. His speeches were wafted across the English channel, and proved an acceptable condiment in the banquets of those who assembled nightly to read, and to hear read, the wisdom of Paine. Such was the man who figured as the leading promoter of the second decimal project in France.

The executive directory assumed their full powers in the autumn of 1795. Parisians had begun to respire, and trade and commerce to assume something like their former appearance when the new decimal plan was brought into operation. It was

thought a fortunate circumstance that Lepeaux's exaltation took place at that critical juncture, but this coincidence seems to us rather problematical

Article 2 of the decree which received the sanction of the convention, and became law at the above named period, says, "There shall be but one standard of weights and measures. It shall be a rod of platina, on which the metre, the fundamental unit of the whole system of measures shall be traced."

Article 5 defines the metre. "Metre, the measure of length, equal to the 10,000,000th part of the arc of the terrestrial meridian, contained between the North Pole and the equator."

Lepeaux and his coadjutors also attempted to reform the calendar, giving 30 days each to the 12 months of the year, and altering the names of the months. The 5 days of excess were to be celebrated as holidays. The days of the months were to be divided into decades; every *10th day* was to be considered the Sabbath, in accordance with Lepeaux's "Theophilanthropy," and no other Sabbath was to be publicly sanctioned. The hours of the day and the minutes of the hour, together with all shorter periods of time, were to be arranged in a descending subdecuple series. Such was the law. Many parts of this absurd article of the decree have been subsequently repealed.

Lepeaux's admiration of the decimal system assumed the form of a mania that required all numeral objects to be considered in the order of *tens*. The day soon arrived for the introduction of the new system, but, alas for rulers, projectors, and people, the manner of *placing it in practical operation* had either been overlooked, or too faintly regarded. No public instructions had been issued that were available to the wants of the people. The early patrons of the new system had swept away all the old standards, and it was now seen, and felt too, that *no single term on the new scales found a corresponding quantity on the old tables*. Even the metre, described a quantity totally unintelligible to the people. They had supposed that this new system would, by a kind of magical process, convert confusion into order, and establish uniformity from one end of the nation to the other. But when the whole scheme, with its strange names undetermined quantities, and provokingly inconvenient magni-

tudes was fairly placed before them, it was so widely different from everything they had looked for, that their extreme disappointment found vent in unmistakable sallies of indignation. The retailers and small purchasers felt the greatest degree of annoyance. They were unable to carry the law into effect, from sheer inability to calculate the required equivalents. Thus the buyer found himself at the mercy of the seller, and every trivial sale was attended with a sharp contest; respecting the rights of *meum* and *tuum*. Every purchase partook of the character of a speculation. This, combined with the confusion and perplexity produced by the oversight which we have named, was sufficient of itself to have ruined any project even if contrived with the genius of a Euclid. But there was something beyond this. The new quantities *when determined* were to be called by *new names*. The prefixes of the terms denoting multiplication were derived from the Greek, and those denoting division from Latin. But the French peasant knew nothing of Greek or Latin, and the whole plan was as unintelligible to him, as if the names had that day been imported from China. He was continually con founding *deci* with *deca*, *hecto* with *kilo*, and *myriagramme* with *millegramme*. Besides this he could never remember their *order*.

Another cause of complaint appeared, which, though not so perplexing as the former two, yet must surpass both in duration. We mean the *inconvenient magnitude* of the quantities proposed, in lieu of those they were designed to supersede. This blemish is not very conspicuous to the geueral observer, from being felt almost exclusively by those who are daily employed in manipulating weights and measures; but to them it now proves and ever will prove, a perpetual discomfort.

During the revolutionary storm, 300,000 keepers of retail stores were incarcerated, their property confiscated, and their prospects ruined. Trade and traffic were regarded as ignoble pursuits, while "the pride, pomp and circumstance of glorious war," were, with all classes on a worshipful eminence. But the small dealers were not the only persons embarrassed; every individual of the great public, that is, every buyer as well as every seller, was compelled to endure some portion of the

general grievance. In a short time the general tide of metropolitan murmurs received a large accession from the rural districts, until its accumulated force threatened the very existence of the government. Barrass and his associates in power, at length aroused from their dreams of future prosperity, by the clamors of the populace, felt that they could no longer remain quiescent spectators of this grand working of events in Lepeaux's department. But what could they do? Some feeble attempts were made by means of public instructions, yet all such were found to be of no avail so long as the new denominations remained unaltered. The directors were in the position of children, who, having set a complicated and powerful piece of machinery in motion, were standing mute with wonder and affright from a conscious sense of their inability to stop its progress or control its motions.

Another cause of the unpopularity of the decimal system at that time, is found in the manner in which it was associated in the minds of the people, with Lepeaux's ridiculous "Theophilanthropy." Perhaps the most unfortunate event in the catalogue of mischances that attended the introduction of this reform, was that of making it subservient to the purpose of infidelity by abolishing the Christian Sabbath. This impious innovation originated with Robespierre, and not with Lepeaux, as it is generally supposed. He of the guillotine introduced the denary Sabbath into France, by appointing one day in ten, according to his system of divinity, for the religious consideration of some one of the virtues, as truth, justice, and the like, What fellowship he had with these virtues it is difficult to imagine.

However, this sacrilegious use of the system to perpetuate a continued breach of the decalogue, placed every Christian in direct antagonism to its advancement; and although the prevalence of infidelity in that age is a melancholy fact, yet the whole nation was not entirely submerged by that wide-sweeping whirlpool. Shortly after the excitement caused by the late cruel dynasty had subsided, we find 500 priests in Paris, and Lepeaux persecuting them in hot indignation for ridiculing his religious amusements. It is a notorious fact that this new

calendar, with its decimal Sabbath, as it was called, fixed upon the decimal system a stigma that is scarcely yet removed. At that period every man whose religion was anything beyond nominal, felt himself bound to oppose it upon principle. An open attack had been made upon the religious feelings of the whole nation, and those who continued indifferent to the result must have felt condemned as traitors to their God, and not many degrees better than the Judas-like characters, who, in order to trade with the crescent, trampled upon the cross.

At this juncture the directory were informed that the commissioners first appointed to ascertain the length of the metre, were proceeding with their labors. This intelligence was at first received with astonishment, mingled with displeasure arising from a feeling of rivalry. The provisional metre was, on its introduction, publicly announced as being nothing more than a substitute for one that would, at some future period, be obtained by actual measurement. But, certainly, nothing was more foreign to the intention of all concerned in the directory than to connect themselves. in any way, with the "royal metre," as it was contemptuously called. Yet now, the directors, trembling for their places, and, probably, for their lives also, were glad to avail themselves of any expedient to divert the torrent of indignation which threatened to overwhelm them. Two out of the five had given place to others, but Lepeaux still held the reins of government, though with an unsteady hand. Talleyrand had recently joined their councils, and obtained their utmost confidence. He wisely recommended them to cast oil upon the tronbled waters by patronizing the metrical committee. To him this very committee owed its existence, and he had no connection with Robespierre's abortive attempt to effect its destruction. Accordingly Delambre's friends were courted, a new decree was issued in favor of his committee, and they were encouraged to proceed with their labors. It then became the fashion to sound forth the sterling merits of the legitimate metre; its presumed mathematical accuracy was applauded; the people were assured that the old names of quantity should be restored, and an entirely new system ar-

ranged; and the scheme was entitled "a grand expression of national talent."

On their entry into Paris, the metrical committee were received with public expressions of courtesy and respect. Their report was presented on the 10th Prairial, A. D., 1798, and was received with unbounded applause. A new material metre and kilogramme were constructed on truly scientific principles, and presented with a pompous address to the two councils of the legislature; and these prototypes were ultimately deposited among the national archives, where they are still preserved with little less than religious veneration.

Borda was directed to ascertain, with scrupulous care, the exact length of the seconds' pendulum at Paris, for the purpose of establishing that of the metre, thus to facilitate its recovery in case of loss or accident. The absurd article of the previous decree, relative to the decimal division of time, was repealed, except the denary Sabbath, which Lepeaux still managed to preserve.

This committee also introduced the decimal division of the *quadrant*, but that achievement procured for them more compliments than sterling credit. The decimal system when applied to proper objects prevents perplexity, *but the circle is not of their number.* It is already provided with a mensuration suitable to its peculiar denary proportions, and one which admits of no improvement.

On 13th Brumaire, A. D., 1798, the legislature acknowledged the metre and kilogramme, recently presented, as the legal criterions of the measures of weight and capacity for the whole of France, to the exclusion of all others; at the same time admitting the names proposed by the earliest committee, but leaving the decimal divisions of the metre and its units undisturbed. The list of denominations now permitted, consisted partly of names in general use before the revolution, with a mixture of others known only in particular localities. The well known sounds of the old names awoke former associations, and seemed like the voices of old friends; but this drop of comfort was sadly embittered when it was discovered that these names were to be matched with the former decimal quantities. *Nor was*

this new measure rendered more palatable from being concluded with a threat of compulsion.

After the novelty and excitement attending the introduction of the amended plan had subsided, its popularity ceased; and, in spite of the long tables of equations, and all other "appliances and means to boot," the calculations of value and quantity in the retail department of trade, still continued to be impracticable to many, perplexing to most, and odious to all. Instances of the people taking "French leave" to match the old names with the old quantities in their bargains, need excite no surprise when we reflect that it would be more likely for buyers and sellers to prefer to transact business by a system well understood by both, than by one that was intelligible to neither.

This third essay to introduce the decimal system was regarded by Lepeaux with feelings of displeasure, since it implied the superseding of his own well ordered nomenclature by another that was remarkably clumsy; yet he turned it to some account, since it furnished him with a pretext to prosecute those Christions that fell within the meshes of the law, and we bear record that he availed himself of this chance to the fullest extent of his power. He had formerly secured the attention of the multitude to his theological whimsicalities, through the imposing character of pompous exhibitions, seconded by his own oratory; but, these things having lost the lustre of novelty, were fast sinking in public esteem. He experienced another mortification from the decline of his popularity in the national councils. All these misfortunes he attributed to sacerdotal influence. At last, opposed by all parties and at all points, he threw up in disgust an office of considerable power, after having held it for nearly four years.

All parties were now sick of the decimal system; the legislature in making and repairing laws, and the people in observing those already enacted and the contagion continued to spread until it assumed the type of a confirmed epidemic. As to the project itself, notwithstanding the royalty of its origin, it was now in a pitiable condition. Clothed in the ragged garments of infidelity, deserted by its legislative protectors, opposed by the

craft of the politician, the zeal of the priesthood and the thick-skulled fury of the ignorant, it still, nevertheless, struggled on, maintaining a dubious and somewhat occult existence, until the memorable period of the invasion of Russia by the armies of France.

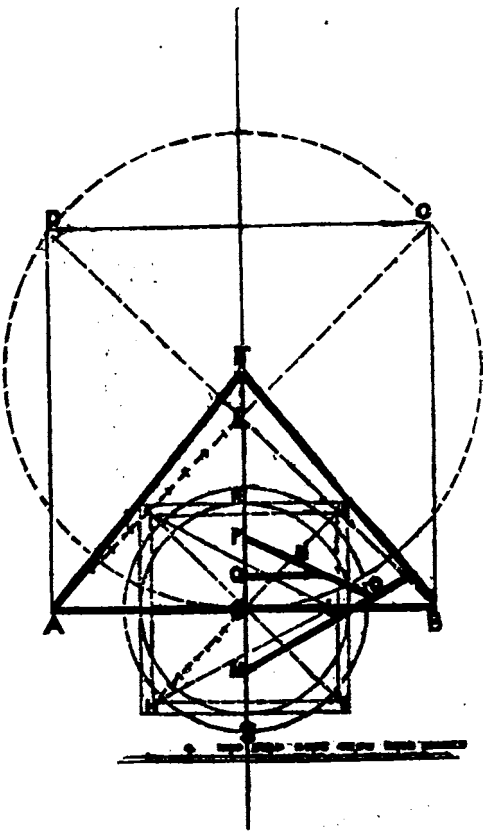
The legislature of that day made a decree, granting the use of the ancient terminology in connection with the metrical standard units, on condition that the word *usuel* be added to each, whenever such names are expressed. Thus the *toise usuel* described two metres; the *livre usuel* equalled half a kilogramme, and so on for others. But the most striking article in this decree is that which directs that these units shall *not be divided decimally* but in *duodenary* order, that is, into halves, thirds, quarters and eighths.

This act of surrender on the part of the ruling powers, may be regarded as the total abandonment of the decimal principle, as far as they were concerned; we find that France had then gained little beyond the *metre*, and the experience resulting from a series of troubles, from the first day that Delambre's committee left Paris on their geodesical enterprise to the date of this decree, A. D. 1812, a space of time numbering just 21 years. How easy it is now to perceive that the Parisians might have obtained a suitable standard without the assistance of any committee. We mean their *toise*—a measure with which all Frenchman were acquainted. Besides, the act of taking the exact length of the pendulum for the purpose of preserving that of the metre, invests the rod of motion with the dignity of the ultimate criterion. Hence, the pendulum after all becomes the *principal standard.*

The sticklers for the decimal system, brought the decimal and the duodecimal scales into collision; for the new ounce and its divisions on the *usuel* scheme were so widely different from the *gramme* and its decuples, that the proportions could not be ascertained without a troublesome calculation. Perplexities and embarrassments pervaded the whole community. Artificers, in order to accommodate their various patrons, found it needful for the purposes of measurement, to be provided with a prism, having the divisions of the "*foot royal*" delineated on one side,

the *centimetres* and *millimetres* of the decimal school on another and the quantities *usuel* on the third. These annoyances were not confined to the marts of commerce, they were also felt in pharmacy, for no dependence could be placed upon the manner of preparing medical prescriptions; and all things conspired to make it appear as if the confusion of Babel had met with a modern parallel; all confidence in "men and measures" having given up the ghost!

In order to still the tumult, the government, then under the dynasty of the Bourbons, interposed the weight of its influence with the view, it is believed, of entirely submerging the decimal principle as regards quantity. But this very movement seemed to call forth more friends to the cause which it was designed to crush, than it was ever supposed to have possessed. Whether this accession of support was due to political motives, or, whether it was instigated by the published animadversions on the decimal plan made by foreigners visiting France, it is hard to determine; but while it protracted the convulsed state of society, it aroused the system from that condition of suspended animation in which alone it could be said to have existed. The friends of the decimal principle availed themselves of these circumstances to strengthen their ranks, and exerted themselves right earnestly to secure quietude and convenience by the establishment of the complete decimal system of 1795. The spirit of the age was more favorable. The dealers were harassed with the vexations we have described, and a reaction was evidently produced, so the legislature, plied hard by the friends of the principle, took advantage of the popular movement, and passed the last decree in favor of the decimal system, A. D. 1837. This law made the original plan and the present nomenclature compulsory throughout the whole extent of France. after the first day of the year 1840. The space of nearly three years was allowed for the public to become acquainted with the names of the quantities and the demands of the decree, which it was understood would be rigorously enforced. This law has been observed. At first some reluctance was manifested by the lowest class, which caused the legislature a little trouble, but the people of France are at length in possession of their decimal, or metrical system after forty-five years of toil and disquietude.



PYRAMIDAL FREEMASONRY.

BEING A SERIES OF ANNOTATIONS ON THE ORIGIN OR ARCHETYPE OF FREEMASONRY DISTINGUISHED AT THE BUILDING OF THE GREAT PYRAMID IN THE LAND OF EGYPT, 2170 YEARS BEFORE THE PRESENT DISPENSATION. READ BY THE SECRETARY BEFORE THE OFFICERS AND BRETHREN OF THE ST. AMBROSE LODGE, NO. 1891, HELD AT BARON'S COURT HOTEL, WEST KENSINGTON.

Before closing these essays I wish to add substantial proof, and endeavor to show what a grand delineation of magnitude and extension there is displayed, geometrically, in this Pyramid of Gizeh, in the land of Egypt. Our Masonic ceremony, speaking of geometry, says: "By it we may discover how the planets move in their different orbits, and mathematically demonstrate their various revolutions. By it we can, rationally, account for the return of seasons, and the beautiful and mixed variety of scenes which each season displays to the discerning eye. Numberless worlds are around us, all formed by the same Divine artist, which roll through this vast expanse, and are all conducted by the same unerring law of Nature. Then, while such objects engage our attention, how ought we to improve, and with what grand ideas ought such knowledge to fill our minds? A survey of nature, and an observation of her beautiful proportions, first induced man to study symmetry and order. This gave rise to societies, and birth of every useful art. The architect began to design, and the plans which he laid down having been improved by time and experience, have produced those stupendous works of art which have been the admiration of every age."

We may, therefore, consider geometry is the most important part in the original design, collectively with the cosmic relation of the universe, in framing this most noble pile of stone masonry we have been, theoretically, exploring on paper, without the fatiguing journeys to or from, and coping with sand drifts and other annoyances from the Arabs and their plunderings.

I intend by this diagram to show, by plain geometry, how this Pyramid was set out or planned by the Grand Geometrician of the Universe, by unerring lines; but those lines in true conformity with the vast ethereal expanse of worlds, and governed by the same geometric laws; lineal measure being also determined by these laws—the cubit of 25.025 and unit of 1 inch being the fixed standards. Colossal as our structure is, it is an atom only in space, yet situated and so built as to form a miniature world, proved by its mathematical correctness.

We will follow through the application of principles adopted in first laying down the plan of the building. We have advantages our ancient forefathers did not possess, except to very limited proportions. All knowledge was transmitted orally. or by illustration; not so now, for we have the advantages of printed matter, and other resources, to guide our pursuits in geodesic knowledge. The first operation being to lay level a hard rocky surface of fourteen or fifteen acres, and set out the four sides correctly with the cardinal points (any size would have answered according to the principle laid down), but there was design of great skill and ability to fix the base side lengths A, B, C, D, each side delineating the 365¼ days of the solar year; this correctly accomplished, a line was drawn from corner to corner diagonally each way, crossing each other at E, the sum of which in the fixed unit of inches denotes the slow precession of the equinoxes, 25,827 years. Then from the centre, E, divide one of the semi-diagonals, say from E to A, into ten equal parts, and take nine of these parts for the height of the Pyramid, F. (This $\frac{9}{10}$ of the

half diagonal, or $\frac{8}{20}$ of the whole diagonal, of square base being the key, and the only key required to unravel all the slopes, inside and out, in a constructive point of view; in short, it solves the whole construction in its simple geometric details).

In the next place, describe a circle with F as a centre, the circumference of which will be equal to the four sides of the square base. A, B, C, D, with unerring exactness,—the outline of the Pyramid being thus duly formed at its proper angle, 51°,51′,14.8″. We shall see, as we proceed, how each part is based on the true principle of plain and practical geometry. Following on we will next proceed with the inside passages, continuing the same adaptability of lines and superficies; in this instance beginning with a circle in place of a square, dividing the height of the Pyramid into two equal parts, F, G.—describe a circle with this half height, having the point G on the base line for its centre. Divide into four the radius of this circle, to form the square whose four sides equal the circumference, and whose diagonal lines thus divided are parallel with the former diagonals of square base, and, crossing at G, divide one of these lines from the point G to H into nine equal parts, add one of these parts to each diagonal line outside of circle at H, I, J, K, and from each of these points draw straight lines forming the desired square. The two upper angles of this square at J, K, intersect with, and bisect the semi-diagonals of the base between A, E, and B, E, of the first formed square. This would again prove the correctness on which the geometrical problem rests, and also proves the mathematical precision of the Great Designer when constructing the work. But, to proceed; from the lower corner of this square at H, draw the hypothenuse from H to L, and also from the upper corner from K to L (dotted lines), thus forming the true angle of inclination or slope, 26°18′ of the ascending and descending passages. To determine the position of these passages according to this angle of inclination, for the descending passage, bisect the lower half of circle from G to S at M, and draw the line parallel with H, L, extending to the outer casing of Pyramid, from the central axis; to form, or determine the position of floor-line of first ascending passage and grand gallery, bisect the diagonal line from G to J at N, and parallel with K, L, draw the line P, O, from central axis at P, and intersecting on descending passage line at O, thus completing the true angle of inclination and position. Also, for lengths, for the passage way to queen's chamber; divide equally in t wo parts the height, between P and G, on vertical line at Q, from which point draw a line parallel with base of Pyramid, intersecting the ascending passage floor-line, truly correct in position on th at line, to form the requisite lengths of grand gallery, and the passage way to it, with marvellous exactness, when compared with our great measurer, Piazzi Smyth, in his work, 'Our Inheritance in the Great Pyramid.' This last completes the passages as far as we know.

Having these passages and angles correctly and geometrically set in position, I may add they define and lead up to a positive problem, only defined, as far as my limited observation has extended, in this our gigantic pile of masonry, and that at an age when, as some of our scientists would assert, few but barbarians existed. But to return to the poin t where we left off; on the central vertical line we divided the distance between P and G at Q; now, if we turn over the compasses to a third point, at R, we have Q, P, R; on this point R is the top line of the square of Piazzi Smyth's diagram, which square, in area, equals the area of the circle, having G for its centre, or the half height of the Pyramid; and if we describe a circle from the same centre, inside this last square (both the circle and square, in my diagram, are in red dotted lines), this circle will equal, in area, the square I obtain for the inclination or slope of the passages, and I think I may be bold enough to assert if these lines are truthfully drawn they will bear me out in my working of this problem, and I have yet to learn where the geometrical lines are to be found outside of the Pyramid and its mathematical proportions. Here we have the area of a circle equal to a given square, and the area of a square equal to a given circle, both worked out by square and compass, like other geometrical problems.

My strong opinion is, that on this line R, where a direct double significance is attached, with a point in geometry, there will be found the locality of a double set of chambers, and the starting-point will be the ante-chamber on both sides. It is only repeating what is on the story below, if we may make use of so familiar a term to express so great a scheme of construction.

As many of my readers can and will try the application of these lines, and those having space, would adapt that space to draw it out on a large scale; and, furthermore, to prove the correctness of the result of their endeavors, I will, for the uninitiated, give directions so to form a scale of inches to any size square, so that the truth of the whole may be tested. As the base side length, taken from Piazzi Smyth, is 9131.05 P. I., divide one side of your square, or the base of the Pyramid, into nine equal parts, leaving a residual of $100\frac{31}{100}$, or what would make a little less than an ⅛ of one of those 9ths, then each of these 9ths would represent 1000 inches, so that you would have nine of these 1000ths, which, together with the residual, would be 9131 inches; thus you may, on a straight line, dot off some five or six of these parts, and divide one into ten parts for 100ths; thus you have a scale, for all practical purposes as close as any scale can be for so vast a building; and, if the diagram be correctly squared, and the angles correctly formed, according to the diagram in connection with this paper, the results will be in close proximity to the illustrations of Piazzi Smyth.

Thus the whole of the passages are determined by plain and simple geometry, independent of its mathematical results and great astronomical delineations; it is one gigantic pile of wonderful construction, not of necessity requiring any given measure, or set of figures, after the first setting out of its basal plain. Geometrically, any size would produce the same angles and slopes; but it requires the starting figures of cosmic commensurability to produce the great equations and mathematical results set forth by Professor Piazzi Smyth's work, 'Our Inheritance in the Great Pyramid.' And, there is little doubt, as far as my comprehension of the practical theory of construction is concerned, that if a space could be found sufficiently large to set out the base of the Pyramid, to prove these lines, to a scale of a sixteenth its full size, or about 48 feet for the base length, requiring a room or floor of about 50 or 60 feet broad by 100 feet long—under such conditions it is very probable these lengths could be tested with some degree of certainty, and so establish this problem in geometry as fulfilling the facts and figures so far known. At the present time many arguments are alleged for the different discrepancies in actual measurement, and not a few are the opinions put forth to account for these discrepancies by very logical arguments—one by a gentleman, Dr. Wood, of the United States, who argues that the excessive rays from a vertical sun for some 4000 years has caused the whole structure to warp, more particularly the south side, being more exposed,—and I am inclined to endorse that opinion, from what has come under my own observation under a tropical sun. Some attribute the cracks and kind of fissures now discernible to volcanic disturbances, and some to a settlement, but the many ages it has been acted on by the sun is the most practical theory. Under all these circumstances, if my lines are not so minutely correct, the practical working with the positive geometrical following on of the lines, and the results attained and demonstrated, are very remarkable.

I believe there is much more yet to be developed in this grand and noble pile of scientific skill and ability. The discerning eye and the practical man can now see by its construction what was intended by the Great Architect to be removed without disfigurement, so that in after ages the same may be said and applied to the top end of the grand gallery as is now said of the bottom end; that is to say, at some time or other certain stones were removed which disclosed the queen's chamber and passage-way, and the almost perpendicular shaft once covered by the ramp stone; but doubtless the whole, both before its removal and since, had its significance and meaning; and I contend this geometric development places these other chambers in position.

Now, brethren, to bring this vast matter of our ancient pedigree to a close, I would impress on you the dignity of our order, and proud, indeed, ought we to be as Freemasons to have the distinctive honor to be quoted as a fraternity emanating from so vast a seat of learning. Not, as I said in the outset of these annotations, would I detract one jot or tittle from the regal splendor of King Solomon's Temple, but rather add to its lustre by showing what wisdom and learning had preceded that historic time, and with the great wisdom with which King Solomon was endowed, and the resources at his command, those scattered elements of learning could be so collected, appropriated and concentrated on the Temple that nothing in this world could surpass it.

It is a grand pinnacle, my brethren, to exalt ourselves upon, and if those among us of a lethargic temperament can be induced to raise themselves to think more highly of the dignified status we have always held and been the custodians of, I again say, if I can actuate those of my brethren who think harshly of our ceremonies to investigate their precepts and teaching, and see the vast field we cultivate for wisdom and learning, then wil my hopes be realized and the object of these annotations or essays be gained, for verily the Grand Geometrician of the Universe has not brought us along in history, and preserved our traditions for so many ages, that we should be despised and set down as babblers and heretics. I maintain that Freemasonry has achieved some of the most gigantic, and raised some of the most stupendous edifices on the face of this earth, and by the guidance of our Divine Creator there is much yet to be accomplished to fulfil our "allotted task." Freemasonry is inseparably bound up with the volume of the Sacred Law; on it our foundation rests, yet of itself Freemasonry is not a religion. It disseminates light like the sun, but while that great luminary lights but one half the globe at one and the same time, Masonry, with its effulgence, lights the entire universe and sends its rays of healing, consolation and good cheer, dispelling ignorance, superstition and error. To practice all the Masonic virtues would be attaining to a very high state of perfection, but it is not the regeneration of the heart by the Holy Spirit, nor does any of our ritual preach any such doctrine. "With the exception of Christianity, I know of no other institution in which benevolence so pure, and philanthropy so disinterested, are taught in obedience to the command of God; nor where, but in the volume of the Sacred Law, the social and moral duties are enforced by such awful sanctions as in the Lodges of the Brotherhood!" Who can thoroughly understand the moral mysteries, as well as those of art and science, which our legends unfold, and who has so laudable and high ambition to participate in the exalted sphere, with congenial associates, in that subtle communion and fraternization which genuine 'Sublime Freemasonry' is peculiarly calculated to afford." So mote it be.

GLIMPSES OF OUR CELTIC ANCESTORS BY EDWIN WILMSHURST RETFORT, NOTTS, ENGLAND.

INTRODUCTION.

As the following articles were written for publication in the *Banner of Israel*, a periodical advocating the theory that the British people are the ten tribes of the lost "House of Israel," it is necessary to explain that the writer has inferred that the Celtic tribes, whom the Romans found in possession of Britain, were descendants of Asiatic emigrants and of Hebrew descent.

Professor Rawlinson says that the Celts, who were the first people who arrived in Europe *from Asia, their birth-place*, pushed out the sons of Japheth, and, also, that a people known as Cimmerii, or Cimri, attained to power in Western Asia and Eastern Europe between B C 800-600.

From the "cities of the Medes," near the Caspian Sea (See II. Kings, xvii., 6), they migrated, and escaped over the Caucasus to the *Crimea*, thence to the *Cimmerian Land* of Herodotus, where now, in Wallachia the River Sereth runs into the Pruth. Pressed on by their kindred, the Scythian Sacai, the Cymry, or Cimmerii, migrated further to the *Cimbric* Chersonese (Jutland), from whence, always followed by the Saxons, they arrived in Britain, occupying the east and south coasts till the Romans, and afterwards the Saxons, pushed them to their present locations in Cumberland (*Cymry-land*) and *Cymria*, or Cambria, now Wales.

But the Sacæ, shown to be of the same ethnic stock as the Cimmerii, Cimri, or Cymry, also came into Europe *from Asia*, where they had seized the most fertile province of Media, called from them *Sakasina*. Strabo mentions the 8th, and Herodotus the 7th century B. C. as the period of the first appearance of these Scythic tribes, the ancestors of the British race; and the 8th century B. C. was just the time when the kingdom, or "House of Israel" (as apart from the *Jews*), were deported to the cities of the Medes. Herodotus states that Media was *not* the cradle of the race of the Sacæ.

Moreover, the Danes and Normans, who followed them to Britain, were of the same original stock as the Sacæ and the Cymry, and we are driven to the conclusion that the Cimmerii were a branch of the Sacæ, that the Sacæ were kinsmen of the Danes, Jutes and Normans, and that *all* came from the identical part of Asia (Media) to which the ten tribes were carried and scattered by their Assyrian conquerors, as recorded in Hebrew chronicles, in one of the latest of which, written just before the captivity, they are called (Amos, vii., 16) the "House of Isaac," whence Sakai-Suna, or Sons of Sakai—abreviated Saxons—"In *Isaac* shall thy seed be called."

PART I.

Before we approach the subject of the identity of the Britons with one fold of the lost sheep of the House of Israel, we must reject the popular delusion that the Cymry bore the same relation to the civilized Romans as the Australians. Maoris, or Red Indians, bear to the English. The nomadic tribes who came west across Europe from Asia were not aboriginal (Japhetic) savages, but rather enterprising backwoodsmen, rough and hardy pioneers, who, for various causes, had left the teeming lands of Western Asia.

If a far future generation discovers in North America steel-polled axes of the best Sheffield make, they will probably argue that the first wave of Europeans came there with the

implements extant in their age; and the presence of implements of bronze (the production of civilized man) found in every part of Britain, and the fact that our ancestors used war chariots similar to those used by the civilized nations of Asia is an evidence that the British Celts, with whom the Romans came in contact, were survivals of colonies of civilized Asiatics of an age long antecedent to the Romans themselves.

The fact that Christianity was preached and received by them in the age of the Apostles shows that importance was attached to their conversion, and a passage from St. Paul's Second Epistle to Timothy calls attention to incidents interesting to Anglo-Israelites. "Eubulus greeteth thee, and Pudens and Linus and Claudia." Where now stands Chichester, the capital city, for the last 1,400 years, of South Saxons (Sussex) stood, in the first centuries of our era, the Celtic capital of the Regni (the opposite part of Britain to Gaul), which was, by Aulus Plautius, reduced into a Roman colony, and while a "colonia" of veterans was quartered there, the historian Tacitus records: "A few States were given to the British chief Cogidunus, whom I, even, remember, a faithful ally to the Romans." To the present day, the Roman rectangular camp, which may be traced in the present configuration of the city, exists within sight of the Celtic circular stronghold, which crowns the summit of the "Trundle," the highest elevation of the surrounding downs.

It was the policy of the Roman Emperors to adopt into their families, or "gens," distinguished chiefs of subject nations, and there is little doubt but that Claudius Cæsar gave his name and protection to the British king, henceforth "Tib. Claudius Cogidunus," the females of whose house would hence be all "Claudias."

The Roman family of Pudentinus was of the highest senatorial rank; and, in the army of Plautius, it is believed his son commanded a cohort stationed at Regnum (now Chichester.

About A. D. 67, the epigrams of the poet Martial were all the rage in Rome, and from them we extract the following:—

O, Rufus, my friend Pudens marries the foreigner Claudia;
O, Hymen, be propittious with thy nuptial torch.

Elegantly rendered by Professor Plumptre,—

Claudia, the fair one from a foreign shore,
Is with my Pudens bound in wedlock's band.

And in a later epigram, when children had blessed the union, the poet continues,—

Since Claudia Rufina has sprung from the azure Britons,
How comes she to have the feelings of a Latin maid?

What grace and beauty! With the daughters of Italy, she may pass as a Roman; with those of Greece, as an Athenian matron, etc., or,—

Our Claudia, named Rufina, sprung, we know,
From blue-eyed Britons; yet, behold, she vies,
In grace with all that Greece and Rome can show,
As born and bred beneath their glowing skies.

It is as likely that the high-born Pudens married a savage when he chose the British maid with auburn locks (Rufina) to be the mother of his future patrician descendants, as that an English officer on service at the antipodes would disgrace his family by marrying an aboriginal woman; and the fact that Claudia Rufina rivalled the beauties of Rome in grace and elegance, is an evidence of the racial superiority of our Celtic ancestors, and possibly of a Roman education.

In A. D. 1723, in excavating a cellar at the corner of St. Martin's Lane and North Street, Chichester, was found the dedication stone of the Roman temple of Neptune and Minerva, stating that the land for the temple was voluntarily given to the College of Roman Artificers by Pudens, son of Pudentinus, showing that, in close proximity to the Celtic town of Cogidunus, a Roman officer possessed land, and that Roman culture

was strong enough then to induce a guild of artizans to come there to erect Roman buildings.

Dr. Stukeley, a savant of the period, believed the Pudens of the inscription to be the Prudens of the poet Martial, and husband of Claudia. the British maid ; and, considering the small grasp of the island then held by the Romans, it is extremely unlikely that there should have been two Pudens, who each married a Claudia, and each, moreover, with golden locks.

But can we connect this Pudens and Claudia with those mentioned in St. Paul's epistle? And how and when did Paul of Tarsus become acquainted with them? And, moreover, where did they receive the sacrament of Christian baptism? We believe we can answer these queries satisfactorily.

LETTERS.

LETTER FROM S. G. ARNOLD.

Washington, March 12, 1884.

Dear Sir: I notice, from Piazzi Smyth's article in the last STANDARD, that he commends, in no words of measured praise, the careful work of Mr. Petrie at the Great Pyramid. He says:

"The battery of scientific measuring instruments which he took out with him was more extensive than anything before known in that region, and had been in large part prepared for the occasion by his own hands with an acuteness and manual dexterity which cannot be too highly commended."

Mr. Petrie is a disbeliever in Mr. Smyth's theories, and the warm endorsement which his work has received from the Astronomer Royal is therefore the more noteworthy, and will give to his measurements a value in the eyes of the public which they would not otherwise have attained. As they are the latest and most accurate, and have been made with great care and labor and with the best of instruments, I was immensely interested to see what height he gave to the base side of the Pyramid, because none of the measures hitherto taken sustain the theoretic measures which were long since adopted by our Society.

According to Mr. Taylor's very careful investigations, the measures of the base side differ by about 70 feet. The most reliable may be re-stated in brief as follows: 693 feet, 728 feet, 746 feet, 763½ feet, 764 feet. Mr. Taylor explains these wide diversities by reminding the reader that the sides of the Pyramid incline inward and that the earlier measures were taken above the mountains of sand and debris which time has gathered around the building. The measures taken under the direction of Col. Howard Vyse in 1840, after the discovery of the casing stones and the corner sockets, are generally regarded as the most accurate and as approaching very nearly to the original model of the building.

But if there is disagreement in regard to the side of the base, there is no less disagreement in regard to the height. Indeed the height has been generally estimated from the base. The incline of the casing stones having been ascertained, the point at which the lines meet will be lower or higher, just in proportion to the size given to the base. Hence the height has been put at 478 feet, 480 feet, 490 feet, 486 feet, &c.

When it was discovered that the height of the Pyramid was intended to bear the same relation to the base as the radius of a circle bears to its circumference, the matter approached nearer to a solution but did not quite reach it. It could hardly be assumed that the proportions of this geometrical figure were accurately known at so early a period as

the building of the Pyramid. As it was not known to the Greek mathematicians of Alexandria, we would not expect it to be known two thousand years before. Mr. Taylor supposed that while the building was projected on that idea, the proportions had not been accurately ascertained. Hence the height could not be accurately ascertained from the length of the base side unless their formula was the same as ours, or we knew the amount of errors in their calculations. If their formula was erroneous and ours is correct, clearly they would not give the same results.

But in due time it was discovered that the different parts of the building had curious correlations. Among these none is more remarkable than the apparent relation between the length of the ante-room floor and the circuit of the base, the height of the building, and the diameter of the circle on which the building is supposed to be projected. And if it can be shown that these several proportions accord with the actual known measurements, all the problems are solved. Hence the very great interest that I felt in these latest and most accurate measures of the great building.

Allow me to go a little into particulars. The floor of the ante-room is said to measure 116¼ inches, plus. It may be 116.26 inches—a very curious and significant number which appears to be the key to all external proportions of the building. If you multiply it by 50 it gives the theoretic height, if you multiply it by 100 it gives the diameter of the circle which is supposed to circumviron the base. If you multiply it by the formula in our arithmetics for deriving a circumference from a diameter, it gives the days, hours, minutes and seconds of our calendar year; and, by removing the point two places to the right or multiplying by 100, it gives the apparent circuit of the base. Such a combination of startling results could hardly be an accident, and hence our Society leaped at once to the conclusion that the results thus ascertained must certainly be those which the builder had in his mind when he "laid the measures thereof."

But there always has been a stern difficulty. All the actual measures were fatal to this theory. The earlier ones were altogether too small and the later and more accurate ones were too large. A theory that proves to be correct fits into all the circumstances and explains all the phenomena; but in this case the whole circuit of the base, as ascertained from the masonry line of the engineer, was some 16 feet or 192 inches too great, and we must either believe that it was incorrect or abandon our theory.

It is just this cloud that Mr. Petrie's measures have served to remove. As ascertained by his better instruments and more careful work, one side of the base measures 9126 inches which accords almost exactly with the theoretic measure, and clears away all doubts which have beset our problem. The theoretic measure is, in fact, greater by only 5 inches. Besides, if Mr. Petrie is correct, it goes far to prove that the builders of the Pyramid understood the true relation of a circumference to its diameter. If we multiply 116.26 inches (the length of the ante-room floor) by 50 it gives as the theoretic height of the Pyramid 5.813 inches or 484 feet 5 inches. If you take this height and derive from it the circumference of the base, you will find it to be 36.524 inches, or, for one side 9.131 inches. We get this result by our formula. But if the builders of the Pyramid did not use the same formula, how does it happen that their work corresponds so exactly with the latest and best and most accurate measures?

Again, if the builders did not use the same formula as ours, how does it happen that the theoretic measure expresses so exactly the length of our calendar year. If you multiply the length of the ante room floor (116.26 inches) by the formula now in use for obtaining the circumference of a circle, the result will be as follows:

```
                    3.1415927
                       116.26
                    ---------
                    188495562
                   62831854
                  188496562
                 31415927
                31415927
                ----------
Days,           365.241567302
                           24
                ----------
                   966269208
                  483134604
                ----------
Hours,          5,797615248
                         60
                ----------
Minutes,        47,856914880
                           60
                ----------
Seconds,        51,414892800
```

	Days.	Hours.	Minutes.	Seconds.
Our calendar year,	365	5	48	46
Pyramid year,	365	5	47	51
Difference,				55 Seconds.

It will be observed that the figures which thus express the length of our calendar year also express the circuit of the Pyramid's base. But they require the removal of the point two places to the right. They are 36,524 inches, or, for one side of the base 9131 inches, being, as we have said, 5 inches more than the measure given by Mr. Petrie. The difference is just enough to show that there was no collusion, and the impression left on the mind of the thoughtful student is that the measures derived from the ante-room floor are those which the builder adopted, and that the little room in front of the king's chamber was so constructed as to record this key to the external measures of the great building.

S. G. ARNOLD.

LETTER FROM T. HOLLAND.

182 BROMPTON ROAD, S. W., April 15th, 1884.

Mr. President:—Yours of the 1st inst. just to hand, and I hasten to reply though I sent a diagram and slip, as per enclosed, a week ago, to Mr. Bisbee, thinking it probable the one sent to you was worthless *as it is considerably in error*, sending it away under some anxious haste to get it off my mind while shifting my residence. I think the diagram now enclosed is much more correct and produces many more facts geometrically, and of a practical character, mathematically I will not say. But, if my scale and compass principle produces a fixed height, and a circle struck from that height, the circumference of which is equal to four base side lengths, surely there is some ground for my conclusions, leaving the tests by trigonometry in more able hands. The other results from a following on of my lines seem to me remarkable, namely, the production of a circle equal in *area* to a given square, also a square equal in area to a given circle, and of different sizes, yet both required to complete the formation of the structure in a practical sense. I have a very high and distinguished respect both for Mr. Wood and Mr. Dow and their mathematical calculations, and it may be possible discrepancies may exist outside their gifted calculations—"Flinders Petrie" for instance. I will however leave the whole matter in your hands, and

I am confident my humble efforts will not only be safe, but judicially applied if found worthy.

Yours most sincerely and respectfully,

THOS. HOLLAND.

I have made several of the enclosed diagrams to send here and there. They are on too small a scale for close testing, but answer the purpose to illustrate my meaning. I am sending to Piazzi Smyth, Mr. Biden, Mr. Homer, and others, before publishing.

T. H.

LETTER FROM REV. JAMES A. UPJOHN, IN REPLY TO MR. LATIMER'S INQUIRY AS TO HIS METHOD OF FINDING THE NUMERICAL VALUES OF SCRIPTURE NAMES.

Dear Sir: I began at the first word of the first verse of Genesis and counted the value of the first letter added it to the value of the second letter, and so on until I got beyond the cumulative number 888. If before that I found the cumulative number 666, I marked it. In some parts of the Bible I counted as far as 999, then I would begin as at first and count the first letter of the word next following the last word included in the first sum, and add to that first letter the value of the next, and so on until I had reached 888, or had found none there, and from that point I would start again counting as before. In this way I found many appearances of 888 and of 666. Of course when I saw an approximation or likelihood of the number I would examine more closely. I would always begin anew at each verse, when the verse preceding ended with a period. I do not think that many appearances were passed over, for I have frequently tried to find or pick out a 666 here and there and do not recollect finding any, in this way, which I have come across in the progress of my consecutive counting. There may be grammatical rules which would exclude some given *e. g.*, when the last word included in the 666 is in the construct state, having a termination different from its independent form. But these instances are comparatively few.

This 666 must be studied with a reference to Rev. xiii. 18. I think that the number as found on Pharaoh, Nebuchadnezzar and other Old Testament heathen kings gives us types of anti-Christian manifestations. A student of history could find the parallel between them and epochs and events which have occurred during the Christian era. But I believe that the number has a wider application: Thus its original reference is the *genus homo*, next, man in covenant with God, next, the powers in their relation to that man in covenant with God. The Bible concerns itself not with all men. It starts with Adam and Eve and gives us the names of three sons, Cain, Abel and Seth, but we must believe there were other sons as well as daughters. Then again it takes up Abraham and is occupied with the history of his descendants, and whatever accounts of other people came in are incidental as they are brought into relation with the Jews. I started with the intention of getting out a work on 888, which is a simple subject, but was turned off to 666, the reference, Rev. xiii. 18, leading me to believe that it would awaken more interest. There is a language in these numerally which can be used and understood universally. They are in language what uniformity in weights and measures would be if adopted by all people. I hope I have made clear some points, and if you find I can elucidate the matter at all, and have any difficulty to suggest, I shall be most happy to do what I can to remove the obscurity.

I thank yon very much for writing, and send you a prospectus of 888 which may throw additional light on the subject.

Faithfully yours,

J. A. UPJOHN.

LETTER FROM REV. J. M. PERRY.

APRIL 12TH, 1884.

My Dear Sir: On receipt of your very welcome letter I immediately went over to Edinburgh to consult with Professor Piazzi Smyth, and on his recommendation I applied to a shipowning friend of mine in Liverpool with the object of getting my instruments taken out to Alexandria and back free of all charge; and I am now happy to inform you that I can get this done provided the members of the expedition take their passage from Liverpool in the same steamer that takes out the instruments. This will, of course, very materially reduce the cost, and I should think that £50 or £60 would cover the expense of packing, carriage to Liverpool, and carriage from Alexandria to Cairo or the Great Pyramid, and erection there, together with the cost of bringing them home. I shall be glad if you will kindly give me the earliest possible notice of the starting of the expedition, as I shall have to get a new stand made for the great equatorial, and many other preparations to make. I suppose we shall all start from Liverpool.

I heartily reciprocate your kind wish to meet me, and trust that the time may not be far off when we shall be associated together in the Egyptian expedition, as I presume you will form one of the party.

The Scottish Astronomer strongly recommends that no attempt be made to take the great telescope to the top of the Great Pyramid, but that it be erected near the base. In this I think he is right, for although it would not be impossible to get it to the top, yet the expense of doing so would be so considerable, and the difficulty and inconvenience of getting up and down the Pyramid for the necessary observations would be so great, that it would very materially restrict its use, while the advantage gained would be *nil.*

Of course the great telescope will at all times be at the service of members of the expedition for viewing and examining celestial objects, but the work which I should propose principally to devote the instrument to is the measurement of double stars south of the celestial equator. Some time ago I mentioned the idea of taking out my telescope to Athens or Egypt, with this object, to the first double star observer in the world, Mr. S. W. Burnham, an American astronomer, no doubt well known to you. He strongly approved of the suggestion. The following quotation from his letter will be interesting:

"With respect to Athens and Egypt I have, of course, no practical information or personal knowledge, so you will make due allowance in considering my notion about the matter. On general principles I should select Egypt, where I should expect to find, for a portion of the year at least, a dry atmosphere and a rainless interval. These conditions I have found to be very important with respect to good seeing. You doubtless know what I have said on this subject in my report on the Lick. Obs'y., and I have no doubt the statements there would hold good elsewhere. I should certainly select a place of that kind in preference to any other, after my experience in California. There is a further consideration which, other things being equal, would at once settle the question with me if I had any such trip in view, and that is the latitude. In Egypt, which is only about 30° north, you will have a splendid chance to work south, and further than any observatory in Europe or America can do. You will remember that at Mount Hamilton, in latitude 37° N., I could find new stars down to 45° S., or nearly that. With first class conditions you might expect to go to 50° S., one half of which will be almost new ground. Measures of stars there will of course be very valuable, for nothing practically has *ever* been done with the micrometer below 35°, and but little south of 20°. There is every reason for making the trip, if you can bring it about. I know of nothing that would be more interesting or profitable astronomically."

Of course, in writing this, Mr. Burnham knew nothing of the proposed expedition by the International Institute, nor did I when I received it, but his words show that useful

and important astronomical results may be reasonably expected from the use of such a telescope as mine for a few months in Egypt.

With kind regards, I am, my dear sir,

Yours very sincerely,

JEVON J. M. PERRY.

EXTRACT OF A LETTER FROM C. PIAZZI SMYTH.

APRIL 26, 1884.

Its advocates began this work by saying that the metre was founded on the ten-millionth of the quadrant of God's created earth; but they are now beginning to reveal their real design from the beginning—viz., to throw the earth, if they could, overboard, and make the standard of the metre the metre-bar itself, as made by Frenchmen, and kept in a building in Paris for all men to come there and bow the knee to it.

Had it not been for that, all President Barnard's vaporings about the length of the earth's axis being absolutely unknown, and that it will always be so, were as prejudicial to the metre founded on 1-10 millionth of the quadrant, as to the sacred cubit founded on 1-10 millionth of the earth's semi-polar axis.

But he cherishes the idea of the human-made bar of metal in Paris being made to rule the world eventually, without any reference to either God or the world.

Yours truly,

C. PIAZZI SMYTH.

EXTRACT OF A LETTER FROM J. N. WING, NEW YORK.

JUNE 2nd, 1884.

I confess that the metric men (in scientific circles) hold sway here, and it will be a long pull and a strong pull to gain the lead. I, of course, talk with many literary men, and the amount of ignorance and indifference the majority exhibit is wonderful.

I do have some hope that Lieutenant Totten's book will arouse some interest on the subject of metrology.

And in regard to the Pyramid, I find many well read people on most subjects, ignorant as to the commonest facts of the history of that wonderful monument, besides a large number totally indifferent regarding it. I am not by any means discouraged, for experience has taught me that all great movements have been carried to successful issues by oftentimes a mere handful of earnest workers. We have here, at least, two able, earnest laborers, Lieutenant Totten and Mr. Clark; men who will yet be heard far and wide in this fight with the metric men.

Yours sincerely,

J. N. WING.

EXTRACT OF A LETTER FROM J. L. DAMPIER.

APRIL 17th, 1884.

Shall He find faith on the earth at His second coming? The absence and want of faith will then be one of the sure signs of the times. Then let us take due warning, for the air is thick with doubts regarding things unseen and the inspiration of the Bible; fables and myths are the terms applied to many of the events related in the Old Testament, such as our *first* parents, the building of the Tower of Babel, &c. It is contended now to be discovered that the continent of America was peopled with a wondrous race thousands of years before "In the Beginning," and the account of the "Let Us make man," which is nothing but a fable or myth handed down from this wonderful race existing so many

many years before in "The Lost Atlantis," now re-discovered and brought to the light, to the light of man's understanding, so that he can see, touch and handle it, and therefore he believes, without the slightest doubt, forgetting that "Blessed are they who believe yet have not seen." They pretend to have discovered the origin of the whole heathen mythology, and that all the stories in the Old Testament are of the same class, naught but myths and fables—forgetting that all these ancient myths of Greece and Rome, in fact, throughout Europe and Asia, contain the Truth, but daubed over with untempered mortar, that true meaning and appearance has been obliterated and put to a wrong use. "The Serpent and the Cross" are worshipped—the created before the creator. The serpent and the cross may be traced in many of the figures and hieroglyphics of Central America. Part of the great continent they declare to have been inhabited thousands of years before Adam and Eve. All through India and China may be traced in their gods and temples, the "Serpent and the Cross," how and why is this? Because (as Dr. Seiss shows in his admirable work) God placed the same in the heavens "In the Beginning"—the twelve signs of the Zodiac, with their attending thirty-six Decans, instructing Adam in the same, thus handing down the future gospel, read in the stars above their heads, the Bible of the antedeluvians, understood by Noah and handed down by him, and still carried on to the building of the Tower of Babel, when we know confusion took place, and the people departed covering settlements as God led them, carrying with them the Truth, which in time became hidden, worshipping in these Zodiacal signs the created instead of the creator. Let anyone compare the myths and gods of the heathen with these signs, and the fact is apparent from whence these myths have their rise—viz., from the Truth delivered "In the Beginning," and not Christianity from these myths.

Yours truly,

J. L. DAMPIER.

EXTRACT OF A LETTER FROM MRS. H. E. GODFREY.

MAY 1st, 1884.

The other day I sought an introduction to a lady who has a friend living up in the mountains, almost to the eternal snow-line. For the last sixteen years he has been engaged in the study of the Bible. Six months of the year he is surrounded by deep snow. Living in his cabin all alone, he devotes this time to prayer and study, having no other books but the Bible. The result is something wonderful. How or why he was led to the study of the breast-plate of the High Priest I do not know.

Last winter he spent at Oakland, and directed an artist how to draw his charts, making them the exact measure of the described breast-plates. He arranges the names of the twelve tribes by the signs of the Zodiac, each sign corresponding to the tribe, the month and the stone upon which the name was engraved. In the peculiar way in which the tribes are placed, many things are shown which have never been discovered and all correspond to facts. He explains how the Urim and Thummin pointed, and, the lady said, many other things which she could not convey, because she did not understand.

He has lived alone so long that he is not able to express what he wishes to convey. He wants his thonghts written out for a book and would have been glad to have had his brother, Judge Haven, do this, but his law business interfered. He went before the Congregational Club of San Francisco, explained his charts, and while talking, men rose to to their feet interrupting him with objections; at the close, only one man expressed the opinion that there might be a great deal of truth in what he had shown, and for one he did not like to say there was none. I immagine, from what was told me, it was a bombshell among dry bones.

The little that was told me was so wonderful and glorious that I could not help thinking that if this information could be secured for the Institute, it might show a new way to

study the Pyramid problems. If so, there would be great significance to the command, "Look unto the hills, from whence cometh thy help, thy help cometh from the Lord who made the heavens and the earth."

Surely if there is an inspired measure this breast-plate, which was worn by the High Priest when he entered in before the Lord, must be superior evidence, particularly if the metric system cannot be applied to its size.

Yours respectfully,

H. E. GODFREY.

EXTRACT OF A LETTER FROM LIEUTENANT C. A. L. TOTTEN.

JUNE 1st, 1884.

I have Barnard's third article. It is weak. You will get copies soon. It issues in book form this week, I believe It will do some harm, but not with those who read both sides of the question. He cites coincidence and gets up an imaginary Temple of Diana and a series of facts to match. I was waiting for the third article in hopes he would have some new facts to give and make some pointed arguments. But the whole matter is barren of interest to me, and his style mere denial and ridicule.

Yours truly,

C. A. L. TOTTEN.

EXTRACT OF A LETTER FROM JACOB M. CLARK, C. E.

Since I wrote you, I have seen Lieutenant Newburger of Elizabeth, N. J., a Hebrew gentleman, formerly an officer in the Prussian army, and afterwards in the American volunteers in the civil war, who has just returned from Europe. Before he went, I asked him to observe any facts he could, as to the usage of the *people* of the German States in adopting the French metric system.

He says that in ladies' dress goods, the French system is used. The reason is, that such goods are imported from France, and merchants and others simply follow the invoices as a matter of convenience. As to all goods manufactured in Germany, and as to other transactions among the people, they uniformly adhere to the "El" or "Elle," (the cubit of Ezekiel), and think of using nothing else, and this fact is very uniform throughout, except as to such matters of public record, &c., as are controlled by Government.

The last number of the Magazine was exceptionally good in all the articles. I was much interested in Redfield's, "The Altar and Pillar to Jehovah," and have read it again and again.

Sincerely and truly yours,

JACOB M. CLARK.

TRANSACTIONS OF THE OHIO AUXILIARY SOCIETY OF THE INTERNATIONAL INSTITUTE.

April 23, 1884.

Colonel M. B. Ewing, Cincinnati; Miss Wetherell, Nottingham, England, and P. W. Ward, Cleveland, were elected members at the meeting.

Mr. W. Le Cont Stevens, of Packer Collegiate Institution, writes:

Your journal impresses me as an attempt to unite two things that have no necessary connection.

1st. The preservation and simplification of units already in use.

2d. The reference of these units to the Great Pyramid, and the preservation of what Dr. Barnard has called the Pyramid Religion.

I find the names of such men as Hilgard, Rogers and Fleming, whose opinions I highly respect. While I have had no opportunity yet of finding out from these gentlemen what is the basis of their opposition to the metric system, I can readily imagine arguments, exclusively non-religious, that might have much weight with them, arguments quite independent of any assumed "earth commensurability" attaching to the standards now in use. The earth's polar radius is *deduced* from measurements in what Piazzi Smyth stigmatizes as mere outside rind, and any earth commensurability relating to the inch is as uncertain as that relating to the metre. That the metre is better than the yard as a standard I do not at all insist, but what we do need is definiteness, simplicity, decimal relations between initial and derived units, ready convertibility between those of length, volume, weight and value, without the slightest consideration for any imaginary inheritance in the Great Pyramid or anything else.

Pardon me for saying you have tied a heavy mill-stone about your neck in becoming sponsor for Piazzi Smyth. President Barnard's criticisms appear to be eminently sound. Professor Smyth's reputation as a man of cool scientific judgment, it seems to me, must be destroyed by his indulgence in such wild vagaries as I find throughout 'Our Inheritance in the Great Pyramid.'

Mr. Latimer in reply says:

You say our Magazine impresses you as an attempt to unite two things that have no necessary connection.

First—The preservation and simplification of units already in use.

Second—The reference of these units to the Great Pyramid and the preservation of what Mr. Barnard has called the "Pyramid Religion." If you have not observed from the reading of our Magazine the relation between the British units and those of the Great Pyramid, then you have read in vain. Most assuredly they are there, and moreover I have no doubt at all that we shall show more conclusively the earth commensurability of the British measures than has ever been proved for the French metre, which you know is not a ten-millionth part of the quadrant running through Paris as was intended, but that part of the quadrant passing through New York. There is an error of 1850 metres, probably.

As to Dr. Barnard's fling at Professor C. Piazzi Smyth and those who have followed him, in calling our work that of the "Pyramid Religion," it only shows the animus of every metric advocate that I have had anything to do with, as they always resort to ridicule to carry their point. I think that you will find that there is no uncertainty in regard to the commensurability of the inch with the earth's measure. I admit the ingenuity of the French system and the convertibility of its terms, but you could learn that as well with any measure you choose to use.

In discussing the letters Dr. Redfield said we should not repudiate the term "Pyramid Religion." We do not hold any religion in distinction from the religion of the Bible, but in corroboration of it. Those who believe that the Pyramid was built by Divine inspiration should accept the terms "Pyramid Faith" and "Pyramid Religion." Mr. Latimer said, "we do not object to the term, but to the derisive manner in which it is employed. I cannot doubt the inspiration of the architect of the Pyramid."

Mr. H. H. Pain, of the *Stock Exchange*, England, writes: "I am involved in an attack on the metric system. Mr. J. B. Brown has expressed his intention of giving me my 'quietus' next month, so could you send me some condensed pamphlets on the merits of the Anglo-Saxon weights and measures in order that I may meet my opponent's arguments."

Mr. J. B. Brown is a member of the London Chamber of Commerce, and also of the Tariff Committee of the British Chamber of Commerce in Paris. He is a zealous advocate for the introduction of the French metric system into England. He says: "The decimal system would save thousands of pounds sterling to English trade. The system is genius itself, a bit of real human inspiration."

In reply Mr. Latimer read an extract from John H. Felton's "Argument for American Consistency in the Extension of the Decimal Scale of Weights and Measures in Harmony with the National Currency." Mr. Felton gives a succinct account of the confusion and distress which prevailed in France when the metric system was introduced.

Dr. Redfield said there were many objections to a system exclusively decimal. The division of the months of the year must be duodecimal, and for many purposes an octonary division is preferable.

Mrs. W. A. Plumtre, England, sent the names of a number of persons interested in objects of the International Institute. She also enclosed an extract from an English paper relative to the work of Flinders Petrie for the Egypt Exposition Society.

"The great mounds of San, which mark the position of the once famous city of Tanis (the Zoan of our Bible), have been selected by the Egyptian Exploration Fund as their field of work during this present season. The many friends and supports of the Egypt Exploration Fund have good cause to be grateful to the Egyptian government and particularly to His Highness the Khedive, for granting them the exclusive right of digging at this site on the shores of Lake Menzaleh, in the Delta. It is also owing largely to the hearty concurrence of Professor Maspero, keeper of the Boulak Museum, that Mr. Flinders Petrie, the newly appointed agent of the Society, is now actually beginning the work of exploration. M. Naville, whose efforts for the work last year were so successful, though unable personally to superintend the excavations, has promised to edit any inscriptions which may be discovered."

Samuel Beswick writes on the same subject. He says: "Mr. Petrie was sent by the advice of the Royal Society. The district is near the place where the first battle of Tel Kebir was fought against Arabi Pasha. It is perhaps the most extraordinary spot in all Egypt, but it is a city of the dead. It was once a magnificent capital, more splendid in some respects than the ancient Thebes. This historic spot has now a terribly bad reputation for fevers, rain and despicable weather. It will be well if Mr. Petrie survives the isolation he will have to endure in this unhealthy district. The proprietors of the Boulak Museum undertook to explore it and found a vast treasure of broken obelisks, sphinxes, shrines, columns, beautifully carved and covered with figures and statues of gods innumerable. Some of these have been transferred to the Boulak Museum, near Cairo."

Mr. Latimer read extracts from a letter by J. Ralston Skinner and illustrated it by blackboard diagrams, but the letter in full was reserved for another meeting. Letters from Jacob M. Clark and J. N. Wing gave accounts of the meetings of the New York Society.

Mr. William H. Searles writes: "A friend of mine here, an experienced engineer,

spent two years in Mexico, where, of course, he had to adopt the metric system in all his work of railroad location and construction. He became heartily sick of that unit, finding it exceedingly inconvenient, both in horizontal and vertical measurements, and particularly in cubic quantities." Mr. Searles says: "The discussion of pyramid questions is rapidly spreading and taking in all classes of men. It is well that the subject finds opponents as well as friends, otherwise the development would not be healthy. We need have no fear of intelligent discussion of the whole question, as we desire to make no claims and to advance no doctrines which are not founded on truth.

Professor C. Piazzi Smyth also writes of the benefit we derive from opposition, and refers to the necessity for another Egyptian expedition.

John F. Shaw, of Toronto, Ontario, says: "I think that when the grand aims of the International Institute are more generally known, every thoughtful man in christendom will consider it an honor to become a member and thus assist in developing one of the most important movements of the age."

Letters were also read from Mrs. E. Jane Copeland, Bryantville, and Lewis Biden, Portsea, England.

A bronze medal of the centennial of the adoption of the great seal of the United States, was sent the Society by B. A. Mitchell, of Philadelphia.

May 7, 1884.

As Mr. Latimer was absent, Mr. A. M. Searles, Vice President, occupied the chair. Rev. L. C. Rodgers, Georgetown, Col.; William Ritchie, Sharon, Pa.; and George C. Mastic, Cleveland, O., were elected members.

Professor Alfred B. Taylor, of Philadelphia, wrote with reference to Mr. Holford's article in the *Tennessee Journal of Education* on "The Arithmetic of the Future." Mr. Taylor says: "Mr. Holford writes as though from the year 1976, the octonary arithmetic (with all its advantages) will be an accomplished fact. This is even earlier than I have prophesied for it [see my Reports on Weights and Measures, p. 91]. I there contemplate a *century* or *two* of obstruction and resistance but believe that what is truest, wisest, best, shall surely in the end secure its empire."

With reference to the "Metric Commission" in Washington, Jacob M. Clark says: "I have proposed to Totten to join him in a circular to be sent to as many as we know in Washington, with a view of effecting what we can. Will you and your friends West do something of the same kind?"

Referring to the proposed Egyptian expedition, Professor Edward R. Graham says: "If I could be of any service I would gladly accompany it without fee or reward. I cannot help feeling the 'granite leaf' has something important to reveal."

Edward Theodore Cooper, Omaha, Nebraska, writes on the same subject. He says: "I practiced as a surveyor for twenty years at the Cape of Good Hope under the British colonial government. The surveys as there conducted are trigonometrical, worked out from a measured base line. The system as there adopted would be the only one available in ascertaining the basal dimensions of the Great Pyramid. Professor Piazzi Smyth, on page thirty-nine of 'Our Inheritance,' is in error in his statement as to the expense to be incurred in the preliminary clearing of the ground from those obstructing rubbish heaps of broken stones. In a survey of the character now contemplated, little or no clearing of the ground beyond opening out or clearing the corner sockets would be necessary—a level piece of ground being found and cleared in the neighborhood whereon to measure a base line. I should willingly associate myself with any body of gentlemen whom your Society might organize for the purpose of fully carrying out the object you have in view."

Samuel Beswick, civil engineer, writes: "No effort should be spared to get up an American expedition at as early a date as possible. If the British leave Egypt anarchy will reign for a considerable time, and make it unsafe for any European or American to be there. The British exploration party are now at work on the east of Jordan; the Ger-

mans in Egypt and Jerusalem; and Petrie was sent off in a hurry the very day on which his late work was published, showing that advantage is being taken of the present lull, lest another outbreak should destroy the chances for a year or two." Mr. Beswick suggests that the base of the Pyramid should be examined and measured by mining galleries or tunnels along the four sides; he thinks that this would be less expensive and quite as effective as the plan of clearing the entire face of its rubbish.

Lewis Biden, of Portsea, England, says: "I have been equally pleased with yourself at the friendly feeling manifested lately between the better portion of the British and American people. I believe we are yet to become very closely allied on both sides of the Atlantic. There has been far too great an inclination to cultivate association with the French, who are totally unlike the English, speaking races in character and thought."

W. T. Alan, Greenville, Pennsylvania, writes with reference to his experiments with snow crystals. He has sent an article on the subject to the Royal Philosophical Society of Great Britain.

Professor W. A. Rogers, of Cambridge, Massachusetts, says: "I am having some new bars made of speculum metal. I shall try one of them for you. I can put lines of 10,000 or 20,000 to the inch on it. The surface will have a beautiful block polish and will not tarnish. I shall soon send you both the yard and one half yard bars."

Other letters were received from Thomas Holland, London, England; Professor Asahel Abbott, Brooklyn, New York; Mrs. H. E. Godfrey, Grass Valley, California; J. L. Dampier, London, Ontario; B. A. Mitchell, Philadelphia; George Kellogg, New York; Miss Emily Damon, S. Hanson, Massachussetts; T. B. Mills, Las Vegas, New Mexico; Rev. E. P. Ingersoll, Rosevale, Kansas; and other members.

Lieutenant Totten sends three papers, "Notes of Pyramid Studies." The first, "Early tradition as to the object and builder of the Great Pyramid," show that books were written and traditions preserved from times prior to the deluge referring to the erection of an important document, which was intended to transmit valuable information down to a late posterity. These traditions come down to us from countries the most distinct and separate from each other, and through persons of almost all religions. Lieutenant Totten's other papers are "The Religious Theory" and "The Scientific Theory.

Lieutenant Totten's papers occasioned an animated discussion in which the principal speakers were Drs. Newcomer and Redfield and Mr. A. M. Searles. A paper was then read from Rev. Dr. Wild, Toronto, Ontario, after which the meeting adjourned for two weeks.

MAY 21st, 1884.

Rev. L. A. Lambert, Waterloo, New York; C. A. G. Lewis and N. Raymond Chappell, New London, Connecticut; F. N. Learned, of Pittsfield, Massachusetts; John Heard, of Strathroy, Ontario; and Henry Lowe, of Denver, Colorado, were elected members.

The President then gave an account of his western trip and spoke of the interest manifested by persons whom he met in the objects of the Institute, especially in the contemplated expedition to Egypt.

The subject of the "Metric Commission" at Washington was then discussed. A letter to Mr. Latimer from the Hon. B. P. Bland, Chairman of the Committee, was read. Mr. Bland says: "The Committee on Coinage, Weights and Measures have taken no final action upon the matter of the metric system and will hear you or other gentlemen upon the subject at such time as you may be pleased to present your views." Hon. O. D. Conger wrote on the same subject: "I have made inquiry of members of the Committee on Coinage, Weights and Measures and I learn that there is no probability of any legislation being reported at this session relative to the adoption of the French or other system. The Committee, however, meets on Wednesday of each week and a hearing can, no doubt, be readily arranged if you so desire."

A paper from Samuel Beswick, C. E., "The Standard Base of the Pyramids," was then

read by the President and illustrated by blackboard diagrams. In the discussion that followed Mr. J. H. Dow spoke in eloquent terms of the value of W. F. Petrie's recent work at the Pyramid. He then read a paper on the Pyramid and British inches, which was received with applause, and are solution was passed that it should be published in the July number of the INTERNATIONAL STANDARD.

A letter from Mr. Beswick inclosed an extract relative to Mr. Petrie's present explorations among the ruins of Zoan:

"Apart altogether from the interest awakened by passing events in everything connected with Egypt, many will be specially pleased to learn that the ruins of Zoan, the chief city of the Egyptian Delta in ancient times, are about to be thoroughly examined by 'The Egypt Exploration Fund' Society. The excavations to be made are expected to yield a rich harvest in objects of Biblical and other historical interest. The lost histories of the Shepherd Kings, who are supposed to have ruled over Egypt for five hundred years, are generally understood to be buried under the mounds of Zoan. It is expected also that here there will be found documents bearing on the history of the Hebrews during the 450 years of their sojourn in the land of Pharaoh. In short, no site in Egypt, or indeed in the whole East, is known to be so rich in buried monuments as this. To carry out this exploration in a thorough and successful manner, from twenty to thirty thousand dollars will be necessary. Enough has already been subscribed to give the work a fair start, and accordingly excavations have already commenced under the superintendence of Mr. W. Flinders Petrie and of M. Naville, both well known as distinguished Egyptologists."

A paper from Professor Piazzi Smyth, "The Earth's Axis of Rotation," was a reply to a statement of President Barnard in the 'School of Mines Quarterly.' President Barnard says "the length of the Polar axis of the earth is a quantity which may with strict truth be pronounced to be up to this time absolutely unknown." At the close of his paper he refers to the reformation of the calendar and the disturbance caused at the time of Pope Gregory's alteration. By a singular coincidence a letter on this subject was received on the same date from Professor F. Hess.

After a general discussion upon this subject letters from other members were read.

The meeting adjourned for two weeks.

June 4th, 1884.

Miss Oviatt and J. H. Holway, Cleveland; P. H. Stewart, Cookstown, Ontario; and Professor A. B. Hyde, of Allegheny College, Meadville, were elected members.

A letter was read from Jacob M. Clark, which gave some useful information with respect to the use of the metric system in European countries. Mr. Clark enclosed an envelope recently received from a metric advocate, which bore the inscription, "The adoption of the metric system, now making rapid headway in this country, will bring us into harmony with more than a score of nations, save millions annually in computations and a year of the school life of every child."

In connection with this subject we give some extracts from "The Decimal System," a work written some years ago by John H. Felton. Mr. Felton gives a graphic account of the distress and confusion that prevailed for forty-five years in France, in consequence of the introduction of the metric system. With respect to the "International Association," he says: "The orderly character of the decimal system, since its complete establishment in A. D., 1840, attracted the attention of foreigners visiting France. This circumstance aroused the ambition of the French philosophers, and induced them to attempt the extension of the metric plan. Meetings were called at various times, and communications addressed to foreigners of distinction, soliciting their influence in favor of the project. Such was the state of affairs in the autumn of A. D., 1855, when the great national exhibition attracted a large influx of foreigners to Paris. The friends of the metre, availing themselves of this favorable opportunity, convened a general meeting and formed themselves into a regular society, comprising all the foreigners of distinction that could be prevailed

upon to join them. The International Association aims at nothing less than the conversion of the whole world to the decimal system, through the medium of the metrical. The first is a good work and may be accomplished through the use of our present standards; but the establishment of the metrical system in all the nations of the earth is quite another thing. The *rod* of these wise men of France may become a serpent, but it will never swallow up all the standards in the world, after the manner of that of the great Jewish legislator. It has been suggested that the world would adopt the French scale of centimes and francs. We assume the boldness to state that as long as common sense presides at Washington, we shall never exchange our excellent scale of currency for any in the world. We now come to consider the metrical terminology abstractedly. All that we have said regarding its reception by the people of France will doubtless apply with equal force to the people of America. It would be a dangerous experiment. The length of the names, the novel and unusual sounds, the difficulty of recollecting their order and the time that must expire before they could be perfectly understood and correctly applied—all these objections and others not named would be found to render the whole catalogue as repulsive to our digestion as it was to that of the French. It is true they have survived the dose; but knowing their sufferings under its operation we prefer seeking a milder remedy for our commercial and social disorders. Besides our confidence, in the skill of their physicians has received a severe shock, from observing their serious errors, and the protracted sufferings of the patient under their hands. No, *messieurs*, we cannot take the metrical pill, although it is gilded with the attractive epithet of philosophical."

Valuable papers from Lieutenant Totten and J. H. Dow were read by the President. A paper from J. Ralston Skinner was held over for the next meeting. Letters were read from several members, and after a short discussion the meeting adjourned till June 18th.

MONTHLY RECEIPTS FROM SUBSCRIBERS TO THE INTERNATIONAL STANDARD, FROM APRIL 14TH, 1884, TO JUNE 9TH.

April—Mrs. E. D. Kimball, Salem, Mass., $2.00; Rev. J. A. Upjohn, Neenah, Wis., $2.00; E. L. Wilson, Philadelphia, $2.00; S. A. Chaplin, Plymouth, Ind., $2.00; P. W. Ward, Cleveland, $2.00: Jas. F. Rhodes, Cleveland, $2.00; Ole Olsen, Elgin, Ill., $2.00;

May—Henry Lewis, Cleveland, $2.00; L. Breckenridge, Cleveland, $2.00; I. C. Brewer, Sandusky, O., $2.00; Dr. J. W. Redfield, Cleveland, $3.00; Cholmondeley Woodward, Barrie, Ont., $2.00; Wm. Ritchie, Sharon, Pa., $2.00; Thos. Wann, Cleveland, $2.00; B. Saunders, Cleveland, $2.00; Wm. Rundquist, Elgin, Ill., $2.00; Jos. Hugill, Akron, O., $2.00; C. A. G. Lewis, New London, Conn., $2.00; N. Raymond Chappell, New London, Conn., $2.00; John Heard, Strathroy, Ont., $2.00; Rev. L. A. Lambert, Waterloo, N. Y., $2.00; Public Library, Elgin, Ill., $2.00; J. M. Durkee, Pittsfield, Mass., $2.00; F. N. Learned, Pittsfield, Mass., $2.00; Thos. Irvine, $2.00; W. B. Chisholm, $2.00; Wm. Chisholm, $2.00; Capt. Frazee, $2.00; E. W. S. Neff, $2.00; F. Fitz, $2.00; C. H. Schoenhut, $2.00; P. M. Arthur, $2.00; J. W. Richardson, $2.00; J. F. Ryder, $2.00; G. F. Ely, $2.00; Dr. J. A. Stevens, $2.00; W. F. Beecher, $2.00; H. C. Ranney, $2.00; Clark I. Butts, $2.00; W. J. McKinnie, $2.00; J. F. Holloway, $2.00; W. U. Masters, $2.00; all of Cleveland. U. S. Patent Office, Washington, $3.70; A. S. C. Wurtele, C. E., Buffalo, $2.00.

June 9th—Henry Snyder, Pittsburgh, $2.00; A. A. Folsom, Boston, $2.00; Rev. Samuel Studdijohn, Trenton, N. J., $2.00; Rev. L. B. Hartman, Trenton, $2.00; F. G. Darlington, Pittsburgh, $2.00; W. L. Nicoll, New York, $2.00; Lewis Parker, Trenton, N. J., $2.00; Hon. H. S. Little, Trenton, N. J., $2.00; W. C. J. King, Barrie, Ont., $2.00; Geo. Kellogg, New York, $4.00; L. Biden, $7.79; Rev. E. P. Ingersoll, Rosevale, Kansas, $2.00; Mrs. W. A. Plumptre, $2.44; W. B. Chapman, $2.00; F. G. Williams, $2.00. S. J. Miller, $2.00; E. S. Page, $2.00; Thomas Reeve, $2.00; E. J. Leighton, $2.00; N. P. Bowles, $2.00; John Todd, $2.00; Dr. Newcomer, $2.00; Alexander Vance, $2.00; Dr. R. A. Vance, $2.00; N. B. Gray, $2.00.

EDITORIAL NOTES.

As the historical portion of the article on "The Unveiling of Isis" was concluded in our last issue, the first part of the next series is postponed to our September number, in consequence of a press of matter.

Valuable papers from Lieutenant C. A. L. Totten, J. Ralston Skinner and Arthur S. C. Wurtele, C. E., arrived too late for this number of the Magazine. They will appear in the September number.

REVIEWS.

'NOTES ON PYRAMID STUDIES.' By Lieutenant C. A. L. Totten.

These notes are published as a series of articles in the *Hempstead Inquirer.* They contain much valuable information in a popular and interesting form. We have received nine articles, viz.: 1. Early Traditions as to the Object and Builder of the Great Pyramid. 2. Past and Present Literary Dignity of Subject. 3. The Leading Modern Theories on the Great Pyramid. 4. The Religious Theory. 5. The Scientific Theory. 6. The Geodesic Theory. 7. The Astrologic Theory. 8. Egypt, Gizeh, and the Pyramid's Orientation. 9. The Unique Geographical Position of the Pyramid—The Prime Meridian—Standard Cosmic Time. Complete sets of these papers can be obtained by applying to Lieutenant C. A. L. Totten, St. Paul's School, Garden City, L. I., N. Y.

THE RESTITUTION, issued weekly by the Christian Publishing Association, Plymouth, Indiana. Terms, two dollars per year, payable in advance.

The Restitution advocates the final "restitution of all things which God hath spoken by the mouth of all His holy prophets since the world began." As a means to this end, the establishment of the Kingdom of God on the earth, with the Christ as King of kings, the restoration of Israel, the literal resurrection of the dead, the immortalization of the righteous, and the final destruction of the wicked, eternal life only through Christ, and many other kindred truths.

I. In the first division of 'The Coming Age: Its Nature and Proximity,' the nature of the coming age is fully discussed as to its physical, moral and political character. In establishing the proximity of that age, the prophecies of Isaiah, Jeremiah, Ezekiel, Daniel, Zechariah, Christ, Paul, Peter and John, in his Apocalypse, are fully examined. Their Hebrew and Greek originals are compared, and their testimony critically noted relative to its rapid approach. It forms a complete text book of those prophecies which relate to a future age.

II. The second work is devoted to the investigation of the various phases of the Eastern Question: 1, The Egyptian phase; 2, The British phase; 3, The Russian phase; 4, The Ottoman or Turkish phase; 5, The Hebrew or Jewish phase; 6, The American phase, etc. Price of each work, $3.00. They contain about 500 Royal octavo pages each. Send to C. H. Jones, 77 Clark street, Chicago, Ill.; to the Restitution, Plymouth, Ind.; or to J. P. Weethee, Millfield, Athens Co., O.

OUR REST AND SIGNS OF THE TIMES, published monthly by C. H. Jones, 77 Clarke street, Chicago, Ill. Terms, one dollar per annum.

Our Rest is strictly undenominational, but is a firm advocate of the inspiration of the Holy Scriptures, and of salvation only through faith in the atoning sacrifice of Christ.

The Youth's Examiner, published monthly by the above, endeavors to bring Bible truth before our children in simple language. Terms, forty cents per annum.

THE GOSPEL ACCORDING TO ST. MATTHEW. Translated from the Greek text of Constantius De Tischendorf and other standard texual authorities. By Charles Gardner, M. A. Printed on extra heavy, tinted paper, elegant cloth binding. Post paid, only sixty cents.

As the object of publishing this gospel was merely to show the style and design of the whole work, we will allow all those who purchase this book at sixty cents this amount of discount on the price of the whole new testament when completed. C. H. Jones, 77 Clark street, Chicago, Ill.

THE NUMBER COUNTED 666, AND THE NAME COUNTED 888, by the Rev. James Upjohn.

These books investigate the numerical values of names in the Hebrew Scriptures; they are companion volumes, price one dollar each. They will be sent postage paid by remitting the price to Rev. James A. Upjohn, Neenah, Wisconsin.