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IN THE

GREAT PYRAMID OF JEEZEH IN EGYPT

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BIBLICAL ASTRONOMY.

When the tribe of Simeon appears their ensign will be some form of a sign commonly named The Fishes (Dagim), where we have two fishes bound to the neck of an immense cetus or shark. As a fish is the emblem of hatred, so here we have Messiah, and Israel with him, rejected of men, and for a little time * subjected to the " contradictions " of the rebel archangel and his crew of apostate spirits. Moses for some cause makes no mention of Simeon in his last review (Deut. xxx), but Jacob couples him with Levi, whose ensign was the altar in the galaxy circle that represents Messiah offered for the sin of the world by wicked hands ; and he says, " Simeon and Levi, brothers, the iniquity of their purpose have they accomplished." † They have rejected and slain Messiah ; and this he figures as houghing a bull, or (as some read) digging through a wall, and Messiah is a wall no less than a bull—a leader and guard. (Lam. ii, 18.)

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* Heb. 2, 7, 9.

† This is the sense given in the Septuaginta and indicated in the Samaritan, where the archaic *kali* becomes *kalu*, the regular form of the verb ; a change that no orthodox Hebrew would allow, for their purpose is to preserve the text entire as it has come down from the most remote times, though as here and in other places, the Mesorites have mis_taken *kali* for a noun, and printed it as if it was constructed to the plural of *kelim*, instruments, vessels.

All Jacob's words here are blessings (Gen. xlix, 28), but in this case (as in v, 4) he blesses Messiah in cursing his enemies. '' I will divide them in (Jacob) wisdom ; I will scatter them in (Israel) power." The empire of darkness and its subordinate kingdoms and societies on earth shall fall into incurable dissentions and disappear from under the heavens of God, righteousness and truth and love alone remain as things eternal that can never fail. The letter forms of this sign are all instruments of violence and force, a hammer, a maul, a club, a sword, a spear, etc. With the tribe of Gad comes the sight of a lamb, with fleece of gold and horns of brass. Moses perceives him couching (as he does) like a lion, and ready to dash the mightiest of his foes with a blow from his head. (Deut. xxxiii, 20.) Jacob sees Messiah overcome by the rush of a host, but declares their overthrow at the end. Moses makes him leader and sharing the honors with the Lawgiver himself. This is purely astronomical. Aries takes the first part of the month Abib, while Taurus takes the second; and in the days of the Exodus he had become the opening sign of the old sacred year by being in the vernal equinox. The first half of Aries also rises with the crown and ceptre of King Cepheus, a form of the first father and lawgiver of the race. One of his feet passes through the line of bands that connects the two fishes in Pisces-Cetus; for by the suffering of death only can Messiah, and Israel together with him, render harmless and terminate the contradictions of the sinning, so these shall no more annoy them forever.‡ Of the letter-forms belonging originally to the sign Aries, the most are drawn from a serpent strangling two human beings at once, though sometimes there is but one, and sometimes (as in our figure 8, an old form of this sign) there is only a serpent

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‡ One name or this sign, shared by others indeed, but chiefly used for this, is Jazer (Jehovah the Helper). One of the most singular astronomic references in our older books is to this as a new planting for the vine of Sibmah (Healing), a form of the tree of life among the twelve signs (Isa. xvi, 9; Jer. xlviii, 32). Her branches have been broken down in her native soil by the '' lords of the Gentiles ''—Satan and his aids—so she is uprooted, pruned and borne beyond '' the sea '' even to the sea of Jazer (*i. e.*, the sea bordering on Jazer), or to Jazer itself; Aries being the first form, and after leaving the shore by Zidon upon the celestial sphere. The '' weeping of Jazer '' seems to be th weeping at the Autumnal Equinox for the Mediator's departure from the world of the living with the sun from the upper hemisphere. (See under Dan. supra.)

that has died in the attempt to shorten the life of Messiah. Our own H is a secondary form of the old Heth, that is found with two cross strokes upon the Moabite stone, while in coin letter there are three cross marks, and in old Phœnician is a form still nearer the original, having one cross mark in the middle and two half cross marks in the opposite directions from each upright stroke, the one near the top and the other near the bottom. To many forms are attached the heads or tails of serpents, in both east and west.

But when Ephraim appears for Joseph we have the most splendid sight of all, for in Taurus are the brightest and richest groupings to be found anywhere upon the face of the skies, though far south are groups of stars of the first magnitude, as there are not in the north. In the centre is a bull, sustaining upon one horn a shepherd with kids (or lambs, Isa. xl, 11) and their dam, while he bears down upon a giant and dogs in front and below. That giant is the Chesil of the Hebrews, the Orion of the Greeks, the atheist Hiranyacaspu of the Hindus. Chesil is one foolish (fat-witted) and stupid, one that is too proud and too dull to reason that God must appear in humanity if he will manifest his deity to all ranks of created spirits; and so when he heard of an alleged decree that man should be lord of hosts, he refused to believe it to be from God; and to show it to be without authority, he drew man into sin when he had been appointed his guardian, an act whose atrocity can never be realized by a created mind. The Hindus make their form of him originally the head warder of Vishnu, the Mediator, and for arrogant demeanor, with his next mate, he was sent down upon earth, where both were to be born thrice, and one of his names was to be Hiranyacaspu, the golden-clad, the real meaning of Orion among the Greeks.* Along with Orion we must notice his two dogs Hate-light † and Rend the weak.‡ The former is at his feet, in the world of the dying and dead;

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* Where he sets his foot springs the river Eridanus, that widens to a sea in the region below and then contracts to a river, whose place is marked by the star Achemor, near the southern pole; and this is the Styx Virgil (Geor. i, 243), the river of hatred and death. The Eridanus may be the same from *eris*, hatred, contention, but more probably Jordan, the descending from *Yarad* to descend, which also may be the root to *eris*, strife.

† Cains Sierus-Kayin Zohar.   ‡ Procyon-Porek—on.

the other is above at his back, in the world of the living. The first is spiritual wickedness, the last is brute violence, hierarchial usurpation, military tyranny, that is ever attempting to influence the minds of men with fear of bodily harm and hope of sensual pleasure, instead of caring for the wellbeing of the body through the right action of the soul. This infernal dog is represented by what is called the dog-star, the brightest of all the stars, and he is held to be the mate of Hiranyacaspu, as his name is Hiranyacsha, or the golden-eyed, the Chrysaor of the Greeks, that some make a mate of Pegasus as sprung from the blood of Medusa, and father to such monsters as Geryon, Echidna and Chimaera. Concerning the Hyades in the face of Taurus and the Pleiades in his neck, we are left much in the dark. The former take the form of the half opened door of life in Taurus that is never shut, and their brightest star is the third cherubic star of the four, while its name is *Aldebaran,* which may signify the Director, the Forerunner, or the Breaker through.* It is undoubtedly (like the others) an emblem of Messiah loosing the door of life that the dead may arise with him and come into the upper world; but it is not put for Him at all, since He is already exalted above his foes; and Orion may stand, if permitted, forever aiming his arrow at the gate of life without having occasion to shoot, for they are all gone through and are out of his sight, as out of his reach forever. There is no clear notice of the Hyades in our Scriptures, not even in Joshua, unless by the name Adummim or the Reds, because the red Aldebaran is among them, and this is in the field of Judah's ensign (Ch. xv, 7) as it is in the hemisphere of Leo, and Judah's ensign is thought to be the whole sphere, as Judah (Messiah the Praised) is Lord of the whole circle of nature. (Oedipus Judaicus on Josh. xv.) Scaliger and Bayer, both preeminent authorities, affirm that the Hebrews used Adum (the Red) for Aldebaran. En. Shemesh, the eye or fountain of the sun, or the Terrible, the Dazzling, may be the same, though this is doubtful.

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* This gate of life is referred to when it said to Cain "a sin lieth by the door." This *sin* is an animal foe, a *sin offering,* and Aries is understood, for he is the world's expiation; he atones for all sin that is expiated at all.

But as to the Pleiades the case is different. They have been always seen in the Hebrew Kimah, or the Cluster (Job ix, 9, xxxviii, 31; Am. v, 8), and their delights or sweet influences (Job xxxviii, 31) are thought worth noting in our grandest instance of Paradise Regained that the world is ever to see. The Pleiades are called Benoth, the daughters or young maidens (Gen. xlix, 23, Heb.), and the Succoth-Benoth of the Babylonians (2 K. xvii, 30) seem to have been tabernacles wherein the worship of the Pleiades was celebrated. What they represent is quite uncertain. In Greece they are named the nurses to Dionysus, when he is no longer Bacchus the Bewailed, but the Divine, the son of Nysa or heaven. But as he was the Mediator—God passing down into hell at the autumnal equinox and therefore (Bakui) bewailed, so at the vernale quinox he was (Jah-nuah) Dionysus the Divine, giving rest while himself entering into eternal rest, and so they rejoiced as they had mourned at the opposite season, and this is continued in our Easter or Exaltation (resurrection) service. As the Mediator has to bide his time for seven ages before he can so show up his foes that they can never again gain credit among creatures and disturb the universe with either false rumors and dogmas or physical violence, so these are imagined in a group of seven stars in Taurus, and by some these are impersonated and named the nurses or hostesses of the Son first sorrowing, then with joy entering into rest. Of the Pleiades the Hindus say that they were once mates to the seven princes (Rishas) represented by the seven stars in the Benetnasch or hind quarters and tail of Ursa Major, in the region that is still named Paradise in the sacred astronomy, but for suspicion of some fault six (that are highest now in the Pleiades) were sent down into the neck of Taurus.† This fable looks to a time when the neck of Taurus was still below the equator and so in hell, or the world of the dying and the dead. This was about the time assigned in our Hebrew text for the fall of man; and these exiles could

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† The seventh of these is still seen as the star-satellite to Mizar and named Alcor, the tried, the pure. Those ancient forms of thought have been wonderfully preserved, though usually in distortion among the heathen, and through them we find aid in our study of the divine Word where we have least reason to expect it.

hope to revisit the upper world and remain in at least the pur-
liens of heaven when Aries came to lead the year, for Aries is
the sign of expiation for faults and sins: the Lamb takes away
the sin of the world.   It may be to this that reference is made
in Job (38, 31) for the (*maadaunoth Kimah*) delights of the
Pleiades may be the joys of the world to come and the hope
of these during the present life, that none can hinder the pure
from realizing, and so we may read, "Canst thou make sure
the delights of the Cluster?" The proper answer is, no; but
God can and will, he is both able and willing.

The hostile sect of the Greeks, after the disruption of the old
Aryan confederacy upon the Oxus, has reversed the Hindu
myth and made the seventh of the Pleiades to have flown
away up to heaven through disgust with her sisters, who had
fallen into vice. This would indicate that of the seven ages
of man one was sinless, and this was the Paradise period before
the apostacy of angels and men. But among the Greeks a
certain school prefers to assign gods as suitors to six of the
Pleiades, while one of them (Merope, a person of sorrowful
countenance) married Sisyphus, a mortal, and so her star is
dim. This explication is utterly unaccountable, and contrary
to anything in history of which we have any correct knowledge.
In every human society its first state is the best, and almost
everything deteriorates in time.   Truth popularized becomes
debased and less valued. True, in the world of study and
teaching and in the general action of society, there may be
progress, but as to what makes the true greatness of a people, the
personal wellbeing of the masses and their conscientious life, the
first state of a people is the best. Of the seven churches addressed
through St. John in the Apocalypse, the first four steadily
deteriorate; the fifth receives some degree of reform, but is far
from perfect in this, it has gone but half the way to its proper
goal; the sixth is more fully reformed and is much praised, but
the seventh is the sixth retrograded, and Laodicea, popular
rule, is loathed, and it is time for the judgment to sit upon a
world that will not yield its vices, and a church that has for-
gotten God and the lives of his grandest servants in all past
ages.   The greatness of a people is the greatness of a few

individuals, and these are sent to be God's witnesses to what is noble in life and work in the midst of abounding baseness.

So much for the Pleiades and what they indicate. Their being upon the meridian when the old polar star in the tail of the Dragon looked down at the angle indicated by the downward passage of the Pyramid, may properly signify that a time of reform was near in the call and mission of Abraham, and that the world had relapsed into an apostacy as universal as man. The Aryan schism had not yet completely broken into the hostile and godless factions of China, India, Persia, and the west; and the Ammonians had renewed the once prevalent idolatries of the countries about the Euphrates of the west and the Nile, and even the patriarchal line in Mesopotamia, when a part had migrated from the springs of the Oxus, had shown but too well what Israel would do after Joshua, and what the Hebrew Christian world would be sure to do after St. Paul, and before splitting into the hostile sects that canonised John the Faster, Mohammed and Hildebrand; when the mother of Jesus received more honor than she thought of claiming at the failure of wine in Cana, or when Jesus was tasked almost beyond endurance in his work at Capernaum by the sea.*

When the tribe of Benjamin appeared in the long line of march toward the Red Sea, the spectator would behold for their ensign perhaps two friends closely embracing (Deut. xxxiii, 12), or their substitute, a wolf.† These were both recognized forms of the Gemini in the Zodiac; where we now have a Herakles and an Apollo, where once were men or women embracing, or a man and woman sitting side by side, and where Castor and Pollux were seen mounted upon snow-white steeds, that foreshow the last stage of "the war" in the next sign, when horses have been substituted for the asses that we still preserve in the names of their stars upon our own spheres. There are two

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* The letter forms of this sign are a serpent expiring or dead, a serpent broken backed, a serpent imprisoned (in the east shut up in a bottle), etc. The serpent is put for Orion and his dogs and river. Among Egyptian forms, one is that of half the skeleton of a serpent cut lengthwise through the spine from end to end. The offender is cut asunder. (See under Centaurus-Lupus-Ara).

†Gen. xlix, 28.

wolves upon the sphere; one in each hemisphere, beside the wolf (that some make a panther) Cenntaurus is slaying in the Galaxy circle, that is independent of the Zodiac in every part. So of the Castor and Pollux of the west; in some systems they are together in Gemini; in some they are separated and the one is in his proper sign while the other is in the lower hemisphere—in the world of the dead. So upon a Hindu, Zodiac, * Gemini, as the tenth sign, is represented by a man standing and extending arms, while for a breast-plate he has a circle and inscribed cross, a form of the tenth letter in one of the Egyptian systems, and the source of two numeral systems. The Hindus, Burmese, Persians, and a few others use the circle (zero) at the right hand of a form of A (Aleph) to denote the numeral ten; † while the Chinese, Italians, and certain Egyptians use the cross alone. This sign denotes the spiritual marriage so much talked of among mystics, and allusions to it are somewhat numerous, as in Ps. xlv, the Song of Songs throughout, the Hephzibah and Beulah of Isaiah (lxii, 4, 5), Rev. xix, 7, 9, and others, besides the descriptions of Jacob and Moses mentioned above. The letter forms of this sign are usually some form of a hand, a hand and arm, a sceptre, a serpent paralyzed by a rod, and, certain others, so among the Greeks and others Hippa was a horse, a sea, a ship, the soul of the world, a priestess, etc. The forms of most letters are quite numerous, and this affords no exception to the rule.

At the coming of the tribe of Issachar one would see some form of the sign Cancer—as an ass (Gen. xlix, 14), and perhaps a horse harnessed for war, or a camp. (Deut. xxxiii, 18). The ensigns of Zebulun and Issachar are presented in a single view by Moses, and he adds ''They shall call the people to the mountain; there shall they offer sacrifices of righteousness (or appropriate sacrifices), for they shall suck of the abundance of the seas and of treasures hid in the sand.'' Deut. xxxiii, 19. Here (as in various other places) Moses shows clear traces of his Egyptian training. When the sun

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* Oedipus Judaicus, Plate IX.

† 10, 20, 20, 30, etc.

was in Zebulun (Capricornus) the country was all green from the seed sown in the retiring waters, and when it was in Issachar (Caucerselli) they had gathered their harvest a little before the coming overflow of the river. In each case the people flocked to the temples—in that country all reared upon high mounds, so as not to be incommoded by the Nile inundations—and there they offered sacrifices of thanksgiving for the prosperity of their agricultural labors during the year. As this was the sign where the Scarabaeus or Beetle was placed by the Egyptians, so one of its names was Amalek or the beetles (if not locusts), a power wasteful and destructive, for here the malignant powers are fully shown up as wasters and destroyers, not producers of anything but mischief, and finally (for the time at least) subdued. The enemy is bound when the sun is in Cancer, according to the sacred astronomy; but he has the privilege of appearing again once more at the close of the Millennium, and then (when the sun is in Leo at the autumnal equinox) he is to be forever banished from all power of working mischiefs in the world that God has created for his own glory in the wellbeing of his intellectual creation, not for the gratification of the malicious and the evil.†

Finally, when Judah appeared his ensign had for its principal figure a lion couching down for repose. (Gen. xlix, 9). Moses only says, " Hear, Lord, the voice of Judah, and bring him to his people: let his hands be sufficient for him, and be thou an help to him against his enemies." (Deut. xxxiii, 7). But Jacob, meditating upon his ensign when he gives it, at the same time sufficiently describes it: "Judah! O lion's whelp! from the prey, my son, art thou gone up. He stoops down, he is couching down as a lion, and as a fierce lion ; who shall stir him up?" He then describes the attitude of Leo on the solstice with relation to other signs. " The sceptre shall not depart from Judah, nor the lawgiver from between his feet until

† The war with Amalek lasts from generation to generation (Ex. xvii, 16), because the wicked will not yield, nor will God; he must go through. The letter forms of this sign are a cave, a house, a hollow hand, an arm and hand covering or upholding a serpent grasped by a hand, or paralyzed by the touch of a rod. This sign was in some systems one of the two gates of the sun (see under Zebulun supra) for here was interposed water that must be passed in a ship, of which a horse is a figure. (Hab. iii, 8, 15.)

Shiloh come, binding his foal to the vine, and washing his gar-
ments in wine, . . .   and against him shall the gathering
of the people be." During a portion of the year King Cepheus
with his sceptre is below the feet of Leo upon the opposite
side of the pole, but when the sun comes to Scorpio, of whose
names one was Shiloh (see under Dan supra), the king and his
sceptre are seen, in late night, not directly under the feet, but
turned a little to one side.   He (Shiloh) binds his foal to the
vine; Shiloh is the sun's dwelling place and one of his names
during the season of vintage, the season of the autumnal
equinox.

The letter forms of this sign are usually scourges of various
shapes.   The 119th of our psalms is a meditation upon the
letters as emblems of Messiah and his works, and a representa-
tion of Messiah's mediation for them that have sinned on earth
under the trials of life.   Hence, in this grand oration we have
all the letters of the old sacred alphabet (or rather Aleph-Tau)
with mediations upon these as they rise.

As the first letter (Aleph) represents Virgo Arimech, and its
secondary (Alluph) signifies a prince, so the first (or Aleph)
section is taken up with describing the character of a princely
spirit, sincere, truthful, walking in the law and aspiring to still
higher and higher conformity with its requisitions.

As the second letter (Beth, a house, a just measure), repre-
sents Libra, so the Beth section of our psalm portrays the
character of a just man giving himself day and night to the
study of the word, both in heaven and earth, that his heart and
life may both be pure and blameless.

As the third letter (Gimel) corresponds to the third sign
(Scorpio [Aquila Serpens) Ophiuchus, so in the third (or Gimel)
section Messiah prays to be preserved alive in his fulfillment of
a covenant to pass through horrible dangers in his attempt to
overthrow the malignant powers and rescue man from their
dominion that are ever drawing him into sin and sorrow.

As the ninth letter corresponds to Taurus, Auriga, over
Orion and his fiends, and denotes the resurrection from death,
with clear victory over the malignants, so in the ninth section
of our psalm Messiah acknowledges that he has received the

aid for which he prayed in the Gimel section, in accordance with the everlasting covenant. The intervening sections are less clear than the third and ninth, though in the Vau section (corresponding to Aquarius, Aristaeus and the Urn) he repeats the prayer in Gimel and mentions the everlasting covenant, while he further asks that his humilation in becoming man may not lose him the respect of the universe because he is reproached for it by the vain glorious archangel and his crew of both spirits and men. We may reasonably expect the cherubic letters to head sections more clearly than the others denoting their ideas; and so the Lamed section (corresponding to Leo and looking to judgment and truth wherein he is visibly raised to supreme power), we hear him declare that the "ordinances of heaven" have had their dominion set in the earth; judgment is brought fourth unto victory.

In the Daleth section (corresponding to Sagittarius killing the serpent at the hazard of his own life, Gen. xlix, 17), he reminds the spirit of his covenant that has been accepted and established, saying, "I have declared my ways, and thou heardst me." He asks nothing not engaged him from before eternal ages, and will do and say all he has engaged to do and say.

In the Cheth section (corresponding to Aries and his sacrifice of himself for man) he complains that the bands of the wicked have robbed him; but at midnight—in the world's darkest hour —he will arise and show the Father to be glorious in praise.

In the Yodh section (corresponding to the Gemini and his setting up a sodality hated on earth but destined to dominate it in due time), he foresees the joy that his redeemed will experience when they find that he has overcome death and returned to the upper world, though he has passed through infinite sorrows while he has wrestled with the powers of darkness in their own holds; and he asks that the proud—the apostate angels—may be shamed into everlasting silence, while all that venerate God shall come to him and find unspeakable and eternal joy.

In the Kaph section (that corresponds to Cancer-Aselli), he complains that he is ready to faint and sorely afflicted; his eyes

fail with looking for the fulfillment of the covenant, and his very form has become died and shriveled like a bottle being in smoke and heat.   He wonders how long he is still to suffer with his witnesses that lie slain about the altar and none regard.   He has been conspired against, and almost destroyed upon earth; but he will not turn aside from his work, and he knows that it shall come out right at the end.   He adheres to the law, as will every true man in the world.

As to the Galaxy system and the signs of punishment to the extreme south, there is to most no clear allusion in the Scriptures; but we may find more in it as we proceed than many suppose.   Let us test the matter fully.   The signs of this circle are four, and they occupy about ninety degrees each.   It has been generally customary to treat the stars upon each side of the zodiac as being closely related to it; but this is true to but a limited extent.   Below Cancer, Leo, Virgo and Libra, is the Hydra making signs of flight toward the west.   Upon the Hydra, below Leo, there is the cup of wrath; a little farther on is a raven devouring the body of the monster, as if he were already dead; and near the tail is an owl, that seems referred to in Iasiah (xliii, 20), where it is said, "The beast of the field shall honor me, the dragons and the owls; because I give waters in the wilderness, and streams in the desert, to give drink to my people, my chosen."   The cup also seems referred to in the Psalms (lxxiv, 8), but this is uncertain.

But in the galaxy system proper we have the way of man indicated, as in the Pyramid; and Messiah is everywhere with him to guide or bear him up till he returns, purified and glorious, to the paradise he has lost by sinning.

Near the superior pole, and almost directly over the Tauric group, we see among the stars the figure of a bow, not far above the shepherd and his kids; and not far off toward the right is a rather bright but variable star.   These indicate the position of a divine man named Perseus (Peras, Perats), the breaker [of bonds.]   His bow hangs over his shoulder; and that variable star is Al Ghoul, the head of Medusa, the Gorgon (*Rosh ha Satan*) that he holds in his left hand, twining with snakes for hairs.   This is a sign that he has overcome one that

has the power of death. A little farther on is a chair, and almost directly above Aries is a line of three rather bright stars, having a nebula near the middle star—the only nebula visible to the naked eye. A little to the left of that chair are scattered several somewhat bright stars. In that chair sits Cassipeia, the woman of veiled (sorrowful?) countenance. To the right from her as she sits is her husband, "the lawgiver"* (the kingly man), King Cepheus, or Kaikous, a well-known name of the first man among the Asiatics of the west. These three rather bright stars by the visible nebula, over Aries, are the stars of their daughter, Andromeda (*nadar mutha*), one devoted to death; a figure of the human race exposed to death through the over-weening pride of their mother, who desired that her children should become gods. She (the poets relate) has said that her own beauty is superior to that of the sea-nymphs; and for this her daughter is bound upon the sea shore, over Aries and Cetus, to be devoured by this monster; that Perseus is made to turn into a rock by showing him the Gorgon's head, when he rescues and marries Andromeda. Here we have a mystical account of the fall of man and his delivery through Messiah's triumph over death. The later Jews certainly represented the fall of man in this way, for we find the Andromeda-legend in Josephus,† who locates her binding upon certain rocks on the sea shore near Ashkelon in Palestine. All the current forms of our star-mysteries have come down from man's very first age, though some have taken local colorings on the event of their transmission to our times. The Cepheus group has come, with the others, from the first man himself, who tell us (Ps. xix., 11) that he has been warned, by a right explication of the celestial signs, in what calamities he should involve his race if he sinned, as he has not done at the time of writing his confession (v. 13).

The letter forms of this sign are mostly drawn from water in waves (M), and there are water tanks, ships, etc., the latter sometimes guarded (or piloted) by a serpent, that represents Messiah as victor over the powers of hell. In the Hebrew terminology the law, as the life of the world, is water; and the

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*Gen. xlix., 10 (see under Judah). † Ant.

name of the thirteenth letter (Mem) signifies water. One of the figures of Messiah among the cabalists is a bird leg deep in the ocean of the law, repeating to the central column (the divine Unity in Trinity) the words when " Hear, O, Israel! " is cried on earth. Hence there is no surprise to find the Mem section of our 119th psalm opening with a panegyric upon the law, under which man is condemned to death in his apostacy unless a God descends and suffers for his rescue. Hence the Cepheus group is well represented by Mem—water—among the letters. This is the first of the last ten letters that must be divided among the four signs in the Galaxy system and others below them toward the south. The certainty of our conclusion is clear. The second of these signs is a ship, and the second of these letters (Nun) is a ship. The last of them contains a cross as its principal figure, and the last of the letters is a cross.

The second of the Galaxy groups (we have said) is a ship sailing over waters. It is named Argo, or *Argha*, an ark or float: as once was Capricornus: for this latter is the Argo of fable, while that of the galaxy is the Argo of the mysteries concerning regeneration, for here again man is borne over the waters of the law that are death to the sinning; and this also in a ship whereto Messiah has turned himself.

The letter form of this sign, we say, is a ship or ark, and there are fish or serpents in some systems: the name (Nun) may signify a fish (as in some dialects) no less than a ship. Thus Joshua is the son of Nun, for Aries, his proper sign, rises after the latter half of Nun, the great fish, the Cetus that drags at the zodiacal fishes (Pisces). Nun is probably from the same root with Naus or Navis, a swimmer; and so a fish or ship may have the same name, as both float or swim over water, though a fish has the privilege of living (at least for a time) below the surface.

But every ship must have its master, its pilot and the wind for its propulsion over the waters; and so, after Nun for the ship, we have *Samech*—that has among others the form of a serpent biting his tail, an old emblem both of eternity and the eternal—for the master of the ship; then Ayin and then Pe for

its pilot and the wind that fills the sails. Samech is one that has imposed upon him some important duty, and so is a good title to one that has the general care of the ship and them that sail in it. Ayin is an eye, and so affords an equally good epithet for the pilot of a ship, who must watch the stars and beware of dangers from rocks and shoals and currents in the sea, while he keeps the ship upon the safest course determined by the master.* Pe is a mouth, or what comes forth of it—breath, words, etc.—and so, under certain conditions, it will signify wind, whereby the ship is moved in her voyage. Thus four letters may be appropriated to this sign.

The third in this circle is a horseman (Centaurus), spearing a wolf or panther near a blazing altar (Ara-Coeli), the principal figure in the ensign of Levi among the sons of Jacob. Paul seems to have this in view when he speaks of Christ slaying " the enmity " by the blood of his cross. The wolfish nature of unregenerate man is removed and gives place to what is lamb-like and self-devoting in love in the regenerate, and then the renewed man is ready for any sacrifice and any death whereby he may glorify God and confer spiritual benefits upon his fellow-man.

The letter form of this sign may be Tzade or Koph ; each of these is a slaughter-weapon. As the wolf (or panther) is speared, so Tzade, a spear, is presumably the weapon of Centaurus ; and this will leave Koph (whose shape is usually that of a battle-axe), in both east and west, to denote some means of punishing the wicked in the circle of judgment, one form of this being to cut the offender in sunder (Matt. xxiv, 51). It may, indeed, be put for the cross of Ixion, the great offender ; or Satan, who attempted to usurp divine prerogatives ; and so is made to set up an intrigue with the Queen of heaven herself, as the Hebrews tell of a Reuben that corrupted a concubine of his father's, a legend corresponding to the star-group Bilhah or Bulhah in the sign of the undoubted Reuben among the sons of Jacob on earth, she first and he after her, following Capricornus, the star of Jacob, as it sets below the sea. This cross of Ixion is directly below the feet of Centaurus, precisely as it

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*This seems alluded to in Ps. xxxii, 8 : " I will guide thee with mine eye."

should be, if our theory of it is correct; for in the Ixion legend it is said that Juno deceived Ixion by affecting to come to him in a cloud; and from this was born the centaurs. It was but natural, therefore, that he should be trampled under foot of his own offspring, for the wicked are punished by their own successes: are snared in the works of their own hands.

To the altar (upon which the Greeks say the gods were sworn in the war of the giants) may correspond the letter Resch (a head, a ruler, a scourge or sheep-hook in shape), a sign of dominion: for by humbling himself even to death, the Mediator God seals his covenanted right to rule over all things in his Father's power (Matt. xxviii., 18; Phil. ii., 9).

There still remains the letter Schin (a trident) unaccounted for. By its associations and its form (a fish spear) we must infer that it denotes Messiah controlling all things when he has overcome all his foes and the foes of man, after he has speared Leviathan himself in the bottom of the sea† (Isa. xxvii., 1). Perhaps, then, we should make Schin a substitute for the grand Phœnix Eagle that has arisen from the flames of the altar with man held in his talons, and is bearing him upward (though not on our spheres) toward paradise by the pole. This belongs to the fourth galaxy group that extends upward to the polar heights. Just above this eagle and Ganymedes (modern Antinoüs) is a cross that bears in some systems a dove or swan, and in others a man (Orpheus, Cronus, Prometheus, etc.) Near this is a lyre (Lyra-Vega), once a vulture that tore the liver of Prometheus, and on old spheres a vulture is behind the lyre, and clutches the frame with his talons. Hence some authors name this lyre and its holder vulture cadens (the vulture slain); for sin thwarted by the divine wisdom, joined with power, gives way to what is holiest and best; and the harmonies of the universe are more securely established than if they had not been disturbed. Here, then, is our final Tau (a cross) written (like Nun) upon the face of the heavens.

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† One of the forms of Schin in Hebrew coin is that of a section from the spine of a fish or serpent, with three ribs cut off rather short and in an exact line each with the other. (See under Ephraim, Supra.) The offender is cut asunder from the neck downward, so that the spine shall be fully exposed; and this is the figure Paul uses (Heb. iv., 13) to denote the penetrating sight of the divine Word, the judge of angels and men.

Beyond these the infant Heracles grasps two serpents by the neck, or holds the three-headed monster, Cerberus, in one hand, wielding in the other a mace, while he sets one foot upon the head of Draco, the serpent by the pole (and once the polar sign) as he is springing upon Arcturus below to devour him alive, while his tail is between the great and the little bears. (For these, see above near the beginning.)

Thus, in pursuit of our Bible astronomy, we have gone twice round the heavens—once from Virgo-Azimech round to Leo, and once from the Cepheus group all round to the Swan at the side of Cepheus, and to the two bears, or rather wolves, for these have tails and bears have not; yet, by some means, men have always (so far as we know) named them bears—animals that avoid men and hide in forests, as did man when he had sinned. We are now ready to take up the first case of astronomic forms in the Scriptures—that of the serpent and Eden.

There are two Edens, as there are two Jerusalems, two Sions, etc. Eden first appears as planted (mikkedem) from eternity (Gen. ii., 8), and this has its correspondence on earth (v. 10). Man at his first creation is placed in the first in a happy and enlightened state, filled with divine communications and celestial inclinations, while his body was on earth near the sources of the four rivers of India—the Oxus, the Sanpu, the Ganges and the Indus—named in Moses respectively Pison, Gihon, Hiddekel and Euphrates (Phrath). The serpent, subtler than any beast of the field, is the apostate archangel himself, the sharpest and most crafty of all that fell with him, and are called (as in the Chaldee Oracles) beasts of the earth and terrestrial dogs. The tree of life grows from the pole, and the celestial signs in the zodiac are its monthly fruits. The tree of knowledge of good and evil may be a tree upon earth, interdicted to man as a proof of his obedience. We are not bound to receive all as mystery or conventional statement. Those Hebrews that peopled Scandinavia, upon their migration in colonies from Arsereth or the lower Donaw, called the tree of life Igdrasil, or the tree of perfected knowledge.* It has three roots: one deep down in the death kingdoms, one in the zone of human

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* Higgid-doresh-el.

life, and the other at the pole itself—in hell, in earth, and in heaven.

Thus a part of the story of man's temptation and fall is told in the presentation of ideographs, drawn from the same source as the tribe standards and the stones of Aaron's breast-plate, which are allowed by the Christian fathers to correspond to the twelve signs. So, of the closing account, God set (or rather had set) before the garden, Cherubim and the flame of a sword to preserve the way to the tree of life, so that man should not grope for it like the blind, and not find it. Here is Paradise, surrounded by the twelve signs, and raying out of it is the lambent light of the galaxy, that returns on the opposite side, after running almost down to the (*hadre teman*) chambers of the south, as Sion is in the (*yarcathe zophan*) "sides of the north" (Job xix., 9, Ps. xlviii., 2), the farthest off recesses of the polar regions. So the sons of Noah separated. They bore with them everywhere, in a state more or less pure, the ideographs of the first ages. Hence (*e. g.*) in India they make their mediator god (Vishnu) set his foot upon the pole star and pour down thence through the circle of the moon (the incarnation) the stream of life upon the roots of the tree of life (Jambu Amrita) where it parts towards the four cardinal points.

The next instance of the use of astronomical enigmas in the Genesis is in the fourth chapter, where Aries is couching near the door of life (ch. iv., 7), and the next is in the fourteenth chapter, or the war of the four kings against five. The commander was named Chedorlaomer, the band round the sheaf, according to the Targum, that puts sheaves in the plural. The heavens are a sheaf of corn, whereof the zodiac is the band. Again, each constellation is a sheaf, as in the dream of Joseph, who also dreamed that the sun and moon and eleven asterisms honored him in his sign, Taurus Auriga over Orion and his dogs. In the Oedipus Judaicus it is shown that every name in the story can be treated as denoting some aspect of the heavens. Chedorlaomer is the sun encircling all the heavens in his course; Amraphel may be the lamb of wonder, a form of Aries, the station of Aries or Mars; Tidal may signify a high mound like Gibeon, and Arioch may signify the victorious lion, Arye Nok.

But not to go into all these names here, as taking up too much room, we may remark that Abram (the exalted father) is also a title of the sun; and his three hundred and eighteen men, that defeated and plundered the whole army of the east, is the number of days necessary to add to the current year when it has gone wrong for a certain time. All is a mystical expression of the fact that in the family of this childless Hebrew shall all nations be rightly instructed in divine truth, and cast aside their idols in the last days. Melchizedek, who comes in at the end and receives a tithe so huge as to pass all credulity, is Messiah bringing forth everlasting righteousness and peace, and so Paul makes him a figure of the divine Son, who has neither beginning nor end of days, and makes eternal expiation for sin. He also brings forth the bread and wine, without being complicated with the rites of the temporary paschal season; and this again is Messiah setting up his reformed society, that the world hates and yet must augment from age to age, till it is honored by the whole earth. The whole account is mystical and to us obscure, since the astronomic meanings of many names have not been preserved to our times.

The next clear instance of astronomical enigmas used in story or prophecy is in the forty-ninth chapter of Genesis and the close of the forty-eighth. Of large portions from the former we have spoken already, but still there remain a few yet unexplained. At the close of the forty-eighth, Jacob is made to say to Joseph, whose two sons he has just adopted as heads to tribes, "I have given thee one portion above thy brethren, that I took out of the hand of the Amorite with my sword and with my bow." Like David, another ancestor of Messiah, he can speak in his person, owing to the organic unity of the family, and in giving Joseph a standard for his tribe he uses these words. He gives him Sagittarius with his bow bent upon the foe. An Amorite is a talker, a declamer, a teacher; in a bad sense, a vain-glorious talker, a boaster, a liar, an impostor; hence, it is an appropriate epithet of the vain-glorious archangel himself, and of such as are like him. The position of Sagittarius (Zidon) Messiah has won when the foe, driven out of Scorpio (Aquila-Serpeus) Ophiuchus, has fortified himself to

resist Messiah's advance, and now he gives the sign of his victory to Manasseh through Jacob.

It will be noticed that this gift is made by itself, and not in connection with the family in general. So, among the apostles, Paul stands by himself "as one born out of due time." The reason, probably, is that, like Manasseh, Paul makes a thirteenth, and there must be only twelve mentioned or counted at any one time. For a like reason it must not be recorded that Abram was born when his father was ten times thirteen years old, and so that is left to be inferred by putting together several facts, of which one is stated after the ascension of Messiah. (Acts vii., 4). Abram's mark is not thirteen like Seth's; (Gen. v., 3) but this is left for Ishmael and his descendants after him, till the end of the world, as also first to the adherents of Jeroboam and the heretics of the first five Christian centuries, for Ishmael's descendants have no settled place in history until thirteen times two hundred and three years from his circumcision at the age of thirteen, when their career is ready to be marked all down to the fall of the Turks by multiples of thirteen.*

It cannot but be noticed that scarce anything in the last words of Jacob and Moses can refer to the earthly condition of the Hebrews under the Theocracy, and Jacob expressly shows this at the beginning. Still there is no good reason why their earthly condition in the last days should be excluded. They, for instance, that shall "push the nations to the ends of the earth" are the ten thousands of Ephraim and the thousands of Manasseh (Deut. xxxiii., 17), the same of whom it was said long before (Gen. xlviii., 19) "He shall be a great people," and "He shall become a multitude of nations," where everything is plain and without the semblance of mystery. As to the whole, the Jews have ever referred nearly everything to the times of Messiah, according to the rule that all the prophets prophesied of the times of Messiah. A right apprehension of the relation of astronomy, as well as of artificial numbers and

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* Twelve hundred and sixty years were to elapse from the Hejra to the occupation of Egypt by the Hebrews of England, and so the first Moslem period, from 622 to Omar, must be twelve years. Then all is divided by thirteen till the end, for 1260 is not an exact multiple of thirteen, but is short of thirteen times ninety-seven.

names, to the text of the Scriptures, will go far to render them intelligible, as they never have been since the apostolic age to the great body of the religious world, for, after the death of the apostles, Hebrew thought was scarcely studied, and the Hebrew language in its most external forms was but partially known, even to the scholars of Alexandria and Rome. Hence, artificial and spurious modes of interpretation became adopted, along with the vain philosophy of the Gentiles, whereby the darkness of the middle ages and the growth of popish frauds for many weary centuries became but too well assured. It is only by mastering the problems partly solved by St. Paul and the great Rabbinical circle in which he was trained that the supremely glorious truth of the Scriptures can be realized, in anything like its fullness, to modern times.

Searching investigation will discover many allusions to the old sacred astronomy not noticed in this paper, for no one can gather them all. They are frequently so subtle and obscure as to elude all but the sight of one divinely inspired. Thus "abundant waters wrung out" to the upright among the violent and lawless* may pass unnoticed by nearly the whole world, though it is to an adept a clear allusion to the sufferings of Messiah, indicated in Aquarius-Aristæus, when he receives into his urn, or swallows down the whole violence of the river of death. Again, Messiah ruling "from sea to sea, and from the river to the ends of the earth," may seem a Judaism for the land sworn to the fathers in western Asia; but this is too poor a patrimony for the supreme Solomon, and we must look for it in the celestial way. He shall set in the earth the dominion of the "ordinances" declared in the whole circle, from the sea by Aries to the sea beyond the Gemini, and from (*nahar*) the flood they meet by Zidon, round to the shores of the same, the "going out" (Deut. xxxiii., 18), whence sails the ship that bears all the best hopes of the world. The "waters above the heavens," in the Psalms (cxlviii., 4) are, probably, upon the sphere, and the "heavens of the heavens" (here and in Ps. lxviii., 33) are the (*shamayim*) high places or signs (Cherubim) whereinto Messiah transforms himself. Above

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* Ps. lxxiii., 20.

all "the things in the heavens" mentioned by St. Paul (Heb. ix., 23) whose "patterns" on earth were purified with the blood of bulls and goats, while these were to be justified by something better, are evidently the "ordinances of the heavens," whose "dominion" is to be "set in the earth." (Job xxxviii., 33.)

Thus, while astronomical enigmas mingle in the world's sacred history only in the Penteteuch, in Joshua and the Judges till the close of the story of Samson, and there disappear forever, while artificial numbers and names go on to the end, allusions to astronomical aspects occur everywhere through the whole Bible, from Job to the Apocalypse, everywhere reminding adepts in sacred study that God becomes man for purposes of manifestation, and in that manifestation is included the sloughing off of a heresy, the punishment of the wilfully perverse, and the salvation of all that imitate God in choosing excellence and ensuing it to the end.

ASAHEL ABBOTT.

THE DRUIDS.

"And the Lord shall scatter thee among all people, from the one end of the earth even unto the other, and there thou shalt serve other gods . . . and among these nations shalt thou find no ease, neither shall the sole of thy feet have rest." Deut. xxviii, 64.

"My God will cast them away, because they did not hearken unto Him, and they shall be wanderers among the nations." Hosea. ix, 17.

In the preceding article, the learning of the ancient Britons has only been incidentally mentioned; their astronomical observations, their schools and colleges which were famous in Gaul, their tribunals of justice, their prophets and their bards have been omitted that the one point might be more clearly shown, namely, that wherein they were idolators, their idolatry was *that of Israel*—the *Beth Khumri*.

The inferential proof is strong that the same can be asserted of their luxury and civilization, particularly at their earliest settlement. It is the custom to claim much for the influence of the Romans over these people whom they miscalled "barbari-

ans," but the view of the conquered nation was different; they are reported to have said that when the Romans made a *desert* they called it *peace!*

These same Romans could hardly understand the high and lofty bearing of the members of the royal "barbarian" families who were taken captives to their capital.

Tacitus said of Caractacus (Welsh, *Carra-dag*)—the king of the Welsh Silures—that when he appeared in the street in chains before Claudius, his noble appearance and his eloquent harangue so impressed the emperor that he at once ordered him to be set at liberty. Some of his words were: "If I had yielded at once without opposing you, neither would my fortune have been remarkable, nor your glory memorable; you could not have been victorious, and I had been forgotten. If now therefore you spare my life, I shall continue a perpetual example of your clemency." His father, Bran, remained seven years at Rome as hostage for his son, and there learned of Paul the religion which he took back to Wales. He took with him also, three Christian teachers, Illtid, Cyndaf and Arwystli—which is Welsh for Aristobulus—whose household, perhaps including Bran, Paul greets (Rom. xvi. 10). The 35th Triad tells us: "The three Blessed Sovereigns of Britain were: first, Bran the Blessed, who first brought in Christianity among the Cymmry from Rome; second, Llerwg the Blessed, who built the first church in Llandaff, which was the first church built in Britain, and endowed it with legal rights of country and district and judicial powers, and that of taking attestation on the faith of a Christian; third, Cadwalader the Blessed, who gave permission to all the faithful who fled from the infidel Saxons and their chiefs, to settle in their territories." ('Welsh and Ancient Britons,' by Prof. Tanner, F. R. S.)

Of Claudia, the daughter of Caractacus (probably mentioned in 2 Tim. iv, 21), we have such a description from one of the Roman poets, that we are reminded of the Nazarites who are said by Jeremiah (Lam. iv, 7) to have been "purer than snow —whiter than milk—and more ruddy in body than rubies." Her appearance the Roman poet thought the more remarkable, as she was descended from the blue or woaded people; this

coloring of the skin he seems to have mistaken for a natural peculiarity.

The history of this people covers so great a period that what is true of one time is untrue of another, and we cannot learn from Cæsar the early civilization— which belongs more particularly to this branch of the subject—of the several centuries following the entrance of the Cymmry into the country. This civilization is not only a proof of their origin, but was of such a nature, so mixed with their religion, that it was never wholly lost. Throughout their entire history it appeared in fair and vigorous blossoming whenever there were times of peace, and when these periods of rest were long continued, the abundant fruit was clearly that of the parent tree.

Taleisin, the Welsh bard, thus describes the first settlers:

> "A numerous race, fierce they are said to have been,
> Were they original colonists, Britain first of isles,
> Natives of a country of Asia, and the country of Gaffis;
> Said to have been a skilful people, but the district is unknown.
> Which was mother to these children, warlike adventurers on the sea,
> Clad in their long dress, who could equal them?
> Their skill is celebrated ; they were the dread of Europe."

These "long dresses" appear to be one of the distinctions of the Israelites. On the Black Obelisk found in Shalmanezar's palace at Chalah, in connection with his victories there is a representation of five nations bringing him their tributes. Among them are the deputies of Jehu, tenth king of Israel. These Israelites are bearded, and have long hair, round caps on their heads, and shoes on their feet. Their under garments reach to the ankles, the outer fall in two parts to the hem of the under. The inscription is "The tribute of Jehu, the son of Khumri." Shalmanezar, was however, mistaken in calling Jehu the "son of Khumri." He was only so in being one of the Kings of Israel, to whom Omri—Khumri—had given this name.

Dr. Nicholas, in speaking of the inhabitants of Britain, says, they were "free, industrious, ingenious, spirited, with superior knowledge of the arts, working in metals, commercially enterprising, ready to welcome strangers, holding intimate communications with the continent; subsisting in small kingdoms, each under its hereditary sovereign; proving respect to women by

entitling her to the throne; and so far advanced in intellectual, religious and general culture, that the Gauls sent their sons to Britain for the more advanced education, and the country was generally populated."

If we accept as a fact that these early inhabitants were the idolatrous Israelites, we may safely claim for them at the time of their first settlement in Britain, whatever they could have learned from the nations adjoining Palestine, or from those with whom they had mercantile relations, particularly Egypt and Phœnicia. The Phœnicians were their chosen friends, especially during the dynasty of Omri; his son Ahab married Jezebel (Isabel), the daughter of Ethbaal, king of Zidon; and Ahab not only built a house for Baal, but for himself built summer and winter houses, one of them of ivory, and all, doubtlessly, rich in ornament and crowded with luxury. So adorned was his capital, that Samaria was known to the prophets as the "Crown of Pride."

The prophet Ezekiel says (ch. xxvii. 17) that Judah and the land of Israel were the merchants of Tyre, and traded in her markets, and of these people, with whom Israel was thus connected, Duncker says, "There is scarcely any side of civilation, any forms of technical art, the invention of which was not ascribed by the Greeks to the Phœnicians, especially the building of walls and fortresses, mining, the alphabet, astronomy, numbers, mathematics, navigation, together with a great variety of technical skill."

The Tyrian dye was invented and utilized by them, and Pliny mentions that the Gauls learned from them the art of tinning *culinary* vessels. I emphasize the word culinary, because when science enters the kitchen we infer that civilization has made great advances. For much that is ascribed to them by the Greeks, Phœnicia was greatly indebted to Egypt, and a recent writer says, "Egypt had a school of architecture and sculpture, a recorded literature, religious ceremonies, mathamatics, astronomy, music, agriculture, scientific irrigation, the arts of war, ships, commerce, workers in gold, ivory, gems and glass, the appliances of luxury and the insignia of pride, ages before the

race of the Hebrews had been evolved from the fierce Semitic tribes of the desert."

Of the Raamses of Exodus, an Egyptian writer speaks most enthusiastically, thus describing the comforts of this court city of Raamses Second. He says, "Nothing can compare to it on the Theban soil. It is pleasant to live in. Its fields are full of good things, and life passes in constant plenty and abundance." After describing its fish, fruit and vegetables, he says, "Sweet is their wine for the inhabitants of Kemi." Of their traffic he continues, "Their sea ships enter the harbor, plenty and abundance are perpetual in it. He rejoices who has settled there. The common people as well as the higher classes say 'come hither.' The youths of the conqueror's city were perpetually clad in festive attire. Fine oil was on their heads of fresh curled hair. There was wine in the gardens, fine oil at the Lake Sagabi, garlands in the apple orchards. The sweet song of women resounded to the tunes of Memphis. So they sat there with joyful heart or walked about without ceasing."

Of Seti First—the seond of the nineteenth dynasty—we learn that he carried his victorious arms to Mount Lebanon, and took from thence tall cedars for masts and for flag-staffs to adorn the Theban temples. ('Exodus of Israel,' by Brugsch Bey. Edited by F. H. Underwood).

The prophet Ezekiel (xxviii, 5) gives an account quite equalling this of the excesses of Tyre, the chief capital of Phenicia. He says, "By thy great wisdom and by thy traffic hast thou increased thy riches;" and in a description of what may have been their *yachts*, he proves a luxury that would be extravagant even in our day. For these vessels which combined pleasure and profit, the cedars of Lebanon furnished the masts, the oaks of Bashan the oars, the isles of Chittim produced the ivory for the benches, Egypt made the fine linen with broidered work for the sails; blue and purple coverings came from the isles of Elishah (probably Greece; Elishah was a son of Javan, and Javan is the general designation of Greece). The wise men of Tyre were the pilots, and the ancients of Gebal the calkers (ch. xxvii).

Such was the civilization of the nations with whom the

Israelites had constant intercourse, and there is no reason to suppose that they came behind them in any one particular. In addition to the charges against God's people for idolatry, it is ·said "they followed vanity, and became vain and went after the heathen that were round about them," (II Kings xvii, 15). And the words of the prophets following the dynasty of Omri are a constant testimony that the Israelites had almost ceased to struggle against the temptations presented on all sides. They were "broken in judgment," and the "statutes of Omri were kept." Their history were that of other nations. Learning, luxury and civilization were united with idolatry, oppression of the poor, and every form of cruelty. The highest and richest palaces looked down upon the lowest and most sordid huts. For these sins Israel lost its inheritance, and rich and poor became alike wanderers. They carried with them the memories of the past, they built monuments and left traditions in every land through which they travelled, and everywhere these monuments and traditions told the same strange story of a nation that could worship and "swear by the *Lord*," and with equal sincerity "swear by *Malcham*." (Zeph. i, 5). Malcham was Moloch, "the *king of the gods*," so called in ancient Phœnician theology. The sacrifices to this god are referred to in the last article. Israelites and Druids like the inhabitants who replaced them in Samaria "feared the Lord, and served other gods." (II Kings xvii, 33). Such a nation may well have built the palaces and judgment hall of Tara's Hill, the vitrified forts and fire towers of Scotland (Jeremiah vi, 1), the mysterious temples of Abury and Stonehenge, and raised "stone images," such as the gigantic Tolmen of the parish of Constantine in Cornwall.

Dr. Smith says that "everything within the circle of magic or, to speak more properly, within the compass of experimental philosophy, was the study of the Druids" and the Druids were the learned class of that nation that best answers to what we have every reason to consider Israel was at the time of the Assyrian captivity.

To identify Israel with the ancient Britons, and Israel's idolatrous priests with the British Druids and bards, both civilization

and idolatry must be conceded. Both Jehovah worship, and that of the heavenly host, which He created, must be admitted. Our writers must cease to deny that our ancestors bowed the knee to Baal and to Moloch. They must accept the fact that the largely quoted promises are followed closely by denunciations, and that only when repentant Israel ceases to say Baali, can the loving word of Ishi be pronounced. (Hosea ii. 16.) The Lord will make no covenant with His people until Baalim is utterly put away, in all the forms in which the worship of the creature instead of the Creator, still exists. When as a nation, they "hate the evil and love the good, and *establish judgment in the gate*, it may be that the Lord God of hosts will be gracious unto the remnant of Joseph. (Amos v. 15.)

The prophet Moses foresaw their sin, and told them that when they should call to mind the precepts he had taught them among the nations whither they would be driven, and would return unto the Lord, then should they be gathered from the utmost part of heaven and brought again into their own land. —Deut. xxx.

King Solomon prayed: "If they shall bethink themselves . . and repent, and make supplication unto Thee in the land of them that carried them captives, saying, We have sinned and done perversely; we have committed wickedness, and so return unto thee with all their heart, . . and pray unto thee toward their land, . . . then hear thou their prayer and their supplication in heaven, thy dwelling place, and . . forgive thy people that have sinned against thee, . . . for they be thy people and thine inheritance, which thou broughtest forth out of Egypt, . . . for thou didst separate them from among all the people of the earth, to be thine inheritance, as thou spakest by the hand of Moses thy servant."—I. Kings viii, 47–53.

"And the Lord appeared unto Solomon . . . and said unto him: I have heard thy prayer and thy supplication that thou hast made before me; . . . if thou wilt walk before me in integrity of heart and in uprightness, to do according to all I have commanded thee, . . I will establish the throne of thy kingdom forever, . . . but if ye turn from follow-

ing me . . . I will cut off Israel out of the land which I have given thee." . . .—I. Kings ix, 3–9.

During the prevalence of the worst idolatries some, undoubtedly, preserved their faith and retained pure Jehovah worship, but that the larger portion were idolators is as plain in God's Word as is their final restoration. From the time of the establishment of this mixed religion as the religion of the court, the Beth Omri, or Khumri, worshiped the host of heaven, and the testimony is too strong to be refuted, that the Khumric, or Cymmric priests carried their Baalim into the land whither they fled, that they might worship their gods in peace. For a time they were able to "build and to plant," and then Ezekiel's prophecy was fulfilled (vii, 25, 26): "They shall seek peace and there shall be none; mischief shall come upon mischief, and rumor upon rumor, then shall they seek a vision of the prophet, but the law shall perish from the priest and counsel from the ancients."

Having now given at least some proof that the ancient Britons were the dispersed of Israel, it is necessary to repeat the oft-told story of how they reached the green isle. I will quote from the "Transactions of the Cymmorodorion, or Metropolitan Cambrian Institute," vol. 2d: Essay on the tribes of ancient Britain. "The aboriginal inhabitants of this country never called themselves Britons, their designation was that of Cymmry, or aborigines, and by this term their descendants distinguish themselves to this day from the other inhabitants of the isle. Before this island was inhabited it was denominated Clas Merddin—the sea-girt green spot. After it was colonized by the Cymmry it was called Mel Ynys—the honey island. When it was organized into a commonwealth by Prydain, the son of Aedd Mawr, the people called it Yynys Prydain—the isle of Prydain. All proper names in the old British language have a significant import, and that of Prydain, applied to a person or country, means *abounding in beauty*, hence the Cymmry appellation Yynys Prydain—the isle abounding in beauty. By this name the island was known to the Celtic tribes upon the continent, and when the Romans conquered Gaul, Julius Cæsar heard this designating term. The Roman general easily

Latinized it into Britannia and the people into Britons. The appellations given to the Cymmry and their country were adopted by foreign historians and poets, and after traveling a long round in Roman garb assumed the form of Britain and Britons. As the modern inhabitants feel a pride in the name Britons, they generally distinguish the descendants of the old settlers or Cymmry by the names of Welsh, Cambrians, or ancient Britons, though the people of Wales never assume any other name among themselves than Cymmry."

"From the historical Triads, it seems there were no less than seven grand tribes in the island at the period of the Roman invasion, besides other roving parties. It is equally clear the first settlers were of Arabic origin, and a distinct people from Goths and Vandals. The first settlement was in the Tauric Chersonessus, and next on the western shores of the Euxine. Their numbers were considerable, their government patriarchial. Their real or symbolical leader was called Hu Gadern (Hu the Mighty).

"Hu, we are told, was a man of peace, and being surrounded by warlike tribes, determined to emigrate to a land of quiet and rest. He and his followers reached the German Ocean, which a part of them crossed and reached Britain. They did not come from Gaul as asserted, but crossed the German Ocean, or Hazy Sea, as they termed it. They landed in the North of England, and spread over many parts, and on to Wales. The other portion separated from them, turned to the left, and traveled to Amorica, the present province of Brittany in France."

The tribes—the Cymmry—who reached Britain are described as forming a commonwealth, and protecting themselves with laws and civil institutions. How long they continued to dwell alone is not stated, "but at a subsequent period," says the writer, "two large colonies of those who had settled in Gaul came over and joined these tribes." We know from the authority of the following Triad they were received in peace.

"There were three social tribes of the Isle of Prydain. The first was of the tribe of the Cymmry, who came to the Isle of Prydain under Hu the Mighty, because he would not possess a

land by fighting and pursuit, but by justice and tranquility. The second was the tribe of the Lloegrians, who came from Germany. They were descended from the primitive tribe of the Cymmry. The third were the Brython, who came from Amorica, and who were also descended from the primitive tribe of the Cymmry. They were called the three peaceful tribes, because they came by mutual consent and tranquility, and these tribes were descended from the primitive tribe of the Cymmry, and all these had the same language and the same speech."

It is difficult to know what to omit in this interesting historical essay by the Rev. Mr. Probert, but it is impossible to transcribe his entire account of the division and preparation of the island in apparent expectation of the coming of others of their nation. Another triad, quoted by him, says after all this, "three refuge-seeking tribes" soon followed. Afterwards two others, so that at the invasion of the Romans seven distinct tribes occupied Britain. To these many smaller bands were added, but the seven tribes remained separate. Their names were Cymmry (the original settlers), Lloegrwgs, Brython, Caledonians, Gwddyl, people of Galedin, Coranians, and Peithwys or Picts—all probably tribes of the Cymric nation.

We have some additional information in regard to one of these tribes, which aids in the identification of them all. The Gwddyl or Gaels were divided into two sets—the peaceful, called the Gael Albanach; and the fighting, called the Gael Fichti. The first can be traced to Nord-albin-gia, a region near the River Elbe, the ancient name of which was the Albis.

The Gael Fichti stopped a while in Gaul on their journey from Scythia, and built Pictavium, now Poictiers. A mile and a half from the town, on a height a little to the left of the road to Limoges, remains the imperishable mark of the idolatrous Israel. A huge Tolmen, called now Pierre Levée, thirteen feet long and three feet thick, supported only on one side, challenges the interest of the antiquarian. Rabelais describes it as a stone erected for the carousals of the University students!

The chief point of identification is in the word Gael, and Gaddiel or Gael means god of fortune—being a god much reverenced on the east side of the Jordan, where the tribes of Gad

and Reuben and the half tribe of Manasseh had their portions. On the Moabite stone Mesha says he is the son of Chemosh-gad—the god of fortune—and this idolatry of Moab was too near these tribes of Israel for them to fail in experimenting upon it.

But this subject cannot be more than referred to in this article. The identifications on the lines of the wanderings are innumerable. Those of Brittany alone, where a part of the first division of the "wanderers" settled before crossing to the Isles, would fill a volume.

In the essay by Mr. Probert there is a new derivation of the word Celt. He says "Celtic writers admit that the people known as Caledonians were descended from the Cymmry, whose fathers, separating from their brethren during the period of their grand emigration toward the west, had settled in some part of Europe till war or famine" (a Triad mentions flood as a reason) "urged them to take refuge in Britain. Further, it is well ascertained that the middle of Scotland was one immense forest called Coed Celyddon. In this woody country the people were placed, and as the root of Celyddon is *cel*, denoting a shelter or shade, hence sprang Celt, Ceiltraid and Ceiltwys, all of which terms are either descriptive of the country or its inhabitants, being people of coverts or woodmen."

This derivation—if it is meant that Celyddon and Celt are from the same root—is not disproved by the quotations from Herodotus and Diodorus Siculus given by Higgins. From Herodotus he quotes that "the Celtæ are the most remote inhabitants to the west of Europe, except the Cynetæ." From Diodorus Siculus: "And now it will be worth while to declare that which multitudes are altogether ignorant of. Those who inhabit the inland parts beyond Massylia and about the Alps, and on this side of the Pyrenean mountains are called Celtæ; but those who inhabit below this part called Celtica, southward to the ocean and the mountain Hyrcinus and all as far as Scythia are called Gauls." But the Romans call all these people generally by one and the same name, Gauls." Also that Galates, the son of Hercules, ruled in Celtica, and from his

name the people were called Galatians, and the country Galatia, Gallia or Gaul.

In addition to the seven tribes, bands from the Celtic Gauls established themselves in the island. The Belgæ became a leading tribe. The Welsh form of Belgæ is Belgiad—one that over-runs—and these over-runners were settled in Britain several centuries before the Roman invasion, and are supposed to have been of the original Cymmry stock. We are also informed that the Peithwys, or Picts, "landed in North Britain and settled on the eastern coast of Scotland. They are mentioned in the Triads as coming over the Baltic Sea, and it seems evident that they too were of the original Cymmric stock, though probably corrupted by staying in North Europe behind their brethren and intermixing with other tribes. Among all the arrivals the Triads only mention the Lloegrwys Brython and the people of Galedin as tribes who came over in peace, and were received by the native Cymmry as friends. A change was naturally wrought upon the peace-loving first settlers, but it is an important point to notice that most of the invaders were related to the native Cymmry and spoke dialects of the same common language.

The concluding remarks are these: " From the preceding statements " (of which I have quoted but a short portion) "we learn that the original inhabitants of Britain were a quiet, peaceable people: secondly, they were invaded twelve different times; the principal invasions being those of the Romans, Saxons, Danes and Normans ; they were deprived of their territory, and their character changed, the invasion having but little effect on their language, which continues grand and energetic."

The influence of the Latin on the Welsh language is disproved, and the Welsh asserted to be the more ancient and more philosophically formed ; the resemblances between the two are explained by both containing fragments of the old antediluvian language. The proof that the Britains did not derive such words from the Romans is, that in the Welsh they can be traced to their genuine roots or elementary sounds, and their ideal signification easily explained. One of the examples given is the Latin word Minister—a servant; in Welsh, Menestyr;

root, *menest*—a servant. This interesting subject of language cannot here be entered upon ; the " Essay on the invasions of Britain and their effect on the inhabitants," from the same volume of the Transactions of the Society, is well worth reading, and to it those who care to pursue the subject are referred.

The researches of our societies have traced the Cymmry of the Triads back to the Tauric Chersonessus—the Crimea—and thence to Asia, and the subject has been so exhaustively treated that but few words are needed to complete the argument of this article by tracing the wanderers to the regions of Media and the surrounding countries, at the date when the last deportation of the Ten Tribes took place.

A few references to Sharon Turner's ' Anglo-Saxons ' will be sufficient. He makes three points, especially important to us because his object was only to find the origin of the Anglo-Saxons and not to identify them with the Ten Tribes.

(I.) He traces the ancestry of the British to Media. (II.) He finds sufficient testimony to prove that the time of our ancestors' appearing there was about the eighth century B. C. (III.) He proves that Media was not the birthplace of the nation that appeared there at that date.

One of his quotations from Herodotus is to the effect that the first scenes of the progressive power of these people was in Asia, to the east of the Araxes ; and on the Araxes, one of our writers states, is a Russian fortress bearing the name of Khumri.

The "progressive power," or westward march of the nation in separate bands, can be traced, as has been said, throughout the continent, and is a distinct and interesting part of the subject, but, like much that has been omitted, is too extensive for these articles.

Their object has been to prove, *first* that the Khumri of Britain were idolatrous Israel; *second* that the Khumric or Druidical priesthood, was the priesthood of idolatrous Israel (the Chemarim of Moloch, which word in the Targum is translated ' priests of idolatry") and third that the Khumri who traveled westward to Britain started from the location which the Khumri

reached who traveled northeast from Palestine, as captives of the King of Assyria.

It remains now only to sketch the dynasty from which they took the name of Khumri.

E. BEDELL BENJAMIN.

USES OF THE GREAT PYRAMID.

The many able advocates of the mathematical and astronomical uses of the Great Pyramid, including its metrological and chronological uses, almost totally ignore the idea that it was built for the same inferior and commonplace uses as the other pyramids, as much exceeding them in these functions as it exceeds them in size, and that therein, more than in anything else, it was intended to subserve the highest and holiest of objects, that of representing the Christ and his Kingdom. They appear to overlook the fact that in everything true to Nature, like form indicates like function ; and therein they lose sight of the fact that, in order to symbolize the incarnate Son of God, the Great Pyramid must symbolize humanity in its lowliest and most utilitarian aspect, and that in no other way than in that of representing the very Servant of servants can the Pyramid of pyramids represent mankind recreated into the image and likeness of its great Exemplar.

Having presented what seem to me very good reasons for believing that the primary uses of the Great Pyramid were those of a military defence or treasure-stronghold, ending with its conversion into a sacred shrine or monumental tomb, and that in these inferior uses it symbolized the Christ in his assumption of the contest of human nature with the powers of darknes, in his offer of himself as a refuge from sin and death, in his guardianship of the treasures of wisdom and knowledge committed to his care by his Heavenly Father, and in his victory over death and the grave for those who sleep in his embrace, I now proceed to answer my venturesome queston in regard to its Treas-

urer and its king's and queen's chambers, *What had he in the one, and who in the other, to justify his hewing out and graving them for himself, rather than for his king?* The question is a corollary of the one propounded by Isaiah to the treasurer of King Hezekiah: "What hast thou here, and whom hast thou here, that thou hast hewed thee out a sepulcher here, (as be of the chant),

> 'Hewing him out a sepulcher on high,
> Graving a habitation for himself in the rock?' "   (Isa. xxii. 16·

Reasoning from analogy, I conclude that in the king's chamber he had gold and silver money belonging to the Pharaoh, and gold and silver in the form of divinely ordained standards of weight, length, and capacity, correlated with the skeleton "measure of the man" who was predestined to occupy its granite sarcophagus, and more properly belonging to himself and his posterity than to his king ; and that in the queen's chamber he had Asenath, in the character of priestess and keeper of the wardrobe, presiding over the royal raiment and crown-jewels, and over the garments of a priesthood prefigured by the original of the greenstone statue in the niche, including the ephod, with its jeweled shoulder-pieces and breast-plate, symbolizing the twelve tribes of Israel, and enclosing the mysterious Urim and Thummim, the media of access to the mind and will of Jehovah. Of course, I do not suppose Joseph and Asenath "entered into their chambers," or literally occupied these similitudes of "the secret place of the Most High" except as occasional visitants ; but we may reasonably believe them to have been there most of the time in their subordinates and representatives, and all the time in their attributes of supervision and superintendence.

When Joseph, in obedience to the command of Pharaoh, had furnished his brothers with wagons and provisions, to bring their father and their households down into Egypt, to "eat the fat of the land ;" and when he said to them, in the words of the Pharoah, "Also regard not your stuff, for the good of all the land of Egypt is yours," he gave to each of his half-brothers two "charges of raiment ; but to Benjamin," his mother's son, "he gave three hundred pieces of silver,

and five charges of raiment." (Gen. xlv, 22.) It is not said that the " three hundred pieces of silver," and the " five changes of rai- ment," had relation to the triangular sides, and to the pentag- onal structure of the treasury from which they were taken, but the correspondence between internal and external in nature renders the association of ideas worthy of respectful considera- tion. Neither is it said that Joseph took the silver and the garments from two distinct departments of the treasury over which he presided, corresponding with the king's and queen's chambers of the Great Treasury that was to replace the old one, but many analogous facts and concurrent circumstances can be adduced to show the probability of his having done so. He also sent to his father " ten (he) asses laden with the good things of Egypt," (probably changes of raiment for himself, for his grandchildren, and for his servants), " and ten she-asses laden with corn and bread and victuals for his father" (probably in- cluding his father's entire retinue) " by the way." The " goods," or " good things of Egypt," must have been the sort of treasures of which the Pharoah had commanded, " Also re- gard not your stuff, for the good of all the land of Egypt is yours." Abram's treasures, including the golden ring and bracelets sent by him to the daughter of Bethuel by the hand of his steward, are in the O. V. called "goods," and in the R. V. "goodly things."

The word "stuff," in modern parlance, generally means worthless trash, comparatively so even when applied, in allusion to its derivation, to the "stuffing," filling, or contents of a re- ceptacle; but let the reader, with the help of his concordance, follow up the Bible meaning of the word "stuff," and he will find that it is another word for "goods," meaning dry-goods, mostly ready-made clothing, in extremely intimate association with jewels and the precious metals, as the contents of treasure- strongholds. "Also regard not your stuff, for the good of all the land of Egypt is yours," might better be rendered, "Be not sparing of your goods, for the goods of all the land of Egypt are yours." In this authoritative welcome, which was evidently intended to relieve Joseph from any possible feeling of nepot- sm in the gratification of his desires, the large-hearted Pharaoh

contrasted the meagre treasures of the Israelites with his own superabundant treasures, which were soon to become "all the treasures of Egypt," and to require a much larger and more impregnable stronghold for their accommodation and defence than the one that Joseph began with.

To remove any doubt in regard to "stuff" and "goods" having been equivalent names for at least an important part of the treasures in the strongholds of the Old and New Testaments, let us glance briefly at some of the texts in which they are referred to. In Exodus xxii, 7, 8, we read: "If a man shall deliver unto his neighbor money or stuff to keep, and it be stolen out of the man's house, if the thief be found, let him pay double. If the thief be not found, then the master of the house shall be brought unto the judges, to see whether he hath put his hand unto his neighbor's goods." The treasures in this case are called "money," "stuff," and "goods;" and that the "house" in which they were deposited was not a dwelling, but a store-house, or treasure-stronghold, we may see by comparison with Gen. xlvii, 14, and 2 Kings, xx, 13. Also, in 1 Sam. xxx, 24, David is reported as saying to the men of Belial in his army, who wished to appropriate to themselves and their fellow raiders all the spoil taken from the Amalekites, "As his share is that goeth down to the battle, so shall his share be that tarrieth by the stuff: they shall share alike;" and it is added that David "made it a statute and an ordinance for Israel unto this day." Here we see that the depository of the "stuff" was a fortification, requiring to be defended by a garrison, and that it occupied a commanding position, from which the aggressives went "*down* to the battle."

A treasure-stronghold very like a pyramid is evidently alluded to as the depository of "stuff" in this passage in Ezekiel: "Then shalt thou bring forth thy stuff by day, as stuff for removing; and thou shalt go forth at even in their sight, as they that go forth into captivity. Dig thou through the wall in their sight, and carry out thereby" (xii, 4, 5). Jehovah calls himself "a strong tower," and his people his "peculiar treasure;" and here, under the symbol of a mastaba being digged through by a thief, and of the treasures being carried out by the breach,

he represents himself as no longer an impregnable defense of his people; and represents his people, because they are "a rebellious house," as being taken from his guardianship and carried captive into Babylon. The digging through by a thief makes it a parallel passage with this in Matthew: "But this ye know, that if the master of the house had known in what watch the thief was coming, he would have watched, and would not have suffered his house to be digged through" (xxiv, 43). Of similar import is this in Mat. xii, 29: "Or how can one enter into the house of the strong man, and spoil his goods, except he first bind the strong man? and then he will spoil his house."

One other passage in regard to "stuff" will suffice to show that it was of two kinds, like those given by Joseph to his brother Benjamin; and that these diminished just so much the treasures in his treasury. Jehovah said to Joshua concerning the deficit in the treasures devoted to "the treasury of the house of Jehovah" from the spoils of Jericho: "Israel hath sinned, and they have also transgressed my covenant which I commanded them; for they have even taken of the devoted thing, and have also stolen, and have dissembled also, and they have put it even among their own stuff" (Josh. vii, 11). What had been done by Achan, of the tribe of Judah, was imputed to all Israel, and the particular things which he had stolen were "a goodly Babylonish garment and two hundred shekels of silver and a wedge of gold of fifty shekels"—to a Jew a very tempting part of the spoils of Jericho, all of which Joshua had "consecrated to the treasury of Jehovah." Both Achan and all Israel are said by the old version to have "taken of the accursed thing"—a mistake very like that which makes Joseph say, with evident pride of ancestry and assurance of Pharaonic favor to his family on account thereof, that "every shepherd is an abomination to the Egyptians." But the R. V. substitutes "devoted thing" for "accursed thing," and perhaps a future revision will substitute "a favorite," or something of that sort, for "an abomination." That no mysterious "curse" attached to what Achan had taken, like that of a garment infected with the plague, but that his crime was profanation, is evident also from Joshua's paternal appeal to his reverence for the triune

Jehovah: "My son, give, I pray thee, glory to the Jehovah Gods of Israel, and tell me now what thou hast done." Achan's confession was that of a devout penitent: "Indeed I have sinned against the Jehovah Gods of Israel. When I saw among the spoils a goodly Babylonish garment, and two hundred shekels of silver, and a wedge of gold of fifty shekels' weight, then I coveted them, and took them; and, behold, they are hid in the earth in the midst of my tent, and the silver under it." It is said of Jericho, as I understand it, that the Israelites "utterly destroyed all that was in the city, with the edge of the sword," and "burnt the citadel with fire, and all that was therein; only the silver, and the gold, and the vessels of brass and of iron, they put into the treasury of the house of Jehovah." This would have included the precious treasures stolen by Achan had not the theft profaned them, thus devoting them to destruction. All were taken from the treasure-stronghold of Jericho; and Joshua's statement that they were "consecrated to Jehovah," and were to "come into the treasury of Jehovah," shows clearly that there was no such antagonism in the Hebrew theocracy to things Babylonian and Phœnician as many good people now-a-days imagine. The treasures of temples consecrated to Bel and Ishtar, or to Baal and Ashtoreth (deities of which there is no mention in the Bible previous to the exodus), might be transferred to temples consecrated to Jehovah. It was very fitting, therefore, that the compliment should have been frequently returned. In the case of Nebuchadnezzar, king of Babylon, "Jehovah gave Jehoiakim, king of Judah, into his hand, with part of the vessels of the house of God, which he carried into the land of Shinar, to the house of his god; and he brought the vessels into the treasure house of his god" (Danl. i, 2). After about seventy years, "Cyrus, the king, brought forth the vessels of the house of Jehovah, which Nebuchadnezzar had brought forth out of Jerusalem, and had put in the house of his gods; even these did Cyrus, King of Persia, bring forth by the hand of Mithredath, the treasurer, and numbered them unto Sheshbazzar, the prince of Judah" (Ezra i, 7, 8).

So we see that "the treasures of the house of Jehovah" were

of the same kind as Nebuchadnezzar's treasures of "the house of his gods," so far as the precious metals were concerned. In respect to the class of treasures to which the "goodly Baby-lonish garment" belonged, the "vestments" of "the priests of Baal" belonged to a place in the treasury of "the house of Baal" called "the vestry," presided over by a vestryman, as we see from 2 Kings, x, 22 ; and the robes of the Levitical priesthood, including the ephod, pertained to a department of Solomon's temple called "the wardrobe," which was presided over by the prophetess, who "dwelt in Jerusalem in the col-lege," otherwise translated "*school* or *second part*," by which I understand the secondary or female department of "the school of the prophets." (2 Chron. xxxiv, 12.) *Apropos* of this, may we not reasonably believe that "the wardrobe" in "the temple of Jehovah in Jerusalem" corresponded to the queen's chamber in the "altar to Jehovah in the midst of the land of Egypt," and that Asenath, the wife of Joseph, was to this what "Huldah, the prophetess, the wife of Shallum," was to that?

Such a connection of Joseph and Asenath with the Great Pyramid makes the intimate association of Osiris and Isis with it at the date of its foundation surprisingly intelligible, though the conversion of those good people into these mythical divin-ities did not occur until one hundred and thirty years after-wards, in the conceit and under the authority of Mencheres, the king who "knew not Joseph" in his true character. On this point, so far as Isis and Osiris are concerned, we have the authority of Osborn, endorsed by that of Professor Smyth. Quoting from his favorite Egyptologist, the Professor says of Mencheres, that he was "an immense extender of the Egyptian mythological arrangements into new and mysterious ramifica-tions—the very man, in fact, who put Mizraite idolatry into that ensnaring form and artistic condition with the woman Isis, the man Osiris, and the child Horus, the monster Typhon, Nephthys, and all the rest of his human-minded inventions, in addition to the older Apis and Mnevis bulls, and the Mende-sian goat, that it became the grand national and lasting system of his country." ('Our Inheritance,' p. 519.) "The older Apis

and Mnevis bulls" were only one hundred and thirty years older than Osiris and Isis, having sprung into existence when Joseph and Asenath (who were one and inseparable, as were Adam and Eve) were innocently recognized by their contemporaries as represented in the male and female duality of the sign Taurus as the habitation of the sun, in coincidence with the vernal and autumnal equinoxes, at the date of the foundation of the Great Pyramid.

That the usual treasures in the strongholds of ancient kings and plutarchs were the precious metals in the form of sacred utensils and current money of the merchant, and rare jewels and rich fabrics in the form of robes of royalty and the priesthood, is evident from more instances in the sacred Scriptures than the reader may imagine. An example indirectly referred to in a previous article is that of the "two talents of silver and two changes of garments" given by Naaman to Elisha by the hand of Gehazi, the prophet's steward, or treasurer, and the latter's bestowal of them "in the house," "secret place," or "tower," probably the "treasury of the house of Jehovah" in the days of Elijah and Elisha, in the government of which the inspired prophet was Jehovah's vicegerent, empowered with the right of calling the treasurer to an account for his stewardship. Elisha stood in the same relation to Gehazi that Isaiah did Shebna.

Another example of the bestowal of royal robes and the precious metals in a treasure-stronghold is that of the treasures captured by Gideon from the Ishmaelites—golden earnings to the value of "a thousand and seven hundred shekels of gold, besides the crescents, and the pendants, and the purple raiment that were on the kings of Midian, and the chains that were about their camels' necks"—all of which, in the form of an ephod wrought from these materials, Gideon "put in his citadel in Ophrah." (Jud. viii, 24—27.) In this case, as in so many others, a certain word is translated "city," when good sense requires that it should be translated "citadel." Ophra was a city (Judges vi, 24), and it is nonsense to speak of Gideon putting his ephod in his city in a city, but good sense to speak of his putting it in his citadel in a city. To make toler-

able sense the translators say, "and put it in his city, *even* in Ophrah," but they confess to interpolating the word "*even*" by italicising it; and who can believe that the sacred historian, if going to specify where Gideon put his ephod, would do it in a manner so very indefinite as that of saying that he put it in his city? Moreover, Ophrah did not belong to Gideon, but the citadel therein did, by virtue of his having built it, both as a citadel and as an "altar to Jehovah," like the one built by his great ancestor "in the midst of the land of Egypt;" for the Scripture says of it, "Then Gideon built an altar there unto Jehovah, and called it JEHOVAH-SHALOM: unto this day it is yet in Ophrah of the Abi-Ezrites." On the Great "Altar to Jehovah" was an inscription which I take to have been JEHOVAH-ELOHIM. As in its symbolization of the Christ the Great Altar is often called "the Rock," so this "altar" of Gideon's, "Jehovah-Shalom" by name, is also called "this rock," and in the margin the "strong place," evidently meaning a treasure-stronghold, or step-pyramid; and it is said of "Jerub-Baal, who is Gideon," that he built an altar of sacrifice upon the top of it, on which, with the wooden Ashera he cut down for the fire, he offered to Jehovah his father's young bullock, a symbol of Baal, after having thrown down his father's altar to Baal, on which the bullock was intended to be sacrificed.

Thus we see that the place in which Gideon deposited his ephod was a structure similar to the Great Pyramid of Jeezeh. It was also similar to those great pyramidal altars to the hosts of heaven called "matzabas," the ruins of which are still visible in the valley of the Euphrates, on the tops of which were altars of sacrifice, like those that crowned the teocallis of ancient America, aspiring to the sun in perpetual flames kindled by his rays; and on no other principle than that of kinship to the sabaism to which the matzabs were devoted by the "astrologers and soothsayers" of Chaldea, and to which the mastabas were devoted by the "magicians and wise men" of Egypt, can we account for the marvellous circumstance that the ephod bestowed by Gideon in his Great Altar to Jehovah of Hosts (or "of Sabaoth") became perverted from its use as a medium through which to "enquire of Jehovah" (as in I

Sam., xxx, 7, 8) into a medium through which to enquire of
Baal and Ashtoreth, in the auguries of sun, moon and stars,
and thus "became a snare to Gideon and his house," and such
a seductive form of idolatry that "all Israel went a lusting
after it."

., Gideon's "citadel" being "an altar," and therewith being
"built either altar-wise or battlement-wise," like the Great
Pyramid, the idolatry that attached to his ephod therein is
likely to have happened similarly to that which attached to the
diorite statue in the queen's chamber ; for "Gideon and his
house," besides being partly Shechemite, were Manassites, of
"the house of Joseph," and their specially strong propensity
to side with the Shechemites in the worship of deified Joseph
and Asenath, under the names of Baal and Ashtoreth, is easily
accounted for. They worshiped the graven images of gods
well beloved and comprehensible to them, "saying to a stock,
'Thou art my father,' and to a stone, 'Thou hast brought me
forth.' " (Jer. ii., 27.)

Now, by analogy with Elisha's "tower," with Gideon's
"citadel," with Joshua's "treasury of the house of Jehovah,"
with Solomon's "temple to Jehovah in Jerusalem," and with
Nebuchadnezzar's "temple of his gods in Babylon," it is
reasonable to believe that the first Jehovah worshiper's "altar
to Jehovah in the midst of the land of Egypt" was a treasure-
stronghold, in which the most precious of all treasures have
been safely kept until this day. Also, by analogy with the two
kinds of representative treasures, the precious metals and goodly
garments, in the treasure-strongholds that have been referred
to, it is evident that the granite king's chamber was the recep-
tacle of the sort of treasures that are tried and purified by fire,
under the presidency of the fiery sun, as it were ; and that the
fossiliferous queen's chamber was the receptacle of the sort of
treasures that are crystallized and purified by water, as it were,
under the presidency of "the watery moon." Solomon evi-
dently alludes to such things in general terms, where he says,
"Through wisdom is a house builded, by understanding it is
*ţablished, and by knowledge are the chambers filled with all
'ous and pleasant riches." (Prov. xxiv., 3.) Wisdom,

understanding and knowledge are spiritual; and of the spiritual treasures represented by the literal, the great Teacher says to his disciples, "Therefore every scribe that hath been instructed into the kingdom of heaven, is like unto a man that is a householder, who bringeth forth out of his treasure things new and old." (Mat. xiii., 52.) Also, by analogy of the superintendence and supervision of prophets and prophetesses over the two kinds of treasures in "the treasury or the house of Jehovah," it is reasonable to believe that Joseph and Asenath were not only treasurer of the "gold and silver utensils" and "keeper of the wardrobe," in the hallowed uses of the king's and queen's chambers, but stood in relation to these sacred interiors of the "altar to Jevovah" in the far higher character of prophet and prophetess. That Joseph was in reality a prophet, a sort of archetype of the prophet Daniel, is evident from his prophetic dream of his rulership in Egypt and the obeisence of his brothers, under the symbol of eleven of the zodiacal constellations bowing down to the twelfth, as also in his prophetic interpretations of the dreams of the chief baker, the chief butler and the Pharaoh. From these instances, supported by concurrent circumstances, we may reasonably believe that he was the prophet of the Great Pyramid, and that the prophetic teachings of this "Ancient of Days," this "Rock of Ages," this "Memorial to all generations," constitute a wonderful counterpart to those of the Bible.

One of the things foreseen by the inspired builder of the Great Pyramid is likely to have been Akiba's theft of time between the Pyramid's foundation and the birth of the Christ, to make the Jews wait the latter event about fifteen hundred years longer; and this length of time, if I mistake not, he represented in the number of inches from the north end of the grand gallery to the entrance into the queen's chamber, the passage and chamber which the Great Pyramid chronologists suppose to represent the course and destiny of the conservative, Levitical, jewel-and-old-clo'-loving house of Judah. In respect to Asenath, who I suppose to have presided over this chamber as "keeper of the wardrobe," it is something in favor of her having been endowed with the spirit of prophecy that she was

"the daughter of Potipherah, priest of On," and that the Pharaoh bestowed her upon Joseph as a helpmeet for him immediately after his prophecy of the seven years of superabundance, to be followed by the seven years of famine, in the cereal provision for which the Egyptian mythology makes both Isis and Osiris play the part of divine benefactors. Is it not, therefore, reasonable, to say the least of it, to believe that the prophet and prophetess of the "altar to Jehovah in the midst of the land of Egypt" were Joseph and Asenath, the one the keeper of the sacred utensils of gold and silver, and the other "the keeper of the wardrobe," belonging respectively to the chambers called the king's and queen's?

Does anyone say that such distinct and definite uses of the treasure-strongholds of the ancients may be recognized in the Old Testament, but not in the New, and may be pertinent to the Mosaic dispensation, but not to the Christian? Then let me convince him how mistaken he may be. It was under the figure of a treasure-stronghold, like the Great Pyramid, which represents both earth and heaven, that the Christ said to his disciples: "Lay not up for yourselves treasures upon the earth, where moth and rust consume, and where thieves dig through and steal; but lay up for yourselves treasures in heaven, where neither moth nor rust doth consume, and where thieves do not dig through and steal: for where thy treasure is, there will thy heart be also" (Mat. vi, 19, 20). The treasures consumed by "moths" must needs have been garments, and the treasures consumed by "rust" must needs have been metals, in the cavernous recesses of such a mountain-like structure as the Great Pyramid, without those counteracting conditions in which the builder of this has so wisely provided against such causes of consumption; and such a mountain-like structure must have been the sort of treasury that thieves had to "dig through" in order to possess themselves of the treasures therein. Such a "digging through" was that of the Caliph Al-Mamoun more than eight hundred years after Christ, in quest of the marvellous treasures reported to have been concealed in the Great Pyramid by a famous magician 'more than two thousand years before Christ.

Still another New Testament illustration is this in the Epistle of St. James: "Go to now, ye rich; weep and howl for the miseries that are coming upon you. Your riches are corrupted, and your garments are moth-eaten" (v. 1, 2). Under the like figure of speech, the Christ, under the symbol of "one like unto the Son of Man, clothed with a garment white as snow down to the foot," clothes the teaching of the spirit to the churches, where he says: "I counsel thee to buy of me gold refined by fire, that thou mayest become rich; and white garments, that thou mayest clothe thyself, and that the shame of thy nakedness be not made manifest" (Rev. iii, 18).

In these New Testament allusions to the two kinds of treasures in the strongholds of the ancients, it is easy to see that they had either a good or a bad significance, according to the use made of them. The question therefore is: Were the treasures of the Great Pyramid like those of which the Christ said: "Lay not up for yourselves treasures upon the earth?" or were they like those of which he said: "Lay up for yourselves treasures in heaven?" Believers in the divine inspiration embodied in the Great Pyramid's most modern stage of mathematical and astronomical development, and in its prophetic chronology and symbolization of the Christ and his Kingdom, are predisposed to believe that its treasures were those of heaven, and hence those of the heaven on earth that had been, and those of the heaven on earth that is to be. When they shall have fully come to this conclusion, in both head and heart, they will as freely confess "the Pyramid religion," when accused of it, as they confess "the religion of the cross," regarding them as one and inseparable, and knowing full well that these symbolic terms will lead no honest and intelligent person to accuse them of "worshiping wood and stone."

<div align="right">J. W. REDFIELD.</div>

WHO WERE THE PICTS?

The object of this little paper is to show that the Picts of Scotland were a Germanic race, of Norwegian descent. And it is hoped that either the merits or defects of the arguments here gleaned from various sources, and here very briefly stated, may provoke discussion on this branch of antiquarian research, with a view to showing the connection of the Picts with the Sacca-suni, sons of Sacca (I-saac?).

The many facts showing relationship between the Cymric and Pictish race is, for the present, withheld, to avoid confusion.

The word "Pict" *seems* to be derived from the Latin root, signifying to paint, in allusion to the supposed custom obtaining among the Picts of painting the body, but this derivation is (to say the least) questionable, as it is quite as likely to have been derived from the Welsh "Peith" or "Pith," signifying "to scream," or what is still more probable, it has been derived from the word "Pik," a corruption of the Norwegian "vik," (easily recognized in the Norse viking) and pointing to the connection between the province of Pitea in Sweden and the Pictish race. The Roman name, the "*vecturiones*," appears to come from the Icelandic "vick-verior," equivalent to Pehtar or Picts. The Anglo-Saxon name was "Pihtah" or "Peotah." The Norse "Péttland" (*terra petorum*).

We have various spellings of the name in Welsh and Gaelic, as "Pict," "Phicti," "Peithi," "Peith-wyr," "Pictdich," (a plunderer*) and "Ffichti." The Roman word, "*vecturiones*," is also supposed to be derived from the Gaelic "Uachtarich," (the inhabitants of the cleared countries).

In Pinkerton's 'Essay on Scottish Poetry,' published in 1786, the writer argued that the Lowland Scotch were descendants of the Caledonians or Picts, a Gothic race who were Scythians from Norway, and who peopled Caledonia long before the in-

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* To pick and steal. See Anglican catechism.

vasion of the Romans; and Dr. Jameson then brought out his dictionary, which abundantly proved the common origin of the Icelandic and Scottish tongues.

Pinkerton contends that painting the body was *Gothic* and not *Celtic* custom.

Pinkerton, in his 'Inquiry into the History of Scotland, preceding 1056,' has elaborately proven his contention as to the Gothic origin of the Pictish race, *via* Scandinavia, the ancient Scythia.

The word "vickverior," from which the Roman name *Vecturiones* is said to have been derived, very suggestively appears to imply that the owners of it were a race of wanderers; and this origin pointing, as it dimly does, to the connection of the Picts with " the dispersed" of the Bible, is strongly corroborated by the derivation of the word "Scot" (the ally and companion of the Pict). "Scotica" has also been spelled "Sythica," and the Irish bards say that the Scots were of Scytho-Scandinavian origin; moreover, the historian Gildas, in a passage, states that the Romans returning out of Britain the Scots and Picts came over the Scythian valley in curraghs (Romanis ad suos remeantibus emergunt certatim de curucis, quibus sunt trans Scythicam vallem evecti). The "Scythicam vallem" appears to have been the firth of Edinburgh. In a work by James Paterson of Ayr (from which the writer has derived many facts), on "The Origin of the Scots, etc.," he says that the etymology of "Scot" has been derived from *scinte* or *squit*, a Gaelic word, signifying "scattered" or "wanderers." The significance of this derivation is apparent?

Bede, one of the earliest of our historians, brings the Picts from Scythia, and, according to Greek authority, a diminished body of the Cimbri or Cimmerians of Asia Minor were in Holstein (or Scythia) early in the Christian era (first century).

According to Norwegian history, the Northmen are of Scythian origin, and supposed to have settled on the Euxine about two thousand years (?) before the Christian era. Although this fixes the origin at too remote a period, it is a very strong proof of the belief of the people as to the place from whence they came, the place to which the exiled Jews, or rather, Israel-

ites, went, and which the historian Rawlinson compared to "a great pot boiling over with successive invading hordes of people."

While on this point it is interesting to observe that the introduction to the 'Anglo-Saxon Chronicle,' of King Alfred, speaks of the early inhabitants of Britain as having come from Armenia.

The connection between Norway and Scotland may also be shown from the names of places, thus scone in Scotland has a resemblance to Skon-land in Norway, so hope (Scot), hoop (Norway); almond (Scotch), almand (Norway); weoms (Scotch), wyn (Norway), etc.

In Scotland strange towers or castles of a conical shape, built of stone without cement, may be found chiefly in the Shetland Isles, the Orkneys, Ross, Inverness and Aberdeen, etc. Not less than sixty-five of these are in Sutherland alone. In Caithness we have similar remains, and also later towers with Scandinavian names, as Freswick, Aldwick, Boorve, etc. One, Guernigo, is supposed to derive its name from the Carnavii, a tribe who inhabited a part of Caithness in the time of Ptolemy, and part of the same tribe dwelt in Cornwall, thus very singularly holding both ends of the kingdom. To resume, the building of these ancient towers is always attributed to the Picts, and similar remains of stone buildings are to be found in Norway.

Claudian speaks of the Orkneys as the abode of the Saxons, and Thule by the Picts. "Maduerunt Saxone fuso Orcades; incaluit Pictorum Sanguine Thule." By Saxons, Claudian meant Northmen; and Richard of Cirencester mentions the arrival of a colony of Picts from the Orkneys in the reign of Hadrian.

The *Catini* of Caithness, as related by Ptolemy, the ancient geographer, have a tradition that they came from Germany. No doubt they were of the Gothic stock of the Normen.

An almost incontestable proof of the identity of the Picts and Norwegians is this, that when the Danes overran the kingdom, A. D. 870, the Picts sought aid from the Northmen; and we have on record the expeditions fitted out by Sigurd of Nor-

way, and Thorstein the Red, Harold Harfager, etc., for the re-establishment of the Picts in Scotland.

The Shetland and Orkney Islands had the *udal* tenure of Norway, contrary to the feudal customs obtaining in other countries.

Further arguments of the identity of these peoples can be adduced from the character of the music, the names of the kings* and from the analogy of the languages, which cannot be disputed. Many of the Scotch clans are of Teutonic descent: McIntosh, McKay, McPherson, Davidson, McLeod, Gunn, Gillander, McHeamish, Robson, Henderson, Wilson, etc.

The historian societies concluded (rightly, no doubt) that the Caledonians, from their size and complexion, were Germans. And the Edinburgh Review, in 1803, came to the conclusion that the inhabitants of Britain in the time of Cæsar were German Gauls. The very word " Caledonia " (Gael-doch in Celtic) aids this derivation.

We shall not speak at present of the connection between the Picts and Cymri (but there are many interesting facts on that head). We hope this little paper may be the means of eliciting comment and further information on this interesting question.

G. M. C.

WHAT IS THE TRUE DISTANCE OF THE SUN?

In the September number of the INTERNATIONAL STANDARD I notice a quotation from a little pamphlet of mine on the "Intimate Connection Between Gravitation and the Solar Parallax." That quotation embodies " an important feature in the motions of the planets, hitherto unknown and unsuspected," which is ex pressed as follows: " The orbit velocity of each planet per second in miles, multiplied by the time in seconds which a ray of light takes to pass from the sun to that planet, is directly as the square root of that planet's distance from the sun in miles."

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* Many Norwegian kings lie buried at Icolm-kill, the " Holy Isle."

Appended to this is the editorial remark, "now the first essential is to have the distance of a body from the sun for the purpose of determining the orbit, and without the correct distance we have no correct orbit; hence we have no means of obtaining the orbit velocity." The legitimate inference from the preceding remark is that the given equation $\sqrt{a} = \dfrac{2\,\pi\,a}{c}\cdot\dfrac{a}{l}$ is insufficient to determine the planet's mean distance and orbit velocity. In brief, we can put the equation as $\sqrt{a} = b$. t. in which (b) denotes the orbit velocity, and (t) the time for light $(=l)$ to pass from the sun to the planet, giving the velocity of light as 186,360 miles per second as per Michelson, (a) then is the planet's mean distance, and as we have, in each case, the value of (c) = the planet's sidereal period in seconds, we have (l) and (c) given in the above equation to find (a), for

$$\frac{c\,l}{2\,\pi} = a^{1.5}$$

and (b)
$$=\frac{2\,\pi\,a}{c}$$

and (l)
$$=b\,\sqrt{a}$$

Calculating the distance of each planet separately by the above formula, we obtain distances strictly accordant with Kepler's third law, which makes the squares of the periodic times proportional to the cubes of the mean distances; from which distances the parallax of the sun comes out 8.54223″, and the earth's distance (the mean) as 95,687,700 miles and the aberration of light as 21.088″* which is in excess of the observed aberration 20.5″;

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* The exact amount of the constant of aberration, as now received (it might be more properly said, as now adjusted to the received mean distance of the earth), is 20.445″, to which Strane has added a correction = + 0.043″; but to exhibit an exact correspondence between this corrected value and that determined by the theory, requires, amongst many other things, an exact knowledge of the velocity of light, from which to get the exact mean distance of the earth from the above equation. A few years ago these were taken by Sir John Herschel at 192,000 per second and 95,233,000 miles, giving an aberration of 20.5″. In the Unseen Universe the velocity of light is taken at 188,000 miles per second ; by Foucault at 185,000, and by Professor Michelson at 186,360, which last we have herein adopted. Then the question arises : May not the ethereal medium be retrogade outside of Neptune, seeing how sluggish is the motion of that planet (only 3½ miles per second) as compared with Mercury's 30.6 miles ? It is in view of the delicate and intricate questions involved that we must content ourselves here with stating that a ray of light, passing through a medium moving in the same direction as the earth, takes from the earth's relative orbit velocity the certain amount of motion which diminishes the *observed* constant of aberration.

but the discrepancy is more apparent than real; for if we allow for the easterly drift of the observed ray the true angle of aberration will be *apparently* diminished by virtually increasing the velocity of light with a corresponding decrease of the orbit velocity of the earth.

It is well known that for half a century preceding 1870 the mean distance of the earth as derived from the transits of Venus in 1761 and 1769 was recognized as 95,333,000 miles, differing from the figures of the theory by about its one three-hundredth part. The values now in fashion are considerably less, not however obtained from the solar parallax but from analytical investigations which seem to require a closer proximity to the sun. As this question of parallax has been admitted into the columns of the INTERNATIONAL STANDARD, in consequence of a well grounded hope that the Great Pyramid will (as I believe) sooner or latter solve the problem, I feel that I am not trespassing in adding a few remarks in advocacy of a theory which may exhibit a knowledge of the true earth distance in a very different light to that in which it is usually regarded.

If the Great Pyramid contains within its massive walls the radius of the earth's orbit, we are constrained to admit, either that its architect was supplied with better instruments than science can now boast of possessing, as well as being expert, not only in the use of such instruments, but in the whole theory of practical astronomy (which is exceedingly difficult to admit), or, he was directly inspired by a revelation from heaven with a knowledge of such facts, against which view I, for one, with the deepest reverence for sacred things, would protest, as it would commit omniscience to facts and numbers which are in no department of nature unchangeably fixed. Besides, there would be the inevitable oppositions of science invalidating the plainest indications of the simplest truths. But admit that this law is a law of nature which, in a thousand instances, might have been discovered by persevering observation in antediluvian days, then the distance of the sun would be one of the easiest of problems, implying the posession of no more than ordinary acquirements, and needing no instruments to determine it. Of all the problems that physical science has dealt with, the most

refractory of all is the question, what is gravitation ? Kindred to that is the preliminary one of what is matter ?

We have the impact theory of Le Sage in the one case, and the ring vortex theory of Sir Wm. Thompson in the other, with various modifications to meet difficulties, but science has found it impossible to reconcile a *mechanical* theory of gravity with the conservation of energy, or with the action of a force across, apparently, void space between widely separated masses of matter ; with the inexplicable difference which must subsist between mundane matter and the medium of space, if space be filled with ultra-mundane matter of imponderable nature. But other questions spring up ; for in a perfectly incompressible and continuous plenum, displacement becomes impossible, and under such circumstances there could be no motions of atoms *inter se*, no motion of translation of material masses as planets or comets, and consequently no interchange of motion. But the list of such dilemmas might be indefinitely extended and the whole school of scientific authorities be arrayed on opposite sides of every occult question of physics, with endless permutations, in its efforts to dispense with a Supreme intelligence, at whose fiat nature became what it is, solely dependent on his good pleasure, and alone sustained by his guiding hand. Man is but an epitome of his maker; and the world is but an epitome of the universe. Present analogies are our safest guides to the unseen ; but we prefer to indulge in Utopian dreams of perfection, when on every side we see imperfection stamped on all sublunary things.

Now it so happens that one in whose younger days, the knowledge which was so easily acquired was vastly more inaccessible, was led to form a system of the world for himself, necessarily unbiased by the teaching of others. Following the analogies everywhere observable in nature, he admitted no conclusions which were not in accordance with simple, mechanical principles. Rejecting the corpuscular theory of light, he adopted the undulatory theory in its stead. But this implied the existence of an interstellar medium infinite as space itself, compacting into one grand unit the whole material creation. But, from the start, he rejected the idea that such medium

could be ponderable, for suppose it were, then its attracting power over planetary matter must be infinite also. Let us conceive a globular mass, like our own little world, occupying a point in space, it would be surrounded by an infinite number of shells *assumed* to be of equal thickness. Now under the law of attraction the remote shell would exert the same attractive power over the central globes as the one in contact with it, and so *ad infinitum*. And any, even the smallest, portion of an infinite space is infinite also. But in an infinite space there must be inequalities of temperature and density, due to varying and changing directions in the ethereal currents, affecting the attractive forces from different sides, and on such a scale as would overwhelm the comparatively feeble attraction of the central globe, whose components would thus be liberated by a force infinitely superior. As this is not the case, neither is there the slightest evidence of the slowest change in the force of gravity upon the earth's axis which warrants the conclusion that the medium of space is not ponderable. But it does not follow that the ethereal medium is void of inertion, or is incompressible, or perfectly elastic, or incapable of offering resistance to or of receiving resistance from ponderable matter. Neither is it necessary to consider it in a state of passive inactivity. On the other hand, he regarded the great ethereal ocean as instinct with kinetic energy—the source of all other motions—sweeping everlastingly in mighty currents around a shoreless universe, except where some stellar or planetary island or group of islands presented types of what we are familiar with in this lower world.

Impressed with the idea that it was to this grand feature of the visible creation, to be received by faith in the teaching of inductive reasoning, that we must look for an explanation of the mechanical cause of gravitation, whatever may have been said or written concerning the nature of force, it invariably resolves itself into momentum, or the effect of matter in motion, and the conservation of energy arises from the indestructibility of the *inertia* of matter which motion develops. If there be in organic life, or in chemical action, apparent obstacles to the reception of such a course, a little reflection will suggest many possible ways of harmonizing what at the outset appeared in-

explicable, and then we can afford to wait until the suggestions are verified.

The tendency of the age is to vest too much on our own infallibility and to draw too hastily conclusions impugning the wisdom to which all nature testifies, and dishonoring to that book which reveals a future for the world so adverse to the teaching of science. In the work already mentioned (the ' Unseen Universe,' page 157), its authors come to the conclusion "that the available energy of the visible universe will ultimately be appropriated by the other, and we may now, perhaps, imagine that, as a separate existence itself, the visible universe will disappear, so that we shall have no huge, useless, inert masses existing in far remote ages, to remind the passer-by of a species of matter which will then have become long since out of date and functionally effete. Why should *not* the universe bury its dead out of sight?"

Now, in the theory which has elicited such rancorous abuse from those whose own theories bristle with absurdities, I have at least been consistent and limited myself to intelligible mechanical principles. The great objection of a tangential force, hostile to a planet's elliptical motions, being quashed by the necessary harmony which does and must exist between the circular motion of the ether and that of the planets at the same distance from the sun. I have shown it to be in accordance with all nature's analogies that the ether behaves like any other gaseous fluid in being compressible by force; that in its vibratory motions, as light, those motions can be increased or destroyed by interference of those very vibrations; and as those vibrations are produced by a mechanical cause, the effect must be mechanical also, susceptible of being destroyed by interference of the opposing radiations from ponderable matter. I have also argued, from well grounded premises, that the specific caloric of this ethereal medium must exceed that of all other known matter, and be the chief factor in all meteorological phenomena. And, finally, the theory shows that the planetary arrangements of the solar system emphatically endorse the mutual interference of the radiations emanating from ponderable bodies as the true explanation of the law of gravity, which

must necessarily be directly as the mass and inversely as the square of the distance.

THOS. BASSNETT.

GEOMETRY OF THE COFFER.

As a standard measure of volume and weight, the coffer has been successfully and beautifully connected with the earth-globe, through the medium of the mean specific-gravity ratio of 5.7 water, thus showing how perfectly it fits into and completes the system of metrology wrought into the masonry of the Great Pyramid. The elaborate measures made by Mr. Flinders Petrie, valuable as they are, do not in any way invalidate Professor Smyth's theorem, nor do they settle what the true cubic contents of the coffer's interior really are, or what they were originally. But they do show that two highly gifted measurers may differ in their results for this item by several hundred cubic inches, whereas Mr. Petrie at one time considered the probable error of Mr. Piazzi Smyth's result as only ± 45 cubic inches! If those contents could be certainly shown to be greatly more than 71,250 or 71,318 cubic Pyramid inches—the theoretic and actual results of Professor Smyth—there is still a possibility of a corresponding (?) increase in the density ratio, now called 5.7 nearly, but which still bends upward as the different experiments made to ascertain it are repeated from time to time. The exterior volume of the coffer, duplicating (with every mark of design) the interior contents, must also be allowed to weigh; and then there is the possibility—probability, I would say—of other diameters of the earth than the polar being *also* alluded to. For example: At page 361 of the INTERNATIONAL STANDARD, Vol. II, the Rev. H. G. Wood estimates the equatorial diameter at the longitude of the Pyramid at 41,852,626 feet. In Pyramid inches, and adding 5,152 to reduce to mean terraqueous level, this becomes 501,734,934. The mean equatorial diameter is believed to be further east than the longitude of Egypt; but supposing it is not, and taking polar axis at

500,000,000, the mean diameter of the earth (*i. e.*, the diameter of a sphere of equal volume) will be $\sqrt[3]{501,734,934^2 \times 500,000,000}$ or 501,156,000. The ten-millionth of this, cubed and multiplied by 5.7 ÷ 10, is 71,745.33. The above equatorial diameter by itself would give 71,992.2. Mr. Petrie's two estimates for interior contents are:

By offsets, 72,030
By calipers, 71,960
Simple mean, 71,995; weighted mean, 71,986.

This may serve to shew that the contents theory is not exhausted by a *single* reference to terrestrial measures, and that while the polar axis is certain to appear as the common radius of lineal and cubic measure, other diameters, and eminently the mean of all, cannot be far off when the grand total of the weight or mass of our planet comes into the account, as it inevitably will; for if the coffer deals at all with the solid bulk of the earth, it must have much to say about its shape as well. Such references to the magnitude, weight and shape of the earth-globe render it probable that the peculiar lineal and other relations of the coffer may be arranged with a view to the illustration of spherical measure generally. This appears to come out in the proportions of the interior especially.

Suppose it is desired to express the volume of a certain sphere in the form of a rectangular solid, or hollow vessel, this will be most suitably and elegantly done by making the three dimensions of length, breadth and depth relatively

$$\frac{3}{2}, \quad \frac{\pi}{6} \quad \text{and} \quad \frac{2}{3}$$

of the sphere's diameter. *These are the proportions of the coffer's hollow interior.*

Now, $\frac{3}{2} \times \frac{2}{3} = 1$. Therefore, the middle term, $\frac{\pi}{6}$, is the multiplier for converting spherical into cubic measure; *e. g.*, diameter $^3 \times \frac{\pi}{6}$ = volume; and diameter $\times \sqrt[3]{\frac{\pi}{6}}$ = side of equal cube. Nor is it without propriety that one dimension (depth) is made = two-thirds of the sphere's diameter; because, since a sphere is two-thirds of a cylinder, the area contained in the

product of the other two dimensions (= floor-area of coffer's interior) is the area of the sphere's diametral section, as we shall have occasion again to note.

We are, for convenience, considering the coffer as purely rectangular and regular in form, devoid, too, of the ledge adapted for the reception of a sliding lid; but this feature, as well as the various irregularities of shape, requires attention in the proper place. The concavity of the sides, particularly, is important, enabling a number of different problems to be presented by the same dimension or sectional area, which could not be the case in a perfectly regular vessel. Hence the above proportions for interior of coffer, though well within the variations of the measures in two cases (breadth and depth), are not to be held as representing their mean value; still less so in the case of length, which scarcely touches the shortest recorded length;* but yet the intention to exhibit and employ these proportions is clearly discernable in the general geometrical plan.

What is the particular sphere which is thus portrayed by the interior of the coffer? It is one having diameter = 51.51648 + axial or Pyramid inches. The cubic contents of this sphere are = 71,587.5 of the same cubic inches; and Mr. Petrie derives from his measures a capacity larger than that. Yet it is not necessary that this amount should be actually contained in the coffer when it is so clearly *intimated* by its lineal measure.

Now 51.51648″ × 100 = square root of Pyramid's right axial section.

51.51648″ × 100 = radius of circle of equal area to the Pyramid's base.

51.51648″ × 100 = diameter of sphere whose surface is equal to area of Pyramid's base.

51.51648″ × 100 $\sqrt{\pi}$ = Pyramid's base side.

51.51648″ × 100 ÷ ½ $\sqrt{\pi}$ = Pyramid's altitude

all on the footing of a base—circuit = 365.242 × 100, etc., of same inches.

Then the volume of the entire Pyramid is

$$= \text{Base-side}^2 \times \tfrac{1}{3} \text{ altitude}$$

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*But see note foot of page 5.

or, in terms of base-side alone,

$$= \frac{\text{Base-side}^3 \times 2}{3\,\pi}$$

But as base-side $= 51.51648 \times 100 \sqrt{\pi}$, we have

$$\frac{\text{Base-side}^3 \times 2}{3\,\pi} = \frac{2\,(51.51648^3) \times 1,000,000\,\pi\,\sqrt{\pi}}{3\,\pi} =$$

$$\tfrac{2}{3}\,(51.51648^3) \times 1,000,000\,\sqrt{\pi} = \text{Pyramid's volume.}$$

And since contents of coffer $= 51.51648^3 \times \frac{\pi}{6}$,

$\therefore$ Pyramid's volume $\quad = \dfrac{4,000,000 \text{ coffer's } \textit{contents}}{\sqrt{\pi}}$

$\qquad\qquad$ or $\qquad = \dfrac{2,000,000 \text{ coffer's } \textit{volume}}{\sqrt{\pi}}$

Taking, then, volume $= 2$ contents,
and inner length $\qquad = 2$ outer breadth,
*it follows that outer side area $= 4$ inner side area; because the volume is $=$ outer side area $\times$ breadth; and the contents are $=$ inner end area $\times$ length.

Looking now at interior, its relative dimensions are $\frac{3}{2}, \frac{\pi}{6}$ and $\frac{2}{3}$,

or in the proportion of 9, π and 4 for length, breadth and depth.
From breadth : depth as π : 4 it results that

(a) diagonal of end rises at the π angle of $51° \; 51' \; 14.8''$.

(b) area of end $=$ area of a circle having depth for its diameter (And, by preceding paragraph,* area of *outer* side $=$ area of a circle having inner depth for *radius*.)
Now, depth is $\frac{2}{3}$ of 51.51648. A circle with diameter $= 51.51648$ has therefore area $= \frac{2}{3}$ of inner end, therefore $=$ inner floor; for length is to depth as 9 : 4.

(c) area of floor : area of side as π : 4.
Therefore area of side is $= 51.51648^2$, and that again is equal to a circle with diameter $= 58.13012 +$ or one hundredth of the Pyramid's geometric height.

Thus all the interior areas are circular areas cognate to the Pyramid's geometric and cosmo-metric scheme as propounded by Professor Smyth, after John Taylor's original ideas of a year-day base expressed in terms of a cubit derived directly from

the rotation axis. But as yet only one of the three *exterior* areas (side) is so correlated.

Between the internal and external horizontal planes of the coffer there is this connection, that circuit of interior gives circumference of a circle whose area = area of outer base. If the two planes were *squares*, this would mean that their sides are as π : 4, after the pattern of the alternate squares shown in the Pyramid diagrams of Mr. Latimer and Lieutenant Totten. As they are not squares, nor similar figures, nor directly related in both their homologous dimensions, the object of this connection is a little obscure. It points, however, to this: The circuit within the coffer at about half depth is 209.4395 + (surrounding there an area of 51.51648 *circle*, as before referred to). But 209.4395 + is circumference to a diameter = 66.6 or $\frac{2}{3}$ 100 inches, *and to an area of* 3490.6585 + or 10,000 $\pi \div$ 9, *which is therefore the area of the outer base.*

According to the measures, this equation to base area would come out best in British inches; but the measures do not shew the full original size of the base.† The variations of sectional areas arising from irregularity of figure admit of either inch giving true results, at different levels. Those who prefer British inches might find it worth while to try to correlate all the coffer's measures from this basis. For example:

$$\begin{aligned}
\text{Base area} &= 10{,}000\,\pi \div 9 \\
\text{Assume length} &= \quad 90 \\
\text{Then breadth} &= 1{,}000\,\pi \div 81 \\
\end{aligned}$$

Assume (length and breadth) $\div \pi$ = height.

$$\text{Then height} = \frac{90}{\pi} + \frac{1000}{81}$$

and so on with alternative hypotheses.

But adhering to Pyramid inches, we may note with what ease several of the problems may be worked out from known π.

Say $\pi = 3.1415926535 +$

Then 10,000 $\pi \div$ 9 = base area $= 3490.658404 -$
Square root $\div \pi$ = rad. of equal-area circle $= 100 \div 3 = 33.3$
Circumference of said circle $\left.\right\}$ or interior horizontal circuit $= \frac{2}{3}\, 100\,\pi = 209.43951 +$

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† Mr. Petrie's lowest measures of outside were four or five inches above base; those of inside, one inch above inner floor.

[Notice in passing that 3490.658504 ÷ 30 = 116.35528, nearly the length of ante-chamber in *British* inches.]

The interior horizontal area being that of a circle of 51.51648 diameter, is, of course, $\frac{1}{40000}$ of the base area. (The contraction of the coffer within, towards floor, may likewise provide this equation to a lesser base than 9131.05^2, but at mid-depth the full amount is found.) As the inner end or cross section is $\frac{4}{9}$ of the horizontal area, the former is = a square with side $\frac{91.3105}{3}$; and the outer side = 4 inner end = a square with side ⅔ 91.3105 = 60.873 + = *length of great step*.

The annexed diagram is a combined representation of the leading geometrical problems of the coffer; and its connections with the Pyramid are shown by the small pyramid ABD, erected on the same level as the vertical cross and long sections, EFGH, JKLM, the pyramid being $\frac{1}{100}$ of the height of the Great Pyramid, as per Professor Smyth. (I may note that were the small pyramid's base about .84 of an inch lower, or on the level of the adit to chamber, its sloping sides would pass through the coffer's angles K, L.)

AC, the axis, is bisected in D' and trisected in E', F',

The horizontal section through D' at half height is = the floor area ZA'B'C'; the section at E' is equal to the inner end RSTU; the section at F' = the outer side JKLM.

The circles equal to these sections respectively are the 6th, 3rd and 8th, counting from the centre.

The outermost circle has circumference 365.242 + Pyramid inches; and this circle I would view as the fundamental origin of the coffer's dimensions. It is of equal area to the four exterior vertical sides. A circle of *half* this area is figured as passing through the inner angles ZA'B'C'. Its area is the sum of the two vertical sections of the coffer, meridian and prime vertical, and is $\frac{1}{10000}$ of the sum of the two corresponding sections of the Great Pyramid itself. The radius of this circle is semi-diagonal of interior floor, and minimum height of coffer (nearly), and its circumference = circuit of base.

The diameters of the other circles shown will be found in the margin; and the theorems of which they are exponents will, I

365.2433959973593287768 ±
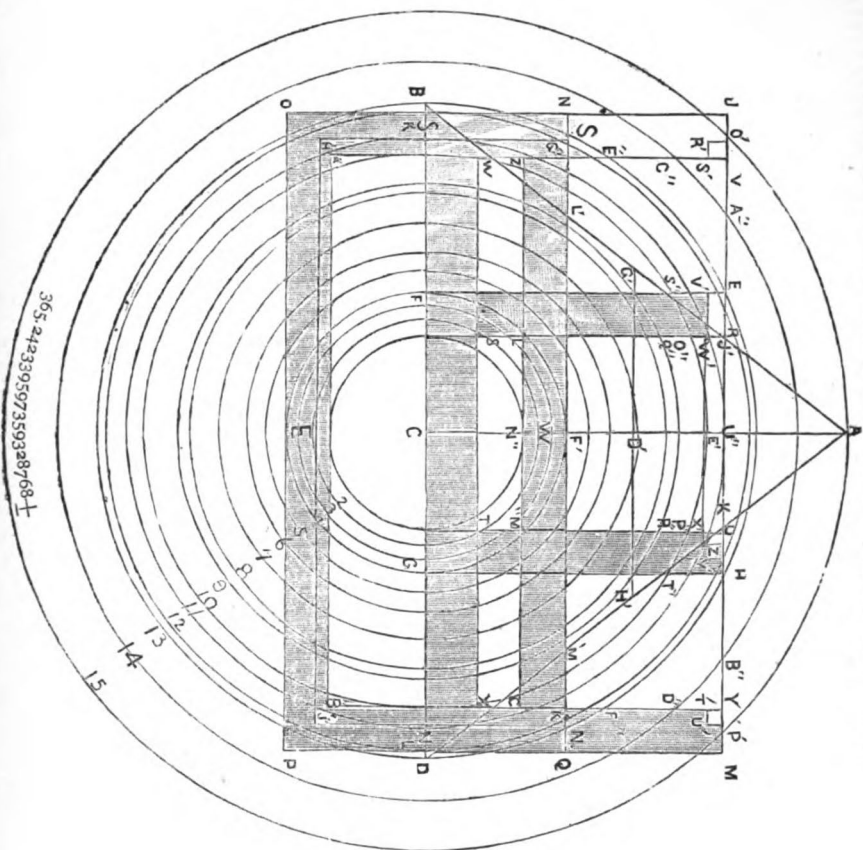
Diameters of Circles.
P. I.

1.　= 26.4 and 26.97397
2.　= 30.43685
3.　= 34.34432
4.　= 38.75341
5.　=ʺ 45.2 ±
6.　= 51.51648
7.　= 58.13012
8.　= 66.6
9.　= 68.68864
10.　= 77.27472 and 77.50682
11.　= 82.2084 and 83. ±
12.　= 90. ±
13.　= 91.31056
14.　= 103.03296
15.　= 116.26025

think, be readily traced, without being detailed here, by those who care to study the diagram. Some of the intersections of the circles with the coffer are also interesting, as in the points O'P', EH, W'X', S''T'', L''M''. The sarcophagus ledge is defined in plan approximately by the circle passing through ZA'B'C', and in elevation by that passing through A, and (approximately) by the sides AB, AD passing near R and U, Y'. Coffer's depth bisected at E''F''?

The five innermost circles are definitive of the cross sections EFGH, RSTU. The smallest, having diameter = inner breadth (minimum), has circumference equal to horizontal diagonal A'C'. The next, having diameter = $\frac{1}{300}$ of base side, or 30.43685, has area = square of full breadth (26.97397^2). Then 30.43685^2 = area of inner section RSTU, $\rightleftharpoons$ circle No. 3 with diameter = depth = 34.34432; whose circumference is = perimeter of square of breadth 26.97397. The square of 34.34432 is again equal to circle No. 4, having diameter 38.75341 + = outer breadth. Circle No. 5 is not directly connected with the foregoing. Its diameter, say 45.2, is about half the maximum length of coffer; its area, 1605 = area of outer cross section EFGH.

Circles 6 and 7 give areas of inner floor and side; and Nos. 8 and 9, areas of outer base and side; diameters: 51.51648, 58.13012, 66.66666 and 68.68864.

Will some of your able mathematical contributors take up the theory of the coffer and systematize it as it demands?

<div align="right">JAS. SIMPSON.</div>

Edinburgh, October 27, 1885.

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For convenience, my computations are derived from t-year = 365.2423396—. A deduction of one, two or three millionths respectively from statements of lineal, areal or cubic measures will reduce to present year values with tolerable accuracy.

At p. 357 of the STANDARD, Vol. II, the cubit of the Turin museum is stated to be .523524 of the metre. That is $\pi \div 6$, or the same proportion that the breadth of coffer's interior has to the modulus 51.576 +. Hence a "coffer" measuring within, $\frac{2}{3} \times \frac{2}{3}$ metre $\times$ 1 Turin cubit, would contain 1 spherical

metre. Also a π pyramid with base-side 3 Turin cubits has height = 1 metre. But in the first case the metre figures as a diameter, and in the second as a radius, whereas it is itself derived from a circumference of the earth. J. S.

THE CAMPAIGN OF MOSES.

FROM THE FRENCH OF M. LECOINTRE.

BY MRS. A. M. SEARLES.

CHAPTER IV.—ACTUAL GEOGRAPHY OF THE PRESENT.

We have given you a description of the geography of the Isthmus of Suez in Moses' time ; let us see what it is in the nineteenth century, and to facilitate the description let us follow the direction of the maritime canal, which, starting from Port Said, on the Mediterranean, ends at Suez upon the Red Sea. It first crosses for a distance of about thirty-seven miles the lakes of Menzaleh and Ballah, a vast expanse of water and marsh, which extends from Damietta to Pelusium, along the sea, from which it is separated only by a narrow tongue of sand. It is here that the Mendesian, Tanitic and Pelusiac branches of the Nile begin to disappear, their mouths for a long time having been hidden by vast accumulations of slimy mud. The waters here have very little depth, and during the rise of the Nile they are of higher level than the Mediterranean, and diffuse themselves by many mouths (or boghaz), which are openings in this tongue of sand ; at the period of low water this phenomenon is reversed.

In ancient times this marsh occupied a much smaller extent. The shore of the sea and the branches of the river were dammed up and the greater part of the lake formed a well-cultivated plain, which nourished a large population. In digging the canal, in many places, under from one and one-half to two feet of mud, were found fields still covered with their crops of maize or of coarse millet that the last catastrophe had suddenly submerged. The date of this event is not probably very ancient,

for Pelusium was still in existence up to the time of the cru-
sades, and Faramah, which is near by, was, at the time of the
flourishing period of Venice, the depot of the commerce of
India. To-day nothing remains of it but ruins, and the sur-
rounding plain, covered each year by the inundations of the
lake, is without vegetation. About twelve miles from Port Said
the canal strikes the ancient course of the Pelusiac branch, passes
upon the right bank and between this and the land of Goshen.

After crossing Lake Menzaleh, the canal passes on to Kantara,
a point much frequented by caravans from Syria, where there
is a little water and some ruins; it continues through fertile
plains, vestiges of the ancient presence of man, crosses the
last lagunes of Lake Ballah, and arrives at El-Ferdane, where
the land rises as far as El-Guisr, the culminating point of the
isthmus upon the line of the canal. Here one no longer finds
ruins, and if the country has formerly been inhabited all traces
of it have disappeared.

On leaving El-Guisr, the canal enters Lake Temsah, and
afterwards strikes the borders of Toussoum and the Serapeum
before reaching the Bitter Lakes.

The destiny of Lake Temsah is singular enough; in ancient
times it was filled by the waters of the Nile, but the canal which
conducted it there being stopped up by a sand bank, it has re-
mained dry for centuries. From time to time an extraordinary
increase has brought back to it sweet waters, which soon evap-
orate. But the digging of the maritime canal has changed it
altogether by transforming it into a salt water lake. In May,
1867, it received the waters of the Mediterranean. The city of
Ismalia is built upon its northern shore. It terminates the great
valley called Wadi-Toumilat, which runs toward the west, and
in which was dug the celebrated canal of Pharoah, which con-
nected the Nile and the Red Sea. After having served its pur-
pose from the time of Ptolemy Philadelphus to the occupation
of the Arabs, this canal was abandoned in the eighth century;
but the remains of it are still extant and can be traced in a very
good state of preservation for a great part of the line. They
have been described by Le Pere in the great work upon Egypt,
'*Memoirs Sur la Communication des Deux Mers*'. He cites

another canal, smaller, but more ancient; it is that which conducted the waters of the Nile to Lake Temsah, and fertilized the whole valley as far as to the Serapeum.   M. de Lesseps says: "The Greek and Latin authors were not ignorant of the existence of this canal (the grand); they attributed its construction to Sesostris or Ramesis II.; Aristotle, Meteor, 1-14; Strabo, I. and xvii; Herodotus, II.-158; Diodorus, I.-33; Pliny, H. N.,-VI-29; Cf. Smith, Dictionary of Bible, III., p. 10-12).   The inscription of Seti I. at Karnah, teaches us that in this latitude we shall find a canal running from west to east.   This canal, according to the inscription, was filled with crocodiles; now the basin which terminates the valley, and at which the canal necessarily ended, may it not be the Lake Temsah of to-day?   More especially as Temsah is an Arabic word signifying crocodile."   (*'Conf. Sur les Trav. de l'isth de Suez,' p.* 16).

The canal of Seti first commences on the Tanitic branch, at the village of Fassouka, joins the Pelusiac branch at Zagalle, and continues by Wadi-Toumilat to its end at Lake Temsah. In later times the canal has been much neglected, and has conducted the water only as far as Gassasine ; from thence its traces are lost in the desert, to reappear at Bir-abou-Ballah, at the mouth of the Lake.   To conduct the sweet water into the isthmus, the Suez company opened it, to leave Gassasine on a new track; at a distance of some miles from the lake it forks, one branch going to Suez, the other to Ismalia, and M. de Lesseps still hopes some day to take it to Port Said.   The amount of water was naturally insufficient for these new developments, and on opening the maritime canal, the work was completed by the purchase of a water supply directly from the Nile at Cairo.

But to return to the maratime canal.   After passing the Serapeum it enters the Bitter lakes.   These are two great basins, of very irregular dimensions and communicating with each other.   The total length is about twenty (20) miles, and the greatest width is six miles.   The larger one is the deepest, but the bottom of the smaller one is, nevertheless, much below

the level of the two seas. They are limited at the south by the ridge of Chalouf, after passing which we come to a vast, level plain, abutting on the Red Sea, the waters of which sometimes overflow it. We call it the plain of Suez. The city of Suez is built toward the point of the sea, upon the borders of a lagune, which drains to each sea; a league further on we find the road-way, at the foot of Mt. Attaka.

The land of the isthmus along the course of the canal is nearly flat, for the ridges of which we have spoken are not much more than wrinkles a little raised above the surrounding plain. The principal of these is El-Guisr, which is at the most only about sixty-five feet above sea level. A little to the north of Suez, towards Chalouf, we come to the mountain, or *gebel* of Geneffe, of which the chain runs from east to west, throwing out a ramification running north and south, which borders the Bitter Lakes. The principal hill of this branch is the one which forms the northern terminus; it is remarkable alike for its height (260 feet), and for the regularity of its form. It is called the Peak of Chebrewet.

The Red Sea of to-day occupies much less space than formerly. It has dried up, evaporated. We find in many places evident proofs of this fact: for example, at the east of Suez, on the Asiatic shore, the soil in many places is formed of agglutinized shells, which could only have been formed at the bottom of the sea; and the state of their preservation is so perfect that the emersion of this bank must be of relatively recent date. Niebuhr (1761) cites an analogous fact. He says: "I saw at a distance of three-quarters of a leagues west from Suez a mass of shells living upon a rock which was only covered at high tide, and I saw similar empty shells upon another rock on the sea shore too high for the tide to reach. Some thousands of years ago then, the Gulf of Arabia must have extended further towards the north."

Besides, this effect is not merely local; it extends much farther, for Niebuhr says again in speaking of Arabia: "The sea coast here has changed more than anywhere else. On all the coasts of Arabia one finds indications that the sea has receded. For example, Musa, which all the ancient writers speak of as being

a seaport of Arabia, is actually some leagues from the sea. We see near Loheia and Djeddah great hills of coral and shells of the same species as those we find living in the Gulf of Arabia. It is the same at Chalouf. We find a beach, pebbles and shingle. The sea still comes occasionally to wet them, but it no longer tosses them about, and it has evidently receded since the day it fashioned them.

But at a more remote period the sea came higher still, even as far up as the Serapeum, and filled the Bitter lakes ; for it has left there as witness of its presence an immense bank of salt eight miles long, four miles wide, and thirty-two feet in thickness. By the building of the maratime canal the sea has again entered these lakes and covered the bank which to-day is entirely submerged.

Prior to this submersion the basin of the lakes formed a great depression, sloping gradually on all sides. The soil was a sand more or less hard, mixed here and there with flinty pebbles, gypsum and clay. As one went towards the bottom he met a belt of blackish earth, very soft, which, owing to the deliquescent salts with which it was impregnated, and to the subterranean filtralions, always remained moist. In a few places the surface would dry up sufficiently to permit of passage. But one felt the ground tremble under foot, and one could easily thrust a flexible switch or rod into it, which, when withdrawn, would bring up a little cone of salt. Accidents there were not rare. Le Pere, president of the Egyptian commission, and a number of the employès of the Suez company came near losing their lives there. The bank of salt was raised from four and a half to six feet above the moist grounds, which it completely surrounded. Formerly, without doubt, this black moist mass occupied the bottom of the lake, and at a certain moment it must have been driven back by the pressure of this bank which by some convulsion has been thrown up onto solid ground. All these facts are incontestible and uncontradicted; but we are ignorant of the dates at which they may have occurred. The ancients have left, it is true, accounts sufficiently numerous upon the isthmus, but they have been so diversely interpretated

that each opinion has found arguments in its favor. Let us try to determine the meaning of them.

The City of Suez is, as we have said, built upon a lagune, of which the point runs some thousands of yards to the north and forms ordinarily the terminus of the Red Sea, but in exceptional cases, when a south wind aids the equinoctial tide, the waters rise much higher and overflow the plains of Suez, which they afterward leave covered with a salt efflorescence. This plain, nearly nine miles in length, is limited at the west by a little rise of ground, the last of the lesser chain of Gebel Geneffe, and at the east by the swelling of the little foot hills of Syria, which form cliffs ; and at the north by the ridge of Chalouf, which leaves Gebel Geneffe and runs to the east, diminishing in height as it advances into the plain, where it disappears before reaching the cliffs of Syria ; so that if the waters still rose it would be necessary to find passage thence.

To-day, at least under ordinary circumstances, the width of the isthmus is something like seventy miles, counting from the point of the lagune at Suez to the ancient mouth of the Pelusiac. But at the time of the exceptional tides, when the waters overflow the plain of Suez as far as Chalouf, the distance between the two seas is only about sixty-three miles, and finally, when they fill the Bitter lakes and advance, even to the Serapeum, it is only about forty-six miles. But between these two periods there may or must have been an intermediate period when the waters, still without entering the lakes, escaped by the threshold of Chalouf. Then the distance also must have been intermediate, and furthermore, the line, following the one where we measured it, must have been carried back towards the east.

Now Pliny and Strabo—who wrote, the first, sixty years after, and the second, twenty years before, the commencement of our era—place upon the Asiatic shore, toward the Arabian gulf, a city of Heros, which appears to correspond with the ruins that we find on the cliffs of Syria, a little more than half the distance between Suez and Chalouf. From the lower end of the gulf upon which the city was situated, as far as Pelusium, extended, according to Strabo, (Geog. xvii.) a desert one thous-

and stadia in length.   In another place he says nine hundred, but in the Chrestomathies, which are neccessarily posterior, he maintains one thousand stadia.

The statement is very clear the only difficulty lying in the question of the stadium, its length not being fully understood. There must at least have been two in use.   The Olympian stadium measured six hundred and seven feet, while the stadium of Samos only measured three hundred and twenty-eight feet. What is to be done in such a case?

This question of the length of the stadium has received much attention from the savans of the Egyptian commission.   They studied it in all the ancient authors who have written upon the subject in Egypt, and after having measured upon the spot a great number of distances, they arrived at these three conclusions, viz:

First—The distances must have been measured directly from one point to the other, as we do on our geographical charts ; the Egyptians possessed the most exact, of which the origin, according to the historians, dated back to the epoch of the great Sesostris. (*See 'Memoire de Jomard sur le systèm métrique des anciens,' page 722 at suivantes.*

Second—Herodotus nearly always employed in Egypt the stadium of three hundred and twenty-eight feet ; it is, for this reason, called the stadium of Herodotus.

Third. Strabo and Diodorus of Sicily employ sometimes the stadium of 607 feet and sometimes the one of 328 feet.   They appeared, however, to copy the accounts they received without taking the trouble to define the measures employed ; the same can also be said in a measure of Herodotus.   See '*Description de l'Egypte.' Memoire surle système mètrique des anciens, par Jomard.   De l'ancien état des côtes de la mer Rouge, par Roziere (Antiquites Memories, T. I et II.   Memoire sur la communication des deux mers, par Le Pere.   Memoire sur les anciennes limites de la mer Rouge, par Dubois-Aymè.   (Etat moderne, T. I.)*

For the value we employ we have an easy means of verification.   We know perfectly the distances.   Let us employ there successively the two stadia.   We shall very readily see which fits the best.

Let us first hear the testimony of Strabo.

He speaks of a desert 1,000 stadia long, which extends from the foot of the gulf to Pelusium. Let us remark first that there is no uncertainty of the manner of measuring this length, for we have it before us in going from the gulf to Pelusium, and deviating neither to the right nor the left, consequently we must apply the measure directly and in a straight line. Now one thousand stadia of 607 feet long would be about 115 miles, which in starting from Pelusium would put us into the Red Sea about forty-six miles south of Suez; the stadium of 607 feet, then, is much too long. On the contrary, with the stadium of 328 feet we land directly upon Chalouf, which confirms what we have already said, that at a certain epoch Chalouf was at the bottom of the Gulf of Arabia; it is in reality, then, the stadium of 328 feet that Strabo has employed in this measure.

He says further that Pelusium was 20 stadia from the Mediterranean Sea; the distance between the two seas was then 1,020 stadia, say sixty-three miles.

Let us turn now to Herodotus, who lived more than four centuries before Strabo. For want of a good interpretation the accounts that he gives have confused rather than cleared up the subject.

He teaches us that, "To go from the northern sea to the southern, which is called the Red Sea, the shortest road starts from Mount Casius, which separates Egypt from Syria, which would be a distance of only one thousand stadia." (Liv. II, 158. *Traduction de nouvelle de Giguet. Hachette*, 1864.) The deduction of one is that the Red Sea stops at Suez; of the other, at the Serapeum.

The first employed the Olympian stadium of 607 feet, and starting from Mount Casius he directs his course to the Red Sea, "taking account of detours and circuits, he arrives thus near Arsinoë or Suez." But there can be no question of "detours" nor of "circuits," since Herodotus speaks of "the shortest road." Now, in marching in a straight line we arrive thirty-four miles south of Suez; the stadium of 607 feet must then be rejected. Herodotus, then, must have employed the stadium of 328 feet. Only we must employ it as he indicates, and it is

this that does not please those who try to prove that the Red Sea did not reach as far as the Serapeum.

In reality it is found to be just 1,000 small stadia from Mount Casius to the Serapeum, and they draw from this circumstance that the sea reached that far. This is an error, for the shortest distance between the two seas in this case would be from the Serapeum to the shore of the Pelusiac, forty-six miles, and not from Mount Casius to the Serapeum, sixty-three miles, as Herodotus tells us.

What he does say amounts exactly to this: "If from the point of intersection of Mount Casius with the shore as a center, we describe an arc of a circle upon the surface of the isthmus, with a radius of 1,000 small stadia, we shall strike the northern extremity of the Red Sea."

In doing this at the present day we strike directly on the desert, which shows us that in former times the Red Sea extended further into the interior than it does to-day, consequently discrepancies naturally occur in accounts that were perfectly stated.

Thus, according to Strabo, the sea reached to Chalouf, sixty-three miles from the shore of Pelusiac, and sixty-seven miles from Mount Casius; according to Herodotus it reached a little further. It must then have overflowed in the east and formed lagunes, of which the northernmost reached within sixty-two miles from Mount Casius, while the mass of water retained by the ridge rested sixty-seven miles from the Mediterranean.

The Bitter lakes, then, no longer formed a part of the Red Sea, but they were filled with salt water which was brought by Pharaoh's canal, commenced by Necos, and finished by Darius (Herod. II, 158), and which, in the condition in which Herodotus saw it, reunited directly and without locks the Nile and the Red Sea. But the Bitter Lakes at a given moment have been made a part of it. And without doubt they were in this condition during Moses' time, for the passage of the Red Sea could have taken place according to the account only in this condition.

They have been separated by the formation of the ridge of Chalouf, which some attribute to a gradual upheaval, which

after many centuries drove back the waters of the Red Sea and others to a sudden upheaval occasioned by some great terrestrial commotion.

"If we observe," says M. De Lesseps, "that the culminating point of the ridge of Chalouf is about eighteen feet above the actual mean level of the Red Sea ; that the ridge is formed of deposits of sand mixed with gypseous clay even to a depth of about twelve feet, and then below that, at a height of a little more than six feet above the actual level of the sea, a rocky bank, rich in fossiliferous deposits at the surface, and of a formation much more ancient than the other lands crossed by the canal, it becomes easy to state precisely the conditions of the retrogression undergone by the Red Sea. At the epoch when the Hebrews quitted Egypt, the rock of Chalouf, the last prolongation of the hills of Geneffe must have been entirely submerged. Then by a continuation of gradual upheavals of the soil, the crown of the rock became bare, and gradually became covered, under the action of the tide and the wind, with deposits of sand, clay, etc., until it came to form a barrier between the sea and the lakes." (*Académie de sciences, seance, du 22 Juin,* 1874.)

Such is the opinion of M. De Lesseps. It appears rational, but a contrary opinion is not less so.

Really we meet in this neighborhood many different traces of violent commotions, such as the one mentioned by Le Pere in the defile of Ramlieh, situated some ten leagues distant.

Le Pere says : "This defile is embanked for about three hundred feet in the plateau which overlooks the valley. The two banks have an inclination of from forty to fifty degrees. The numerous inflections correspond so strikingly with the indentations and projections of the defile, that they seem to have been cut by the hand of man."

"This formation, it appears to us, must have been the result of the rending of the plateau by such a giving way of the valley as is generally produced by earthquakes." ('*Memoire Sur la Communication des Deux Mers*'.)

Besides this, the sacred history mentions a violent earthquake, suddenly occurring in the neighboring countries a little after

the passage of Moses, of which the effects may have extended this far. "*In exitu Israel de Egypto. . . . Montes exult-averunt ut arietes, et colles sicut agni ovium.*" (Ps. cxiii.)

Is is very possible that the ridge of Chalouf may have been heaved up in these convulsions.

Either of these solutions is then admissible, and thus far there does not appear to have been any decisive reason either way. Neither the nature, nor the primitive formation of the country brings any argument in favor of one or the other.

Here is further information upon the level of the Red Sea at different epochs.

Le Pere, in establishihg the level of the canal of Pharaoh, met in the Bitter Lakes some banks of shell fish, and remarking that they were at the actual level of the Red Sea, he concluded that at the time of the separation the level of the two must have been the same; but this conclusion is erroneous.

In reality we must notice that these shell fish are neither broken, nor scattering upon the beach. There are banks of them, and they have not been tossed or rolled thither by the action of waves, but they have lived there. They were then submerged; and since the closing of the passage to the lakes, that is to say, since 740, the sea has sunk away from the height of water it had recovered. What was that height?

We find approximate information at the crossing of the ridge of Chalouf. Pharaoh's canal presents at this point a state of preservation truly marvelous. The slopes are regular, the angles sharp, the bottom, of flinty pebbles and clay, perfectly smooth, without trace of ballasting. We should say the work had just been completed. We can even distinguish very clearly upon the steep banks, the little heaps of rubbish that the workmen brought up from the bottom of the cut at the time of the last cleaning out. All this is easily explained by a collection of local circumstances which avert all cause of destruction and renders very probable the opinion that the cove dates from the digging of Amrow, about 640. Its declivity is 58.25 feet, whilst the height of that of the Red Sea is 60.22 feet. It would not then, to-day, have more than two feet of water at mean tide, and would be always dry at low tide. As a result, the

canal would be of no service. Since at the time of the Arabs
it was still in use, it had necessarily a greater draught of water.
It could not have been less than nine feet at mean tide, and say
from six to seven at low tide. And this is very modest for a
maritime canal that Ptolemy had had dug thirty Roman feet
deep, according to Pliny. The ground would then have been
raised in the twelve centuries that have passed since the time
of Amrow, say about seven feet; a little more than seven-one-
hundredths of an inch per year; and, in admitting the same
proportion, twelve and a half feet since the time of Ptolemy
Philadelphus, this is evidently a minimum calculation.

This circumstance must have had a certain influence upon
the relinquishment of the canal; it could no longer receive
ships from the sea, and it is without doubt because of its inu-
tility, that they have neglected to reëstablish it after the war,
in view of which the Caliph Al-Mausour had, about 740, caused
its mouth to be closed up.

However it may be, and whichever opinion be adopted upon
the mode of the formation of the ridge of Chalouf, what we have
just said shows clearly that at the time of Moses it must have
been deeply submerged, and that it was really the water of the
sea, and not that of a lagune, which came to bathe the feet of
the Serapeum. There no longer remains, then, any foundation
to the objection that M. l'Abbé Vigouroux formulates in these
terms: " At the epoch of Moses the Red Sea no longer reached
as far as the Bitter Lakes. I must scarcely ever have passed
its actual limits. From the time that the Bitter Lakes were
permanently separated from the Red Sea by the ridge of Cha-
louf, they could no longer have been confounded with each
other; they must have borne a distinct name. In like manner,
when Exodus tells us that the Israelites have crossed the Red
Sea, it assures us that they have not passed by the lakes situa-
ted to the north of the ridge of Chalouf." (' *La Bible et
l' Egyptologie.*)

This objection is analagous to that of P. Pugol, who said:
" This reservoir, this basin, where from time to time the Sea
has sent his waves, is it the sea, the great sea, the sea in all its
strength? Does Moses allow the supposition even that the

miraculous passage took place toward the extreme point, there where the waves are stilled, and not at the shore of the great waters, in front of the sea in all his power." (*Etud. relig.*)

It is P. Pugol who employs the grand words, "great waters, great sea, sea in all his power," and not Moses, who simply says, "*unda, mare, aquae,*" and his narrative shows clearly that the passage was made toward the extreme point, in a place where the sea was straight enough to allow the Hebrews to pass over rapidly, and deep enough to drown the Egyptians.

"THE TWO WITNESSES."

In the July number of the INTERNATIONAL STANDARD Mr. W. H. Searles has by a cloud of adverse criticism obscured the main facts that my values of minor quantities, whilst fulfilling many other conditions, are practically identical with those of Professor Piazzi Smyth, and even in the floor length the difference amounts roughly to ⅓ of an inch in 157 English feet, or 1 in 5,300. Then my value of the angle of inclination is larger than that indicated by the Professor's very best instrument by only $7''$; in other words, the difference is only 1 in 13,525.

The method pursued in my pamphlet was to determine with the utmost precision the dimensions of the step and grand gallery by means of multiples of the lunar synodical month and sub-multiples of 2,520 and 2,500, at least the last of which, in the shape of multiples of 5 and 25, had already been found in numerous positions in the Pyramid. Having thus bound myself hand and foot and rendered it impossible to alter the quantities by a hair's breadth, I showed that they without any alteration whatever pointed with exactness to the most important events in the history of the world during the last 2,500 years.

Mr. Searles first summarily disposes of my theoretical numbers; these have been "obtained from purely arbitrary sources after considerable calculation."

Mr. Searles evidently regards calculation or any other process requiring time and thought, as a very serious offense in

Pyramid students, and a sound *a priori* reason for rejecting their discoveries. Having then, after very scant consideration, cast aside and utterly despised the only possible means of ascertaining the exact quantities intended by the Pyramid architect, he makes his first attempt to substitute a better method, and most signally fails.

"For our part," he writes, "we prefer to go directly to the best authorities, who have actually measured the length, and compare their results." And what does he discover? That, as even the best measurers are only men working with imperfect instruments, their measures are not absolutely faultless, and in so delicate an investigation a very trifling mistake makes a vast difference in the reckoning; or in the words of Mr. Searles: "We thus see how a small discrepancy in the measurements makes a wide variation in the dates, and this should warn us *to seek the measures from given dates*, rather than to determine exact dates from the best of measurements."

Thus within less than a page he has entirely shifted his ground, and has been forced to abandon his first suggestion. His second method, which is even more objectionable than the first, will be found clearly stated at the foot of page 246: "The only satisfactory method of solving such a riddle, *if it be capable of solution*, is to prepare a schedule of all prominent marks in the gallery with their distances, also a schedule of important events in history with their dates, and then compare the two *without alteration* on different theories as to the starting-point, until a theory can be found that will reconcile one schedule with another." Now, this is a highly objectional method, because as dates are equivalent to absolutely perfect measures, whilst all human measures are tinged with error, the two schedules could by no means be reconciled without a large number of adjustments; and whether Mr. Searles would be likely to tolerate such adjustments, may be inferred from his having convicted me of having departed from Professor Piazzi Smyth's measure of the step height to an extent estimated by himself at about $\frac{1}{140}$ of a Pyramid inch. The chief object of my method is to avoid even the imputation of having altered measures in order to make them correspond with dates.

Mr. Searles evidently despairs of the "solution" of the "riddle." But if the investigation is to be strictly confined to points which would be remarked by an ordinary visitor, and if the signification of those points is to be determined merely by straight-forward measurement, I fail to see that there is any riddle to be solved. The reason given by Mr. Searles for rejecting my true end of the gallery floor would apply with equal force to the earth's axis; it cannot be of any importance because it is altogether invisible and "imaginary" (?). If Sir John Franklin had reached the North Pole and had cleared away all the icebergs, he would not have found even a brass-headed nail to mark the point of emergence of the line on which, nevertheless, this huge earth revolves. Seeing the ill-success which had attended the labors of students in general for seventeen years, and of my own in particular for five years in the direction of chronology, I arrived at the conclusion that the fault must lie, not in the Pyramid but in those very principles on which Mr. Searles now so strongly insists, but in support of which he has not produced a scintilla of evidence.

Dismissing, therefore, all preconceived ideas in regard to the canons by which the architect should have been bound in monumentalizing the divine scheme of times and seasons, I fell back on that mighty instrument by which all the great victories of science have been gained since the days of Bacon—the inductive method; and finding that the dimensions of the step and gallery, as observed, oscillated about grandly theoretical quantities, astronomical and prophetical, I assumed that these were the quantities intended, and proved my assumptions by indisputable historical facts.

Having said so much in defense of my method, I now proceed to justify my figures: Mr. Searles has, in attacking my values, relied much on the name of Mr. W. Flinders Petrie. Now a cursory examination of that gentleman's book will suffice to show that his measures can introduce nothing but confusion into an investigation like the present. How can Mr. Searles, who insists on accuracy to the third place of decimals, consistently ask me to use such expressions as 1693.7 to 1694.6 12.18 to 13.20? Petrie has in one place, on page 75, actually

used an angle of 26° 12' 50", which does not exist in any single passage in the Pyramid. The use of such an angle would alter my reckoning to the extent of about five tropical years! On the whole, the measures given on page 75 are so discordant that they cannot be taken to represent approximations to the same quantities. I shall presently show from other measures of Petrie that they are as inaccurate as they are improbable.

Now, according to Professor Piazzi Smyth, the transverse height of the ramp is not a constant quantity, but varies from 21.3 to 20.3. The exact mean of six measures, three on the east side and three on the west side, at the points nearest to the step is 20.633. Now, Professor Piazzi Smyth's individual measures are only to the first place of decimals, and to my value corresponds a transverse height of 20.667. Passing by the numerous and careful measures of the Professor, Mr. Searles, from the heap of irregularities recorded by Petrie, on p. 75, obtained a particular value of the ramp height, viz: 23.62, with which to annihilate my theoretical value, and with it the date of the 18th Centenary in 1867. Now, Petrie has nowhere, on p. 75, given explicitly any measure of the ramp height. Therefore Mr. Searles must have obtained his remarkable ramp height "west side," which, moreover, he tells us, is "the mean of two good measures" from the following: "The height of the step-face is 34.92 or 35. on E. and 35.8 or 35.85 on W. . . . the east ramp-top varies from 13.20 to 12.18 below the step from E. to W. and the west ramp-top from 12.82 to 12.2 (?) from W. to E." (Petrie p. 75).

According to Mr. Searles, Petrie found by two careful measures on the west side "that 35.8 was the height of the step (evidently .05 is a quantity which, in dealing with Petrie's measures may be safely disregarded). Therefore, Mr. Searles must have taken as the interval between the surface of the step and the top of the ramp 35.8—23.62=12.18. From the above it is perfectly evident that 12.18 is not the mean of any two measures on east or west, nor any measure, good or bad, on the west side, but the smallest quantity Mr. Searles could find even on the east side; and this he deducted, not, as I had a right to expect, from the mean step height, which would have given

32.2 as the ramp height, but from a measure on the west not for removed from a maximum. Petrie, inclined to be over-confident in the accuracy of his own measures, has appended to 12.20 the doubtful sign of interrogation. Therefore, the only measure on the west side with any pretensions to accuracy is 12.82, and, deducting this from 35.85, we obtain 23.03 as the only good measure of the ramp height on the west side.

I now proceed to test by means of Petries levels my theoretical values of the height of the step and the level of its upper surface:

"Level of face of step over pavement." (Pet-
   rie, p. 75) - - - - - - 1693.7   1694.6
Ditto. North end of gallery floor. (Petrie,
   p. 95) - - - - - - - 852.9   852.3
Height of surface of step above north end of
   gallery, - - - - - - 840.8   842.3

Therefore, according to Petrie, the smallest possible value of the height of the step surface, even on the east side, is 840.8, corresponding to 839.96 Pyramid inches.

I now turn to the measures of Professor Piazzi Smyth, and, though at this stage of the inquiry 20 angular seconds are not of much consequence, I take for the inclination the angle given by Mr. Searles, viz: 26° 17′ 40″.

According to the Professor:

Floor length to foot of step= - - - - 1815.6

$$\text{Inclined length under step} = \frac{61.}{\text{cosine } 26° \, 17′ \, 40″} = \quad 68.04$$

(West side) total floor length= - - - 1883.64

These quantities are almost identical with the 1815.5 and 1883.6 obtained by Petrie on the east side; therefore the error in them must be small.

1883.64 × sine 26° 17′ 40″ = 834.42. But by measures on east and west the Professor found that the point where the ramp line struck the south wall was from 16.16 to 17 inches above the step. Deducting these from the ramp height we find that the end of the floor must be from 6 to 6.4 below the step surface.

Height of end of floor =	834.42	834.42
Interval between end and step surface - -	6. 0	6. 4
	840.42	840.82

Therefore, whilst Petrie has given us 840.8 as a minimum, the professor gives us as a maximum 840.82 (or 839.98 pyramid inches). So even with an angle of 26° 17' 40" the measures of the two highest authorities meet in a quantity differing from my theoretical 840. by from $\frac{1}{25}$th to $\frac{1}{50}$th of an inch.

To avoid all possible objections, I now take Petrie's smallest level of the step, and I take it unaltered. It will soon indicate whether Petrie's value of the step height or the professor's should be accepted as the true one :

1815.5 × sine 26° 17' 40" = 804.24.
1815.6 × sine 26° 17' 40" = 804.28.

	East Side. (Petrie.)	West Side. (Piazzi Smyth.)
Height of foot of step =	804.24	804.28
Height of step =	35.	36.2
Height of surface of step =	839.24	840.48
Ditto (Petrie's minimum) =	840.80	840.8
Error =	1.56	0.32

Therefore the professor's measure of the step must be the true one, and deducting it from his measure 840.82 we obtain for the height of the foot of the step 804.62. But the angle required to give such a height with a length of 1815.6 would be 26° 18' 23".

So on the whole we have :—

Angle calculated from linear measures = 25° 17' 23"
Mean of angular observations = 26 27' 37"
(See L. and W.)
Mean = 26° 18'

This angle will reduce the errors in level of Petrie and the professor to 1.4 and 0.16 respectively.

Unmoved by the objections of Mr. Searles, I still assert that the point (or rather line) at which the floor meets the surface of the step produced is not " imaginary," but a real line of preëminent importance: First, Because it is the true termina-

tion of the great chronological scale of this dispensation; second, because it is in the central vertical plane of the building; and third, because it rises above the north end of th

to the grandly theoretical height of 840 $(= \dfrac{2520}{3})$ Pyramid inches.

On all these accounts we might expect to find here indications of some event of supreme importance. Now in the second part of my pamphlet I have, by an entirely independent method, deduced from the Bible and history a series of great events, separated from one another by periods, astronomical and prophetical. These might be represented by several lines converging to the same point, and that point 1260 years from the taking of Jerusalem by Omar, an event and a period clearly indicated in the prophecies of Daniel. Even if the ordinary date of our Lord's birth be accepted, the meeting point of all these lines might be represented in years by 1896.18+. But the belief is gaining ground that the error in the popular date amounts to only a few months in one direction or the other. So the ultimate expression to which we are led merely by history is 1896.18±.4±. But if our theory of the meaning of the grand gallery be correct, the termination of its floor should represent the close of the times of the Gentiles. So on the whole we have :—

End of "Times of the Gentiles," obtained from
　the Bible and history　　-　　-　= 1896.18±.4
Same calculated from the Pyramid　-　-　= 1895.8578

Yet, Mr. Searles can see in the similarity—nay, potential identity—of these two expressions no evidence whatever of the inspiration which guided the hands of the builders.

If my readers are of the same opinion, it will be mere waste of time to continue the discussion. I may multiply proofs, but I shall never be able to produce better evidence, unless some number actually engraved by the architect be discovered on the great step, and even then we shall have to identify it with some event.

But if the identity of these two numbers be admitted, then I have already shown from the levels that the step height must

be 36.2 (more accurately 36.197) and the angle of inclination 26° 18'. To this height corresponds a floor length of 81.696, or 81 years, 8 months, 12 days. Moving back through this period, from February–March, 1897, we arrive at June–July, 1815. We have thus reduced to one month the time within which the event must have occurred; therefore, it can hardly be any other than either the battle of Waterloo on June 18, or the abdication of Napoleon on June 22, which was only a result of the victory. Three dates are given in my pamphlet, any one of which would set the matter at rest; to all of these Mr. Searles has objected on various grounds. I see no reason for altering to the smallest extent the quantities from which I obtained the date of the Infallibility, and having lately tested it by means of the tables of the Julian period in the Greenwich Nautical Almanack, I find that the remainder 0.65 disappears, leaving only July 18. However, as it constitutes a solitary instance of a second mode of reckoning along the surface of the step, and as it forms a part of the hitherto unsolved mystery of the seven overlappings, I do not insist on the date which is not in the least essential to my proof.

But the date April 20 (Gregorian), or April 22, A. D. (Julian reckoning), stands on an altogether different footing.

Mr. Searles has seized the tempting opportunity held out to him by the writing of his article to turn aside from my pamphlet in order to deliver a side-thrust at the inspiration theory in general.

I have not made any use of the measures of the well. Probably in it, as in other parts of the building, there is something of the nature of an enigma.

Although theologians hold widely different opinions in regard to the date of our Lord's birth, all with one or two exceptions admit that the length of his earthly life was from 33 to 33⅔ years, and that He was crucified on either the fourteenth or fifteenth of Nisan. Therefore, if the Pyramid date of the Nativity be correct, the date of the Crucifixion must be either April 22 or April 23, A. D. 34 (Julian reckoning). Thirty-three years terminated on April 22, which was also the day of full moon.

Mr. Searles tries to discredit my decimals because I have not given the hour and minute of our Lord's birth, quite overlooking the fact that, as Rome was not built in a day, so the battle of Waterloo was not fought in a minute, but continued from a time variously stated at 10:30 to 11.30 A. M., until about 6:30 to 7 P. M. (Brussels time).

Thus the Pyramid gives at least two points from which to reckon. Counting from the beginning of the battle, and allowing about two hours for the difference between mean times at Jerusalem and at Brussels, we obtain for the hour of the Nativity 2–3 A. M. But counting from the hour of victory we are led to the time of the Crucifixion, 9:50 to 10:20 A. M. Now, according to the calculation of Sir G. B. Airy, the time of full moon was 10 A. M. (Jerusalem mean time).

Upon the last of the three dates, viz.: June 29, 1867, Mr. Searles has brought to bear his whole battery of arguments: it is founded on an incorrect value of the ramp-height; it is "in no sense a mark left by the builders of the Pyramid;" and the date 800 A. D., brought forward in support of it, is altogether irrelevant.

I have already disposed of the first objection.

If the grand gallery be a prophetical chamber, surely there must be *some line* designed to serve at least primarily as a chronological scale, and beyond controversy the floor must be that line. The foot of the step and the top of the ramp are marks left by the builders which even the most careless visitor could not fail to notice, and to the latter point on the floor-scale corresponds this date.

The last objection betrays a want of thought, for very little reflection must have shown Mr. Searles that the value of the date as a confirmation of what he is pleased to call the "Waterloo theory" must depend altogether on its *place in history*. It is not impossible that 800 A. D. may hereafter be discovered in the Pyramid; but, even if it be never found, it is still essential in showing that the Pyramid has discovered a wonderful connecting link between the Roman Catholic church and the ancient and "holy" Roman empires. Until my attention was directed to it by the ramp, I did not know that June 29 was St.

Peter's day, or that anything remarkable had happened on that day in 1867, or that the date was in any way connected with Charlemagne ; and lately I have been led entirely by the Pyramid to the very fount and source of the Roman empire.

These questions had often arisen in my mind: You have traced the beginnings of the Babylonian, Medo-Persian and Grecian empires, but from what date are we to count the years of the Roman empire, the last and greatest of them all, in which, too, we are most deeply interested ?

Was Julius Cæsar or Augustus the first emperor ?

Now the only two hints given in the Scriptures of the duration of the fourth empire are afforded by the numbers 1260 and 666.

Now the length of the gallery, parallel to the floor along the ramp line, is—with an angle of 26° 18', but with no smaller angle, 1881.8156, or in time February 11, 1883, and to February 11 in the year 1883, A. D., corresponds—February 14 in the time of the first two Cæsars.

February 14, B. C. 27, was the first day of the reign of Augustus as emperor, and the beginning of what is known in history as the Augustan era.

Not merely this, but if we bear in mind that the Roman civil day commenced at midnight, and believe (on the authority of Sir John Herschel) that, in consequence of previous mistakes, a day was not intercalated in A. D. 4, we shall find that 12 mystical months, reckoned from midnight February 13–14, A. D. 1, terminated at midnight December 24–25, A. D. 800, the first day of the reign of Charlemagne as emperor, and 28 months of Antichrist at 4 P. M. (Roman mean time) June 29, 1867.

Reckoning 52.03165 tropical years backwards from this latter date, we arrive at 11:30 A. M. (Brussels mean time) June 18, 1815 A. D.

In my pamphlet are two dates of which I have hitherto made no use, viz.: February 1927 and February 1972. The following calculations are correct to about 16 days :

February, A. D. 1, to February 1927 A. D. = 1926 years = 1260 × 666.

February, B. C. 27, to February 1972 = 1998 = 3 × 666.

R. Courtenay.

Tanna, Bombay Presidency.

EVIDENCES OF IDENTIFICATION OF THE AMERICAN AND BRITISH PEOPLES WITH LOST ISRAEL. A MARVELOUS DISCOVERY.

THE AMERICANS IDENTIFIED WITH LOST MANASSEH—THE BRITISH WITH THE LOST TEN TRIBES—INCONTESTABLE, CONCLUSIVE AND UNMISTAKABLE EVIDENCES—THE DEATH BLOW TO INFIDELITY.

Evidence No. 13.—*England loses America.* The declaration of Jesus Christ that He had no mission to destroy prophecy (Matt. v. 17.), and his confirmation that every jot and tittle of it should be fulfilled, is always a comfort to my soul. By this we can trace the actual fulfillment of so much of Scripture prophecy in the history of the British and the Americans. I am right down glad that America did declare her independence of Britain, Fourth of July, because if she had not, then Scripture would not have been fulfilled. It was a right thing for her to do, and when seen by the people, would do more to substantiate the Bible as the Word of God than any thirteen hundred sermons. I fearlessly declare that the American War of Independence and the grand Declaration, in 1776, is told as in the Bible, and was the result of prophecy, and if it had not taken place Scripture would have been at fault, God's Word would have received a stab, God Himself would have been untrustworthy, and the integrity of the Bible would have been destroyed. Nothing is easier to prove this in these pages, but may I say that when we find America and this war have a place in the pages of Scripture, it should have the effect on every Godly Christian and pious mind of welcoming the Bible as an invaluable book and rendering it the most thrillingly interesting work we possess. We have seen that by being identical with

Israel we had to renew our strength in the isles, by which we became over-crowded and in consequence had to go forth to establish the earth. The very first attempt that was made, in the direction of taking hold of a new possession, was the colonizing of America. When we of Israel went forth to perform our God-commanded work, the very first thing we did, in the matter of establishing the earth, was the acquiring of America (Isai. xlix. 8). We most wonderfully succeeded, notwithstanding we had to go between three and four thousand miles away from our shores, and in ships of such a construction that we should be ashamed of them in these days. Every ship, and every man within the ship, represented the spirit of the Bible in motion, not a soul in the enterprise that was not a living character on the world's stage, representing the drama of God's providence in one of the most wonderful plays ever acted. Every man was the representative of a prodigious host, penned up in confined boundaries, who had nothing but misery, disease and cannibalism before them, unless help was sent in this direction. Their work was an errand of mercy, for they went forth to save the lives of this host. It was the beginning of salvation to the British stock, and to this day we all have need to thank God, in the interests of a great people, that America was discovered and peopled by the very express "people of God." They went forth from Israel to found a new empire, and their going forth was directly in answer to prayer. By the promise God made to our father Jacob, when he had called him by the name of Israel, the seed had to become "a nation and a company of nations."—Gen. xxxv. ii. Of course this could mean nothing more than a large nation in the possession of many colonies, each of these colonies having parliaments of their own to provide for their internal or domestic affairs, but with no power to alter the constitutional laws of the mother country by which each colony would be governed. It is only in this way that any nation could become a nation and a company of nations, and most certainly only in this way that Israel could so become, but it is distinctly told us in Scripture that the very first attempt that Israel would make in this direction, that of acquiring America, would in the end become a loss

to Israel; that after making the settlement, becoming prosperous by ever increasing in people, in stock, in wealth and in commerce, as the people gained in power and in strength, that they would clamor for independence and refuse to remain under the laws or constitution regulating Israel in Britain. By the Declaration of Independence, Scripture declares that Israel would lose this people, and again we saw the Bible would not be true unless this had happened. God saw this and comforts Israel under this distress. She was not to grieve about it, other outlets would be provided, other colonies would come into her possession, the seed would continue to go on increasing, and she would soon repair this loss. Hence God says, " The children which thou shalt have, AFTER THOU HAST LOST THE OTHER."
—Isai. xlix. 20. Lost what? Why the children of America. Israel had to lose them. God and the Bible required they should become lost to her; and in the very best interests of Scripture, we are glad that the event has taken place; we rejoice in the fourth of July, and that since the loss God has proved Himself true by giving to Israel many other children that she can by no possibility lose.

It may be asked, that if Israel in Britain has lost America, why should she not lose her other colonies in the same way? We say that this would be impossible, because it would break the word of God in divers ways. It would destroy the promise of being " a nation and a company of nations," and also the promise of Israel being the Lord's measuring line to encircle the earth, Deut. xxxii, 7, 8., besides Scripture becomes perfectly satisfied with this one loss, which was only the separation of Manasseh from Ephraim or Israel, required by Scripture. Joseph, our forefather, had two sons.—Gen. xli, 51,52. Manasseh was the elder of the two. When Jacob came to bless them, " Joseph took them both, Ephraim in his right hand toward Israel's left hand, and Manasseh in his left hand toward Israel's right hand, and brought them near unto him; and Israel stretched out his right hand and laid it upon Ephraim's head, who was the younger, and his left hand upon Manasseh's head, guiding his hands wittingly, for Manasseh was the first born. . . . . And when Joseph saw that his father

laid his right hand upon the head of Ephraim, it displeased him : and he held up his father's hand, to remove it from Ephraim's head unto Manasseh's head. And Joseph said unto his father : Not so, my father : for this is the first born : put thy right hand upon his head. And his father refused and said, I know it my son, I know it : he also shall become a people and he also shall be great: but truly his younger brother shall be greater than he, and his seed shall become a multitude of nations; and he blessed them that day, saying, In thee shall Israel bless, saying God make thee as Ephraim and as Manasseh. And he set Ephraim before Manasseh."—Genesis xlviii, 13-20.

From these Scriptures we obtain the clear distinction of Manasseh from Ephraim ; each was destined to be the headship of a nation ; both nations would come from the same kindred; they were brothers to each other, and had to go in two separate roads, with characteristics to distinguish each. Ephraim is a synonymous term, and interchangeable with Israel; indeed, each of these nations were to be named in Israel, because Israel said, " Bless the lads, and let my name be named on them," v. 16. Ephraim, or Israel, was the consolidated term of the Ten Tribes, just as Judah combines the two tribes, and Manasseh comes out, as a nation formed from one tribe only, the thirteenth tribe of Israel. The House of Israel, the ten-tribed House, or Ephraim, was to become a greater nation or " people " than Manasseh only in the sense of becoming a nation and a company of nations, whereas Manasseh was only required to be a nation without colonies. This Manasseh is identical with America, and the very fact that she has no colonies confirms this scripture; just as the British, being Israel, have become a nation and a company of nations, and so sublimely substantiate the other scripture. Indeed, we hazard nothing by declaring that without the splendid histories of the two peoples of Britain and America, the bulk of the Scriptures would go for nothing. We all know that infidelity is a strong foe. She has the natural right to demand how the Scriptures we have quoted have been fulfilled, and I have to declare that

it is impossible for any Christian to give answer apart from the solution we are now giving.

It is well to remember that Manasseh did not separate from Israel when in the Land. She went with Israel into the Assyrian captivity, and she entered with Israel into the isles afar off. Therefore, it was only when in the isles that she could separate, and now we know the separation was only effected from the isles, an event confirming Scripture.

Thus we give the history of the real origin of the American people. Their root is in the Bible. Their own conception of their history is not according to fact. It is illusory. It was the will of God that they should have misconceptions upon this matter, in order to keep up the "blindness that was to happen unto Israel." (Romans xi, 25.) There is now no need any longer to keep up this blindness, because "the fullness of the Gentiles has set in." Therefore, it is now the will of God that we should come to the true knowledge of our origin, and why He has raised up His servants and enabled them very successfully to propagate the truth of our identity with Israel, which not only supplies our history in the past, but also supplies our destiny in the future, which is the brightest, the happiest and most prosperous of all the nations upon the face of the earth.

MEMORANDUM, OR PIOUS REFLECTIONS.

It must be conceded that every minister using a pulpit must be faithful to Bible interests. They ascribe great virtue to ordination and to their ordination vows. Their ordination is an oath on their parts to study the Scriptures, in order to become masters of the same. It involves the recognition of their duty to seek to be able to answer all questions placed before them, based upon the Scriptures. Their duty is to defend the Bible from its enemies. This is not a matter of inclination, compatible or otherwise with whim, but an unalterable demand upon their office. If their answers to the following questions were demanded of them by infidels, or righteous seekers after truth, it would not be a matter of choice with them, but an exaction from God on their parts to give answer according to their gifts. I avowedly declare that no minister should be unable to answer the questions I suggest, and I, Edward Hine, positively declare that no minister could answer them, apart from the identity light contained in the thirteen evidences I have given :

1. Was the restoration of Israel effected in Christ's time? 2. Does the distinction of Israel from Judah exist in the present time? 3. Are the Jews literally or spiritually fulfilling their prophecies? 4. As Judah is literally fulfilling her prophecies, should not Israel do so also? 5. How could a literal people RE-UNITE, or AGAIN unite with a spiritual? 6. Was the tribeship of Dan in the Assyrian captivity? 7. Why is Dan omitted from the future event of the sealing? 8. Is God truthful, or a liar? 9. Then

where are the Canaanites? 10. How are they thorns in the sides of Israel? 11. What did Christ RE-DEEM Israel from? 12. Why did the Apostles, when sent after them, find them using synagogues? 13. What Gentile nation was ever under the Mosaic law? 14. What Gentile nation was ever delivered from Moses? 15. What nation became dead to Moses? 16. What Gentile nation had Moses as schoolmaster to bring it to Christ? 17. If Christ was sent to the Jews, why did He speak to them that they should not understand him? 18. Would it be sanity for a missionary to the Chinese to speak to them in an unknown tongue? 19. If the Jews were to receive Christ, why did prophecy declare they should stumble over that stumbling stone? 20. Is prophecy a "sure word" when disguised or spiritualized? 21. Why did Christ declare the Jews should be desolate, or without Him, till he came a second time? 22. Why does God command them still to serve under Moses? 23. And why does God promise to accept them under Moses? 24. Why would Judah be disobedient to the will of God if they were converted? 25. Christ declaring all prophecy should be literally fulfilled; how could He be trustworthy if the Jews were now converted? 26. Are the countries Judah were to be dispersed in, in Heaven above? 27. If not, where are the isles Israel were to locate in? 28. Is there a west and north and intermediate points of the compass in Eternity? 29. If so, what isles above were Israel to renew their strength in? 30. If not, in what isles below were they to effect this operation? 31. If above, how did Israel establish the earth? 32. If these points only effect the localities of above, what interest could they be to us below? 33. If ministers are the blind, now trying to lead those that once were blind, what confidence should we place in their intelligence? 34. Has God broken His promise to call Abraham's seed in Isaac? 35. Where is the seed with this name now upon the earth? 36. What islands northwest of Palestine do they inhabit? 37. What desolate heritages did they acquire upon being overcrowded in the islands? 38. Which was the first colony they acquired? 39. Who were the children that became lost to Israel? 40. When did Manasseh separate from Ephraim? 41. How is Manasseh now, "a great people"? 42. What part of the earth is her nationality located? 43. Where is God fulfilling His promise of causing her seed to be as the sand of the sea? 44. If infant baptism is a new covenant in place of the old covenant of circumcision, where were the Americans under the old covenant of circumcision? 45. As God never commanded Gentiles to observe circumcision, would not the adoption of this, as a new covenant, imply the Americans were once under the old? 46. If infant baptism is the new covenant, then, is not the acceptance of this rite by American denominations a direct avowal that their forefathers were the people of Israel?

Evidence No. 14.—*America's State Seal is Manasseh's.*—We do not desire to make a long chapter upon this heading. It has been much discussed in the pages of this magazine. Able hands have the matter in their hold. Mr. J. H. Weldon, our Irish friend, did good service to this subject only recently, and if only Lieutenant Totten's promised work on the state seal was published, we should all find it invaluable. I have had the privilege of seeing it in manuscript, and can testify to its extraordinary worth. As suggesting how much can be said upon this matter, friend Totten's book will appear a thick volume covering hundreds of pages, every point of which I should claim as an evidence of identification in itself. It is enough for the pre-

sent service to claim as direct evidence the thirteen stars on the American coins, the thirteen stripes upon her flag, the thirteen olive sprigs in her eagle's right claw, the thirteen arrows in its left claw, the thirteen letters in the motto *annuit cœptis*, the thirteen blocks to her pyramid, or, to be short, the thirteen sets of thirteens to be found upon the American state seal as registered and copyrighted by Act of Congress, to mean, and only to mean, a direct avowal on the part of America that she is the thirteenth tribe of Israel represented by Manasseh. Of course we are familiar with the claim made by many unthinking souls that these thirteens arose because America was originally constituted by the federation of thirteen States. We unhesitatingly dismiss this claim with contempt. In her State seal her very eagle is made to speak, becomes positively a talking bird. Within its beak is inserted the celebrated motto, the second one with thirteen letters, *E pluribus unum*, proclaiming that America is "one out of many," or "one from many."

. Now, if this motto of mighty import is made to apply, or have any bearing upon, the original thirteen States of America, it would be at once apparent to every intelligent mind that it would be sheer nonsense, for then it, the eagle, would be asserting on behalf of America that she, America, was composed of one State of these thirteen, when, of course, America comprised the whole of the thirteen original States, and not merely one out of them; therefore this suggestion must be dismissed as an absurdity. But still the meaning of the motto must be explained. America herself would be disgraced to flaunt about a motto without a meaning, and it is behoven now to gather round the motto and explain its meaning. I claim that it is only susceptible of receiving one meaning, and that the "one out of many" simply means one out of thirteen tribes, or one tribe from the thirteen tribes of Israel. It is not capable of receiving any other solution, and in our previous evidences appearing in these pages we have absolutely and conclusively covered sufficient ground to have clearly identified ten of the lost tribes of Israel. Now, we have said enough to assist our readers to distinctly recognize the last of the lost,

for only eleven tribes have been lost. We have put our hand upon the ten, and now we have done the same upon the eleventh, the lost tribe of Manasseh; or, taking into the total the two tribes of Judah, we have found our brother Manasseh, the thirteenth tribe of Israel.

Piazzi Smyth, F.R.S.E., F.R.A.S., the astronomer royal for Scotland, who some years ago complimented us for our services and research rendered to the cause of history and the service of our great empire, says, in his great work, 'Our Inheritance in the Great Pyramid,' page 577 : "This was the first step towards the improved feeling, and even while it was establishing the newly found identity of the British people with the lost ten tribes of Israel, under the headship of, and inheriting the promises made to, Ephraim, the younger son of Joseph, but destined to become the 'greater,' even as a multitude of nations; but, in that case, where was Manasseh, the eldest son, also destined not only to survive, but to become 'a great people'? While others were merely wondering, a remarkable man, EDWARD HINE, who had already added the keystone to the arch of Anglo-Israelism by identifying the Normans with the tribe of Benjamin and the prophecies connected therewith, came forth at the right moment and showed that the great transatlantic nation, THE UNITED STATES OF AMERICA, was the very representative we were in search of, and that Britain and America were verily two brothers."

I have some seventeen distinct evidences of identity of America with Manasseh, but will introduce them further on.

EDWARD HINE.

THE MEANING OF THE COFFER MEASURES—HOW TO BUILD THE PYRAMID WITH THEM ON BRITISH MEASURES.

In a paper by J. Ralston Skinner of Cincinnati, written in 1881,[*] we have the following remarkable relations of the measures of the great coffer in the king's chamber of the Great Pyramid of Ghizeh.

" Now to the coffer. The measures thereof now to be given are all to be found as those made, actually, by Prof. Smyth (see his works) to within exceedingly close limits (from one to two *hundredths* of inches). Parker form of diameter to circumference of a circle 6561 to 20612. From this we can take the proportion $20.^{612} : 6.^{561} : 64.^{8} : 20.^{62647001}+$. Call these terms *British inches*, and in the first and fourth terms we have the ancient *royal cubits*, so-called, by which cubits the Great Pyramid was constructed in all its parts. Take the third and fourth terms as 648 to 206.2647001+ inches, divide by 24 and we have, for circumference and diameter, (1), 27 to (2), 8.5943625+ inches; (1) or 27 inches is the inside width of the coffer. The wall of the coffer is 6 inches thick, therefore $6 \times 2 = 12$ inches added to 27 inches equals 39 inches, the outside width of the coffer ; 39 inches multiplied by 2 equals 78 inches, which equals the inside length of the coffer. Multiply (2) or 8.5943625+ inches by 4 and we have 34.3774500+ inches, or inside height of coffer. This, in the scale of inches for feet, is the length of the king's chamber. Multiply 34.3774500+ inches by $\frac{12}{11}$ or 20.62647001+ inches by 2 and we have 41.25294002+ inches, which is the outside height of the coffer ; 412.529+ inches is the length of the king's chamber. So we have inside width, 27 inches ; inside length, 78 inches ; inside height, 34.3774500 inches ; outside width, 39 inches ; outside length, 90 inches ; outside height,

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[*]A criticism of the legendre mode of the rectification of the curve of the circle. Robert Clarke & Co., Cincinnati.

41.252940+ inches. Cubic contents of inside of coffer, 72398.9097612846+ inches. Multiply this by 2 and we have the cubic contents of the outside measures, or 144797.81952256920+ inches. These measures, as said, compare with, and explain or interpret, Piazzi Smyth's actual measures of this coffer. From the above, the thickness of the bottom of the coffer is 6.8754+ inches. This multiplied by $\frac{180}{8}$ is 229.1830+ inches, which is the height of this room. So, also, 68.754 is diameter to a circumference of 216 exactly, which is the cube of 6.

Enough has been given to show that all the measuring, duplication, verification and correction, *cannot* arise from accident, but *necessarily*, and architecturally, from the above *modulus* of measure, originating the British inch as the fundamental origin of the measures of the great controlling nationalities of the world."

Leaving entirely out of the question " what is the true infinitesimal value of π," I call attention to the remarkable nature of these figures. If Mr. Skinner has not the exact truth here, as to the intention of the great architect, he has it wonderfully close. That Mr. Skinner is in error as to the height of the king's chamber being 229.183+, I have no doubt, for it has been proved by Mr. Dow and Mr. Searles that the two heights are as follows: To the floor, 230.611064 and 235.470388 to bottom of floor course. But that is not the question with which we have to deal just now. Rev. H. G. Wood of Sharon, without any reference to the coffer, in his paper on the British mile, shows that the British mile originates from the measures of the circle of latitude in latitude 30, or in the latitude of the Great Pyramid, or almost exactly there, or referable to that place. His statement is that the Pyramid, in one sense, symbolizes and perpetuates the knowledge of the British mile, and that the place is where one minute of arc is equal to 5280 feet, which is the British mile. Now it will be observed that for this to be so, the radius of the circle must be equal to 100 times the number of miles as there are inches in the coffer depth, or 3437.7+—the diameter being twice the above, namely, 6875.4 miles, or 1000 times the thickness of the coffer's bottom, taking inches for miles.

Referring to the diagram, we see the relation of the numbers in the coffer to the circle where one minute of arc is equal to one mile. Multiplying the number of minutes in circumference (21600) by 5280 feet, we get the number of feet in the circumference of the earth at or near latitude 30. Multiplying the diameter 6875+ miles, by number of inches in a mile, we have 435,631,270 inches in diameter. Mr. Wood has shown that the common cubit of the Jews is 1.8151 feet or 21.78 *British inches*, or exactly the ten-millionth part of the radius of the circle in British inches. The above diameter is that of the earth in latitude where one minute of arc is equal to one English mile, that is, through the section of the earth in or near latitude 30, not through the centre. This diameter must bear some direct relation to the polar diameter of the earth. Taking the polar diameter to be 500,500,025 British inches, and deducting the above named diameter through the section from it, we have these peculiar numbers, 64868754.9110 inches difference. I did not, as we say, cook these figures, but they are very peculiar, viz.:
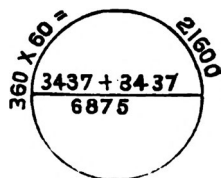
64,800,000 and 68,754.9, or added together, 64,868,754.9 inches. The first integers being the half of 1296, which are the integers of the seconds in a circle of 360, and the second is ten thousand times the thickness of the coffer's bottom. These may be coincidences but they are remarkable ones.

Mr. Dow has suggested in his paper that the true diameter, where the mile is equal to a minute of arc, is shown by the projection of the king's chamber measures southward to a supposed plane, about six miles south of the Pyramid, and it will be remembered that Mr. Wood got Professor Stockwell to calculate where this parallel of latitude should be found, where one minute of arc is equal to one mile, and his answer was from five to eight miles south of the Pyramid. This was long before Mr. Dow's paper. Now comes Mr. Beswick's remarkable paper, in this

number, showing that the place where these measures were laid out is on a plain about 5.75 miles south of the Pyramid; and this suggests the thought, "Does not the thickness of the coffer's bottom, 6.875 inches, symbolize in miles the distance south of latitude 30, where the minute of arc equals the British mile?"* In these papers we take what we think is the intention of the architect in the measures.

CHARLES LATIMER.

[TO BE CONTINUED.]

SIXTH ANNUAL MEETING OF THE INTERNATIONAL INSTITUTE.—INTERESTING REPORTS.

SECRETARY'S REPORT.

The sixth annual meeting of the International Institute for preserving and perfecting Anglo-Saxon weights and measures was held in Cooper Union, under the auspices of the New York and New Jersey branch, November 10 and 11, Charles Latimer, C. E., presiding. It was opened with prayer by the Rev. James French of Philadelphia. Mr. George Kellogg was elected secretary of the meeting. The treasurer's report was read, showing that since the last annual meeting $2,156.48 had been received, and $2,154.83 had been expended, leaving a balance of $1.65 in the treasury with no debts outstanding.

A report in behalf of the committee on weights and measures was made by their chairman, stating that as the sub-reports were not all in, a final report could not be made at present.

The following had been prepared, and in part already published in the INTERNATIONAL STANDARD: "Hebrew Metrology," by J. R. Skinner, C. E. ; "The Metrology of Coins," by S. Beswick, C. E. ; "Metrology in Mechanical Industries," by S. F. Gates ; "Linear Metrology," by Jacob M. Clark, C. E. ; "Surface Metrology," by W. H. Searles, C. E. ; "Electricity and Magnetism," by Colonel S. M. Chester ; and "Cubic Metrology," by Lieutenant C. A. L. Totten. Several of these reports, not published, were read. In due time they will appear in the STANDARD.

At the afternoon session of the first day a congratulatory letter from Professor C. Piazzi Smyth was read, after which the following officers were elected : President, Charles Latimer, C. E. Vice-Presidents, Professor C. Piazzi Smyth, astronomer royal, Edinburgh, Scotland ; Lucian I, Bisbee, Boston, Mass. ; Jacob M. Clark, C. E., New York ; Samuel Beswick, C. E., Strathroy, Canada. Treasurer, A. M. Searles, C. E., Cleveland, O. Secretary, Rev. H. G. Wood, Sharon, Pa. Assistant secretary, Miss Mary B. Sanford, Cleveland, O.

It was the understanding that each vice-president shall be *ex-officio* president of any local branch that may be organized in the vicinity of his residence, and that any local society may proceed in its own way for the election of all its other officers.

*See articles referred to in this paper by J. H. Dow, W. H. Searles and H. G. Wood.

The president spoke of the growing interest he felt in the work of the Institute. He reported that since the Institute was organized $12,469.54 had been expended in its work.

Mr. Clark said that no small part of this expense had been borne by the president. The Institute should give him relief. Subsequently Mr. Clark's proposal was embodied in a report and resolution, submitted by the committee appointed to report on this matter.

Lieutenant C. A. L. Totten then read a paper on the migration of the lost tribes of Israel, identifying them with the people of Samaria who were carried captive into Media, and with the Cumbri of the Crimea who had migrated from Media after the captivity. From thence he traced them to western Europe and identified them with the Anglo-Saxons of Great Britain and their American descendants. He noted the striking similarity in the structure of the Hebrew and Anglo-Saxon languages as philological evidence of identity. In translating from Hebrew into English the order of thought is almost unchanged. He also read a paper on the symbolism of numbers in metrology, and especially called attention to the numerical value of the motto of the United States seal, "*novus ordo seclorum.*" After a discussion of the subject presented by Lieutenant Totten, the meeting adjourned till Wednesday morning.

On Tuesday evening Mr. Edward L. Wilson of Philadelphia, gave a beautiful exhibition of Egypt and the Great Pyramid, with oxy-hydrogen light, in Chickering Hall. A arge and delighted multitude witnessed the views. The president followed with an address on the purposes and work of the Institute, urging the necessity of preserving our Anglo-Saxon weights and measures, on the ground that they are derived from the weights and measures given of God to his ancient people ; that in practical use they are far superior to the antagonistic system based on the French metre ; that historically they are of great value ; that the continuity of terms used in the description of land surveys is highly important to avoid confusion in titles to property ; that the expense of altering the established measures employed in machine shops, and the weights used in retail trade would be enormous without any practical benefit. He also gave a few of the striking and significant measurements obtained of various parts of the Great Pyramid.

The Institute reassembled in Cooper Union Wednesday morning. The session was opened with prayer by the Rev. Mr. Wood. Professor Rogers' bars—one of steel, the other of glass—were exhibited, showing rulings on steel 10,000 to one inch, and on glass 25,000 to one inch. Professor Rogers has ruled 120,000 to one inch. Mr. Kellogg stated that the French metre is shorter than the English metre by a little more than one-fortieth of an inch. Stones from the Great Pyramid, Pompey's Pillar, Temple of the Sun, Cleopatra's Needle, the coffer in the king's chamber of the Pyramid, and other historic relics were exhibited.

Letters from the Rev. Jesse H. Jones, North Abington, Mass., and the Rev. Alexander Mackey, LL. D., R. G. S., Ventnor, Isle of Wight, were read, after which the appointment of committees on various subjects was considered. On motion of Colonel Chester, the president was empowered to appoint all committees.

After the reading and adoption of the report of the committee on raising funds in New York for the support of the Institute, the financial needs of the INTERNATIONAL STANDARD were discussed. Various plans to this end were proposed, in the discussion of which the president wished it to be distinctly understood that whatever support he might give the magazine it is controlled by the Institute. One cause of embarrassment is that one-third of the subscribers are in arrears, and more than one-half do not pay their fees. A motion for a committee on the financial support of the INTERNATIONAL STANDARD was carried.

Mr. Edward L. Wilson being present, a vote of thanks was given him for Tuesday evening's entertainment at Chickering Hall.

In a discussion of the cubit Mr. Clark said that the Mosaic cubit is the true cubit, and if we add to it a hand-breadth we have the polar cubit within a microscopic fraction of it.

Professor de Medici gave an illustrated lecture on the radical methods by which to arrive at the new system of values.

Colonel Chester, on "Electrical Units," recommended the entire abandonment of what is known as the C. G. S. system.

Mr. Clark then read a paper on the "Geodetic and Astronomical Relations of the Pyramid," by S. Beswick, in which Mr. Beswick held that the latitude of Memphis was where the ancient system of measures embodied in the Pyramid was obtained from actual measurement of the earth, the site of the Pyramid being the central station to which all measurements were referred; that the Pyramid was built on the results of geodetic survey in the latitude of Memphis; that the ancient Greeks and Romans sent their scholars to Egypt to learn geodetic and astronomical science, and that modern systems of weight and measure are traditions received from that ancient Egyptian source, more or less corrupted.

Mr. Wood said that from his investigations he believed that the origin of the English mile was in the actual measurement of one minute of longitude at or near the Great Pyramid.

Prof. Felt had investigated cubits, and said that the Egyptians had a sacred and a common cubit; one was used in measuring royal buildings, where the measurements were made downward from an imaginary point or apex, the other in measuring common buildings where the measurements were made upward from the base.

Mr. Clark's paper on the "Five-Fold Kingdom, Identifying Ancient American with Ancient Egyptian Life," was followed by a paper from G. M. Coxe, entitled, "Who are the Picts?"

A discussion of the conditions and evidences of the ancient migration of races then ensued, after which the following committees were appointed by the President:

1. On Devising Means to Carry on the Magazine—Col. S. M. Chester, Lieut. C. A. L. Totten, W. H. Searles, George Kellogg, Mrs. E. Bedell Benjamin.

2. On Expedition to Egypt—Lewis Miller, Akron, O.; John F. Seiberling, Akron, O.; Chauncey Andrews, Youngstown, O.; W. U. Master, Cleveland, O.; Lieut. C. A. L. Totten, U. S. A., Garden City, L. I.; Rev. H. G. Wood, Sharon, Pa.; Rev. James French, Philadelphia, Pa.; Edward Wilson, Philadelphia, Pa. Lieut. Totten, chairman.

3. On the Origin of the British Inch, to investigate the following points: Is the British inch cosmic? How far back may it be traced? Is there a Pyramid inch? Is it the original inch? Is the British inch a degeneration from it? Is its cosmic nature established? What is its foundation?—Mr. Joseph Baxendell, Southport, England, chairman; J. R. Skinner, Cincinnati, O.; F. Gass, London, England; Prof. C. P. Smyth, Edinburgh, Scotland; James Simpson, Edinburgh, Scotland; W. H. Searles, C.E., Cleveland, O.; Lieut. C. A. L. Totten, U. S. A., Garden City, L. I.; Rev. H. G. Wood, Sharon, Pa.; Sanford Fleming, C. E., Ottawa, Canada.

4. Silver Coinage (International)—Dr. Watson F. Quinby, Wilmington, Delaware; Henry Kellogg, Washington, D. C.; Theodore Gribi, Springfield, Mass.; Prof. Hilgard, Washington, D. C. This committee to inquire: What is done in Congress? What is proposed to be done? What is the value of the claim of Wm. Wheeler Hubbel for a new alloy for perfect international coinage based on the French gramme.

On the Origin of the Division of the Circle—Prof. John Stockwell, Cleveland, O.; Prof. C. P. Smyth, Edinburgh, Scotland; Prof. W. A. Rogers, Cambridge, Mass.; Joseph Bexendell, Southport, England; Jacob M. Clark, New York; Lieut. C. A. L. Totten, Garden City, L. I.; Rev. H. G. Wood, Sharon, Pa.; George Felt, New York.

To this committee is referred the question whether the circle was ever divided into 240

degrees, and the Committee on Weights and Measures appointed at the last annual meeting was continued.

The President was empowered to add to these committees at his discretion.

The members of the Institute were especially gratified at the presence of Prof. Asabel Abbott, whose contributions to the pages of the INTERNATIONAL STANDARD are highly prized. An old man of more than four-score years, bent by long and hard study, whose eye still has the sparkle of youth, and whose interest in antiquarian research among Hebrew roots and astronomical data, does not abate with the increase of infirmities. He stood like a patriach among the strong men.

The President having requested the gentlemen of the several committees to continue their investigations, closed the meeting as follows:

Ladies and Gentlemen: If this work is not of God, it will fail; but if it is of God, it will not die. There will always be some one to do the work.

The Institute then adjourned *sine die.*   H. G. WOOD, Secretary.

REPORT OF THE COMMITTEE ON WEIGHTS AND MEASURES.

At the last annual meeting of this Institute a committee of sixteen was appointed to consider and report on weights and measures. A meeting of the committee has not been possible. Correspondence has been the main channel of communication. Owing to the magnitude and diversity of the work, a finished report cannot now be made.

To facilitate their labors, each member was assigned a special department and requested to investigate and report on the best unit of weight or measure for it, also its best divisions or multiples for use, its relation to ancient and modern systems of metrology, and the ease with which its correlation with the Anglo-Saxon could be established.

Reports have been received from Messrs. J. R. Skinner, C. E., on Hebrew metrology ; Samuel Beswick, C. E., the metrology of coins or values ; Jacob M. Clark, C. E., on linear metrology ; S. F. Gates, on the best measure for use in mechanical industries ; and Colonel S. M. Chester, on electricity. Lieutenant C. A. L. Totten has given the result of his study of cubic measure in a volume, published last fall by Wiley & Sons of this city, and entitled ' An Important Question.' Professor C. Piazzi Smyth has given his view of the unit and measure of time in the well-known volumes, ' Life and Work at the Great Pyramid ' and ' Our Inheritance.' Valuable contributions, bearing on the work of the committee, have been published in the INTERNATIONAL STANDARD.

Mr. Skinner brings out the important fact that numbers in Hebrew usage were essentially symbolical. Mr. Beswick gives conclusive evidence that the numerical base of ancient Hebrew weights and measures was 1296000, the standard weight of the gold talent in grains. He also shows how various Anglo-Saxon weights and coins are related to this base number. Colonel Chester shows that the present units for the measure of electricity are not satisfactory. Lieutenant Totten, allowing a deterioration of 1-6000th in the Anglo-Saxon unit of capacity, identifies it with the coffer in the Great Pyramid. Professor Smyth finds the year measure of time indicated by a base side of the Pyramid. Numerous correlations of ancient and Anglo-Saxon weights and measures have been discovered tending strongly to confirm the belief that we are investigating a subject of great antiquity. There is hardly ground for doubt that very great attention was given in most ancient times to the study of metrology. The notion that the learned astronomers and mathematicians of antiquity created a standard of measures, by getting an average length of human arms or finger joints, is unworthy the evidences they have left of their skill and knowledge.

The opinion that those systems "originated before anything like intellectual culture existed," and that they were "constructed without thought of scientific method and owed their earliest forms to accident or caprice," is wholly untenable, a contradiction

of the best historical evidences and open to the charge of disrespect to Hebrew antiquities.

There is good reason to believe that even modern systems of metrology, diverse as they may appear, are traditional remnants of usages current 4,000 years ago.

It does not appertain to the Anglo-Saxon race to cut loose from historical antecedents. It is conservative in its customs, laws, religion and philosophy. Historical isolation is obnoxious to the Anglo-Saxon mind. It reveres ancestral lines, and whoever attempts to overthrow its metrology must expect an opposition natural and persistent.

But no one claims that Anglo-Saxon metrology is perfect. The problem which this Institute has taken to solve is, how to make it perfect without destroying its historical connections. In the performance of this task a few principles are to be observed : a prime unit, simplicit in the construction of tables of weights and measures ; a few standard subdivisions, convenient for use ; respect for historical usage ; a geodetic basis ; easy correlation of the different tables ; and possibly some regard to the symbolism of numbers akin to that which obtained in ancient Hebrew metrology. The French metric system is extremely simple in the construction of its tables, correlation is excellent, it has a geodetic basis, but it cuts loose from historical lines, and the subdivisions in its tables are most inconvenient for use outside of the office or counting room, and as yet it has failed to give a satisfactory decimalization of the circle.

Some effort has been made by members of the committee to rectify Anglo-Saxon metrology without imperiling its main structure. Lieut. Totten, in ' An Important Question,' gives a complete decimal system, including a decimalization of the circle. His standard of length is 1-10,000,000th of the semi-polar axis of the earth. His standard volume is eight cubic units of the standard length. His standard weight is a standard volume of material 5.7 times the density of water. His division of the circle is 24 aliquot parts decimally subdivided. He gives no table of values. The prime unit in this system, called standard length, is equal to 25.025 British inches. Its adoption in this country requires an increase of the foot, and its derived measures by 1-1000th part, a decrease of 4 per cent. in the ounce weight, 20 per cent. in the pound weight; an increase of 24 per cent. in the United States quart, and 2 per cent. in the imperial quart of Great Britain. These changes, except in the standard length, are greater than is required by the French metric system, in which the litre is 5 per cent. greater than the United States quart, and the half kilogramme is 10 per cent. heavier than the pound avoirdupois.

Mr. Clark's system of rectification is decimal; it is incorporated in Lieut. Totten's. In taking 1-24,000th part of a mean great circle for a standard mile, he changes the English mile from 5,280 to 5,472 feet, and divides the foot into 10 parts.

Another schedule of weights and measures by Dr. Watson Quinby, is embraced in Mr. Gates' report. Dr. Quinby's system, like Lieut. Totten's, increases the British inch by 1-1,000th. The foot is 12 of these greater inches. The standard volume is 1 cubic foot. His ounce measure is 1-1,000th of this standard. His quart is 32 ounces. His standard weight is 1 cubic foot of water—the ounce weight is 1-1,000th of this standard, so that the ounce weight of water is identical with the ounce measure of water. He takes 1-432nd of the ounce of water, and calls it a grain weight equal to .004 inches of water; and 250 of these grains to make one ounce weight—that is, the ounce weight equals 1.728 ins. of water. For circular measure he divides the circumference into 1,296,000 seconds. The changes involved in the adoption of this system are an increase in all linear measures by 1-1,000th part, a decrease of the present United States quart by 4 per cent., and an increase of the present avoirdupois pound by 1-1,000th part. The simplicity of this system, with its unique correlation and remarkable approximation to the present United States standards, will not be questioned. The greatest practical objection to it lies in the small change of 1-1,000th in linear measures. Could Dr. Quinby's system be built upon

the present British inch, adjusting quarts and pounds to it, less disturbance to the vast mechanical industries of Anglo-Saxon nations would be experienced. One pound of tea is not required to fit another pound; but in stone, metal and wood work our trades of articles are made to *size*, and the instruments or machines, for which they are prepared, are scattered over the whole country. A change of 1-1,000 in the standard inch involves the loss of immense property. Would it not be better to let the British inch remain as it is, and make 1 cubic foot of 1,729 inches the standard volume, and 1 cubic foot of water be the standard weight, providing that the water be brought to such temperature and so divided as to admit of the closest and most convenient correlation with measures of volume? It may be observed that the United States quart is almost exactly one-thirtieth of a cubic foot. A foot measure of length divided into 12 parts, and differing from the British foot by only 3 per cent. on the average, and by less than 7 per cent. in the extreme, is found in nearly all metrological systems, and the Anglo-Saxon cubic foot is very nearly commensurate with measures of volume now in use. As the "fuss," "foot," "fod" and "pie" are nearly equivalent to the Anglo-Saxon foot, so integral multiples of the "viertel" in Germany, the "litri" in France, the "azumba" in Spain and Mexico, the "imperial quart" in Great Britain and Canada, the "quart" in the United States, the "kama" in Norway, the "quartier" in Russia, the "boccali" in Rome, the "eine" in Austria, are nearly equivalent to the cubic foot of Anglo-Saxon use. It appears also that the "pfund" "funt," "libbra," "sottel," "maund" and "carry" of foreign nations are so nearly the weight of our avoirdupois pound, that the cubic foot of water is almost an exact multiple of them, the average variation being one-third of one per cent. In Egypt, France, Holland, Brazil and Greece, the variation is only one-tenth of one per cent. In forty-two out of forty-six nationalities the variation is less than one per cent., and nearly eighty per cent. of them divide the pound into sixteenths. It appears as if this traditional Anglo-Saxon foot had been preserved amidst the historical revolutions of the past to be lifted in these latter days against the enemy to tradition. As the British inch has gone far to solve the problems of monumental antiquity, so it may be found that the modern confusion in weights and measures is reducible by means of the Anglo-Saxon foot.

But the question is still open how to determine and test the standard foot. All efforts to fix such a standard by taking the average length of human steps, or the mean height of men, or the length of human feet, cannot but be regarded as unscientific in method and inaccurate in result. The only right way of handling the subject appears to be to take some certain and invariable earth measurement. The French metre was thus obtained. Among Pyramid students 1-10,000,000th of the semi-polar axis has been a favorite standard of reference. The British metrological commission resorted to the pendulum method and recommended that the standard inch be a certain incommensurable part of the length of a second's pendulum at London. The prime unit or standard in a perfect system of metrology ought to be a measure both definable and attainable. It is believed that the polar axis is determined within 1-40,000th part, and a system based on it would be correct to the fourth place of decimals. The polar axis, however, is an ideal standard. It cannot be actually measured; neither can a circle of the earth be measured. It is impossible to do it. The practical question is what method for defining and determining a prime standard is most convenient and least subject to error.

A writer in the INTERNATIONAL STANDARD has suggested what he calls a differential pendulum as a prime standard of reference. It is the difference in pendulum lengths of sixty, and one hundred vibrations a minute. He computes this difference at the Great Pyramid, at exactly 25 British inches. He also provides for conveniently testing measures of length by this standard anywhere at sea level, by making an allowance of 1-05-000th of the differential for every ten degrees departure from latitude 30°. Whether his theory can be sustained by facts and practical experiment, we are not prepared to say

But whatever prime unit be made the basis of a metrological system, a simple and practical subdivision in the tables is important. The English foot of 12 inches might be made an international standard of length, with only an average increase of 2 per cent. in the foot measures of European nations. No unit for small lengths is more convenient than the inch with successive divisions by two, three or five. The mechanics' eye naturally catches the middle point of two marks. Hesitation in the use of a shop measure involves great loss of time. The cubic foot, 1,728 inches of water, is a natural unit for weight in pounds, if the pound consists of 16 ounces; for the weight of a cubic foot of any substance, in ounces, is equal to its specific gravity. Could agreement be had by adopting the Anglo-Saxon foot as the international standard of length, volume and weight, agreement in its multiples and subdivisions might in due time be reached without sensible disturbance to national industries.

The creation of an international system of metrology is worthy of great and expensive labor. Whether this can best be done by the adoption of an entirely new standard and new revision of weights and measures, or by returning to one or two simple units that have been identified with civilization from most ancient times, is the question that lies at the root of this whole subject. If people will, they can adopt any system, but the results of adopting a system not in accord with the physical and metaphysical structure of the universe, are beyond human control. A remote calamity is involved in building upon an untrue foundation. The object of this Institute is to avert such a calamity, to work along the lines of providence, and to conserve the Anglo-Saxon units of metrology as veritable inheritances from remote antiquity.

In behalf of the Committee on Weights and Measures,

H. G. WOOD, *Chairman.*

REPORT UPON MEASURING AND DEFINING UNITS OF ELECTRIC AND MAGNETIC ACTIONS.

ELIZABETH, NEW JERSEY, November 9, 1885.

REV. H. G. WOOD, Chairman of Committee on Weights and Measures :

Dear Sir :—I respectfully submit the enclosed report upon measuring and defining units of electric and magnetic actions.

Yours very truly,

P. M. CHESTER.

In reporting upon the subject matter entrusted to him, your committee has been guided by a firm belief in the truth and accuracy of the following propositions :

First—An action of unknown conditions can only be measured and defined by comparing it in each and *all* of its conditions to another action of known value, conditions and effectiveness.

Second—No action is, in the abstract, appreciable or measurable, and its value and conditions can only be estimated by its effects upon visible matter, or by a series of comparisons of effects after conversion into other modes of action.

Third—All modes of action are interchangeable—convertible each into the other, either in the same or different forms of condition, and *exact* correlations may exist.

Fourth—The value of any action may be practically, and perhaps sufficiently, though not entirely, defined by describing the mass of matter affected, and the energy, velocity or intensity of the effect ; or the abstract action may be described as possessing defined " quantity " and " energy " when it is known to possess the capacity so to affect matter, or do work.

Fifth—Exact correlations between two actions can only be said to exist when each condition of the one action corresponds with each condition of the other.

Sixth—Motive action, as it most directly and visibly affects matter which can be

weighed and measured, has been universally accepted as the standard to which all other modes of action may be compared, and their quantitative and energetic elements computed and defined.

Seventh—In practice, motive action is deemed sufficiently described when the quantity of matter affected and the velocity of action are separately indicated, and no units or terms exist by which *all* existing conditions can be entirely defined.

Eighth—Between certain actions, correlations known to exist can not be established directly, because the effects of some actions upon matter are not directly appreciable, and that any effect exists is only apparent by the conversion of the original action to action of other form, the effects of which are appreciable and measurable. This invisible effect is undoubtedly a disturbance of molecules, varying in each case with the form and energy of the action.

This is notably true of magnetic action, and this hypothesis plausibly and reasonably accounts for all the phenomena of electric heat, sound and other conduction, and "*resistance*," which, as a recognized condition of matter susceptible of exact and minute measurement, is an important factor in all electric investigations.

"Resistance" is doubtless the antagonism of cohesive action, to the disturbance of molecules or groups of molecules set up by any action. Hence a certain loss of value in original action, expended in overcoming this antagonism. Hence the varying conducting value of material, the molecular construction of each being adapted to different groupings when disturbed. Hence the conversion of one action into another.

Ninth—The average human mind does not understandingly receive abstract propositions, except when compared with familiar propositions relating to physical conditions of matter ; and even the trained and cultivated mind, after long practice and discipline, with difficulty conceives of quantity, energy and conditional form in an abstract action, a mode of doing. Hence the necessity, not only in communicating ideas to others but in each individual mental operation, of referring to complicated physical illustrations with the danger of confusing the illustration with the abstract fact, and of employing not exact but illustrative terms which are themselves misleading.

Tenth—Because of the facts stated in the second proposition, it is rational that in selecting units and terms to define the value and character of any action, that they should most clearly express the value and character of effect upon matter. Also in choosing between synonomous, or nearly synonomous terms, those should be selected that will, as nearly as may, be expressed equally, *corresponding*, even if unlike effects produced by different modes of action.

Lastly—For reasons assigned in the eighth proposition, no one mode of action can be separately treated, and its method of measurement be efficiently determined upon, or a system of nomenclature established, without some consideration of those other modes of action that are inextricably connected with it, so far as all computations are concerned.

It has been said that practically the value of any action may be sufficiently, if not entirely, indicated by defining its "quantity" and "energy." The word "energy" is herein used in its general and broad sense, as expressive of that quality which in motive action might be defined by the words pressure or velocity ; in heat action, thermal altitude, chemical action, etc. In electric phraseology "energy" expresses the product of quantity and what has been here termed energy. It may also be here remarked that while the terms quantity and energy would seem to be applicable only to amount of matter and effect produced, and the qualities can only be estimated by such physical effects for reasons which will presently appear, they will be used as descriptive of the abstract action or as expressive of the inherent capacity to effect.

The application of electricity in art has been so extended, and its infinitely varying phenomena have been utilized through so many different mechanical appliances, that the

units measuring different qualities are numerous. No other force can be so accurately and minutely described. To use a figure of speech, its length, breadth, thickness, weight, speed, energy, compressibility, each is defined.

Any one electric action may be accurately compared with any other electric action.

But electric engineers carry their own tape-lines, scales and tables, which do not correspond with those used to measure other actions.

This is by no means due alone to the vicious choice of terms by the electric school, but in measure from the fact that in motive action, the standard of comparison for all other actions, no units exist by which to measure some corresponding qualities. In motive force the quality of energy has no name or unit, it is clumsily expressed by describing the process of measurement, giving physical units. "Quantity" is expressed in physical measurements of the material moved.

In electric measurements the descriptive unit applies to the inherent quality itself without reference to the matter affected.

Whilst, in the conception of your committee, it is eminently proper that the inherent qualities of *all* abstract actions should be directly expressed by descriptive units of universal and cosmic application, it should not be overlooked, first, that the accurate estimate and measurement of such qualities is only arrived at through the measurement of matter ; and second, because of the human infirmity above alluded to, and because of the necessity of physical illustration electricans as well as laymen are prone to confuse the illustration and abstract proposition, and treating electricity as a *thing* for purposes of estimate and illustration, it becomes difficult to conceive of it as simply an action and not as material matter.

This may be best illustrated by one or two quotations from an accepted text book.

The author after illustrating the quantitative and energetic qualities of electric action, by comparison to a column of water in a tube, wherein the diameter of column expressed the quantity and the derived *pressure* as corresponding to electro motive force, says : "The notion corresponding to quantity of water and pressure are quantity of electricity and electro motive force (energy). Electric pressure and quantity can not be compared with pressure and quantity of water, *not being measurable in feet and pounds.*"

Of course not. In the one case matter itself, the water is directly measured in physical units. In the other, inherent qualities in an abstract action are to be defined by descriptive units.

To illustrate. Air may be, by motive action, condensed to fill a receiver with two atmospheres.

While in this case the air matter is used as a medium, its weight, bulk, physical properties need not be considered. We need simply conceive that a motive action is stored up and contained in the receiver which may be defined by three descriptive units expressive of quantity quality, energy, quality, and rate of action-quality.

The *pressure*, or to use electro phraseology the "moto-motive force," is fifteen pounds to the square inch, or through an escape of one inch area it would move fifteen pounds. In this case the area of escape would represent the quantity, the unit being one square inch. With two area of escapes the form would be $2 q. \times 1 e. = 2$ effects, or 30 pounds moved. The third unit would measure the *rate* at which $1 q. \times 1 e.$ would move 15 pounds. Now these several qualities of stored motive force (or stored energy as electricians would express it), can be distinctly defined in exact terms, although the existence of the latent force could not be appreciated nor its conditions and qualities measured until by movement it had appreciably affected matter.

The units now employed in electric measurements are these :

Of Quantity..... ....Q............................the Conlomb.
" Current.... ....C.... ....Ampère
" Electro Motive Force...............E. M. F............. ....Volt.

" Work or Energy .... W..... .... J----

" Power....................... P.................. .... W----

" Capacity............................ K.. .... F----

" Resistance .... R........................ .... O----

It will be observed first that the ohm and farad are not properly units measuring or expressing degrees of action, but rather qualities of material matter. Next that W and K are rather products of Q., E. M. F, and C.

The ohm and farad are, however, important factors in determining electric measurement.

" Resistance," as a quality of matter, has been herein-before sufficiently explained.

The *farad* may be illustratively described as the measure of a condenser or a Leyden jar of capacity to be charged with a unit of quantity under pressure of unit electro motive force.

As in all other actions, so in electric action the units of quantity, pressure and rate are important factors.

These units are thus described in the books :

Conlomb: "The quantities developed against the resistance of 1 ohm in 1 second under the pressure of 1 volt.

Ampere: " The rate of 1 conlomb per second. The current against an ohm under 1 volt.

Volt: " The electro motive force that would cause a rate of 1 ampère (1 conlomb per second) against 1 ohm, or the E. M. F. that would charge a farad 1 conlomb."

The ampère is the unit of what is improperly called "current." Care must be taken here not to become involved in that confusion that has misled not only the laity, but expert electricians. The term "current" is not used in any sense analogous to that by which we would express the flow of a stream of water, fluid or gas. Electricity, being an action, has no current, no flow. Yet, used illustratively, and not in the technical sense (meaning rate) either, it is constantly employed by practical experts.

The confusing effects of this phraseology appears in the following quotations.

In preparatory explanation the author remarks : "Scientific men do not look upon electricity as a fluid, and the term 'electric fluid' has led to many mistakes."

Shortly after, however, he says : "Electricity can be looked upon as an imponderable fluid, which, like gas, is compressible, the volume varying inversely as the pressure."

Again he apologizes for the use of misleading terms, thus : "Science does not know what electricity is, but it is supposed to be a kind of motion of molecules or of ether very closely allied to heat and light. Science knows little about molecules or ether, and does not even know if there are such things, but thinks the next thing to understanding anything is naming it."

The *Joule* is the unit of the product, or rather resultant of Q. × E. M. F., and perhaps corresponds with momentum in motive action.

From the foregoing definitions it appears that the ohm is the foundation upon which each other descriptive unit is built. Of course, then, any modification of the ohm would imply a sequent modification of each other unit.

Hence, a possibly slight modification of this measuring gauge, and of the time unit, might result in the establishment of a power and work unit, that would correspond with units now used, or which may be hereafter used, to define the conditions of other modes of action.

The ohm now generally accepted is measured by standard bobbins of wire approved by the British Association, and it is intended to establish a unit of working power equivalent to "a force that will give a mass of a gramme a final velocity of a centimetre per second by alone acting on it for a second." It will be sufficiently accurate for pur-

ent purposes to state this more simply, a gramme moved a centimetre in a second. This is known as the C. G. S. system.

As the great mass of practicing electricians have the terms of this system at their finger ends, and they have by more or less intelligent, but certainly long continued practice, acquired a finger and thumb dexterity in the use of measuring instruments and tables, it would be almost hopeless to popularize any fundamental modification in nomenclature, or in the measuring value of the units now employed, were it not for this fact.

The standard ohm, approved and adopted by the British Association, has been so inaccurately determined that it does not accomplish the object intended, and does not accomplish a C. G. S. unit of force.

The attention of leading electricians has been drawn to this subject, and the propriety of a correction of the present system has been warmly discussed.

Sir William Thompson openly expresses his dissatisfaction, and recommends the abandonment of the C. G. S. system.

This is the more significant as Sir William is an enthusiastic advocate of the French metric system. His general views, though interesting, may not be discussed within the circumscribed limits of this report.

The subject of electric measurement, embracing as it does the careful consideration of other actions in connection, is too broad and comprehensive to be treated briefly or hastily discussed. Your committee regards this report a preliminary only to earnest, intelligent and deliberate discussion by and between the associate committees in the several departments, who now for the first time interchange views, and by all other members of the society. With this conception, no specific units are now definitely recommended, nor can they be until the reports of other members of the general committee are received, studied and digested.

Your committee, however, in advance unequivocally recommends the abandonment of the centimetre, gramme, second system, and the adoption of a system hereafter to be worked out, based upon a system where distance shall be measured in decimals of a perfected (pyramidal?) inch, weight in decimals of a perfected (geometric?) pound, and time in decimals of an hour.*

It is by no means certain that any modification of the standard ohm would be required. A slight modification of other factors might accomplish all.

It is also recommended that such technical terms as are of doubtful and misleading significance should be abandoned, and others of unmistakable significance substituted.

All of which is respectfully submitted.

S. M. CHESTER.

SUB-REPORT OF COMMITTEE ON WEIGHTS AND MEASURES.

LINEAR MEASURES, INCLUDING ITINERARIES.

In the space appropriate to a preliminary report on this branch of the subject, at the present stage of the committee's work, nothing more can be done than to direct the general reader to a few prominent *indicia* whereby the ancient correlations can be traced. The vast material wherewithal to enrich and complete the illustration must appear elsewhere. The simplest view is had from a time in the very dawn of letters, long anterior to the Medo-Persian alliance, when the systems correlated with the plainer and simpler forms of pre-Pharaonic Egypt, and with them, pointed back to a far earlier expression of Nature through an absolutely perfect geometrical system.

In recommending the standard unit of linear measure to be $\frac{1}{10000000}$ part of the earth's semi-axis, as near as reasonably ascertainable, and to be divided into twenty-five

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* The geometric second, 1-1,000 hour, is represented on the earth's *mean* surface by a geometric mile.

inches, we are but repeating the views of Callet, in France, one hundred years ago, followed by Sir John Herschel and many others among the very highest of human authorities. And by making the itinerary to be 24,000 miles to the mean circumference of the earth, the relations flow out spontaneously, as shown in the schedule (heretofore published in the STANDARD), which will of itself be clear to the general reader. (See system proposed below).

For all purposes of popular geography and of navigation, we know the mean circumference with sufficient precision by Clarke's elements of 1878. For geodesy and the higher scientific uses, many will prefer the polar cubit; for the straight base between any two observatories is best ascertainable by the earth's axis and her perimeter.

It has been noticed that the itinerary span, 6.56 cosmic inches, is precisely 9 Egyptian digits, and is the diameter of a circle whose circumference is the *royal* cubit. It may be viewed as the cube root of an adjustable 10 pint gallon, and of 10 pounds weight in water. It is one-fourth of the Asiatic pic, which is a decimal of the parasang.* It is the distance between the ends of the thumb and middle finger, moderately extended. The polar cubit is the natural cubit of the arm-pit. The geometric fathom is the natural reach of the arms without effort. The natural foot is one-seventh of the normal height of a man, or 70 inches; and the inch is the first joint of the middle finger.

All these dimensions are natural, and fully expressive of the structural relation of man to the cosmos, in the body, mind and spirit. The table aims to show the best divisions and multiples for use, but with the idea that others, like the twelve inch foot, the twenty-four inch rule and the thirty-six inch yard should be optional. Their relation to the convenience of men, as expressed in the remains of their systems, is shown by the fact that, making reasonable allowance for degradation and probable differences of origin, these typical forms represent in ratio with all the quotations,

> The 25 inch cubit, over 65 per cent.
> The 250 inch perch, over 85 per cent.
> The 200 inch rod, over 98 per cent.
> The 100 inch reed, over 50 per cent.
> The 65.6 inch fathom, over 57 per cent
> The 10 inch foot, over 33 per cent.

If the quotations could be recovered according to population, the ratios might prove to be more remarkable still. Surprisingly accurate representatives of the polar cubit are quoted from Lorraine, Brescia, Parma, Rome, the German States, Arabia, Persia, Algiers, Patras, Candia, China, etc. Analogies of all the above dimensions are numerous in all parts of the world. (For a more extended view, see "Metric Analogues," INTERNATIONAL STANDARD, May and July, 1883).

The transition factor, 41, which establishes binary relations within the proposed itinerary, is seen to be the reciprocal of seven times the earth's ellipticity, very nearly.

The ancient systems were very generally itineraries, and it is now well known that several of them were connected with each other upon some division of the terrestrial circumference, while the manual cubit and minor members were reached by special divisions. So long as nationalities kept distinct, and the principle of correlation remained known, the differences would not be very troublesome. The best modern instance of the principle upon which they connected, or new connecting systems could be framed, is the Russian. The verst, one-tenth of the Swedish and old Hanover and Brunswick mile, is eight Egyptian stadia (300,000 to the circumference), so that it is sixty-four one-hundredths of the geometric mile, and is contained 37,500 times in the mean great circle, and 24,000 times

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* Mr. Alexander quotes the zereth of the Hebrews at about one-third of such a pic. A more symmetrical form would be one-third of the polar cubit, so that, with this cubit as radius, the zereth would be the tangent of the minor component of the octant — half the smaller acute angle of the 3, 4, 5, Pythagorean triangle.

in about the parallel of Prague and Cracow. And it connects with all the ancient *geographical* systems, except the Babylonian, by a series of simple factors.

The key to all these correlations is the agrarian schœnus of Egypt, which Bishop Cumberland, unwittingly shows, and the Turin cubit and the Coptic fedan prove to have been a cosmic dimension of 100 adjusted 'elbow cubits' of twenty-four digits. The Bishop also states that Moses took the cubit at one-eightieth of the schœnus, so that he could lay out the land in terms of the Phenician aroura. But his fathom was four cubits and the Egyptian three, so that the parasang became thirty Mosaic, but fifty Egyptian stadia. The Syrian or Philetairie mile was 16,000 to the great circle. In this way the principal relations of ancient and modern metrics are easily traced. But there were non-geographic itineraries, like the Greek and Roman military mile, the Pythian (though this may have been meant for 22,500 to the circle), the modern English and the Arabian.

There is considerable reason to believe that the English mile was first derived from Eratosthenes (whose operations look like an attempt to bolster up some form of the Babylonian cubit on a 25,000 mile circle), and that it had been changed. The Arabians seem to have attempted 500 reeds, but to have made their mile non-correlative, both with the earth and with their present gauge, by using a pic intermediate between the Asiatic pic and the polar cubit. But Ezekiel had pointed the distinction between linear and itinerary measures. It has been shown, too, that King David strongly emphasized the 240 division of the circle, that Posidonias probably recognized it, and St. John reasserted it.

The combined effect of conquest and migration was to bring these different systems into collision, and obscure the minds of men as to the ancient correlations. The work of Claudius Ptolemy, in the reign of Aurelius, seems, on the face of it, to have been an effort on the part of the Empire to harmonize metrics by re-establishing the Mosaic system. Everywhere, within and without the Empire, Hebrew and Oriental measures were in use. As one instance, Sardinia, Gaul and Greece had the Mosaic or Olympic mile. It was too late. The storm was gathering which was to send Cæsar after Belshazzar; and in the convulsions that followed, the people of Europe lost their learning, and with it all knowledge of the ancient correlations. It was retained in part among the Arabians.

The distribution of the polar cubit, with its countless analogues, is largely among peoples now recognized by some as the ten tribes. If that is so, the direction of Ezekiel to Judah and Benjamin may have been simply a re-assertion of its authority and value. For aught we know, it may, like the Mazzaroth and the Hours, antedate the deluge by countless centuries. But for all that, the appeal of the system to the majority of men must be on the score of convenience and fitness. The adjustment is so slight that it would probably be unwise for the American people to retain permanently the present inch. If the English choose to retain it, and to measure their land and local mile by the yard, that need not influence us.

We need not wait to ascertain the polar axis by further direct survey. Such work will have its future inestimable value. If we translate Clairant's theorem and the existing formulæ decimally upon the hour, with the best experimental constants known, the constant of gravity at mean latitude *in vacuo* is a decimal of the polar axis. If we are not seriously mistaken as to the polar length and the extent to which geodetic operations have verified, Clairant's hypothesis, the mean gravity constant for a current second of time is 32.1836 English feet, representing precisely a total descent of 100 polar cubits in one-thousandth of an hour. By the direct pendulum method, then, at simple positions, the standard can soon be fixed, and restored at any time, to the limit of practical admeasurement.

The pendulum length at mean latitude becomes

			POLAR CUBITS.	.	COSMIC INCHES.
For	$\frac{1}{1000}$	of an hour	$=$ 20.163472 $+$	$=$	506.60594 $-$
For	$\frac{1}{13000}$	of an hour	$=$ 1.563598	$=$	39.08995

For $\frac{1}{1000}$ of an hour = 1.266515 = 31.66287
For $\frac{1}{10000}$ of an hour = 0.562896 = 14.0724–

Sir William Thompson has shown that a variety of phenomena—the wave length of light, electrical vibrations and the like—are so cosmically related that they can be independently used for verifying the standard and for regulating time. Under the system here proposed the "radian" or analytical unit is $\frac{120}{\pi}$ instead of $\frac{180}{\pi}$; but the geometric degree becomes a simple unit expression for velocity.

JACOB M. CLARK.

NEW YORK, August, 1885.

METRIC SYSTEM PROPOSED BY MR. JACOB M. CLARK.

(ARRANGED FROM CORRESPONDENCE WITH THE COMMITTEE ON STANDARD TIME.)

Adjustment—Increase the English inch, and also the Arabian gauge or guz (= 25 English inches), each by its $\frac{1}{1000}$ part.

For the Arts: Inch decimally subdivided.

Denomination.	Metric Feet	
City, or Builders' chain,	100.	= 40 cubits = 5 rods = 4 perches. Value, = 83,416 + English feet.
" reed,	10.	= 4 cubits.
" foot,	1.	the natural foot.
" inch,	.1	= value, 1.001 English inches.

City lot = 30 × 120 feet = 12 × 48 cubits metric. 10,000 inches metric is the entire boundary of a square acre.

Engineering and Geodesy: Cubit decimally subdivided.

Denomination.	Metric Cubits.	
Earth's semi-axis (polar)	10,000,000.	Grand Unit for Astronomy and Geodesy.
Acre (side),	100.	Convenient length for steel tape-chain, value = 208.5416 + English feet.
Perch,	10.	Convenient length for base-bar, value=20.854 + English feet.
Cubit,	1.	Unit for Engineering, leveling, etc., value 25.025 English inches.

Solid cubit, the measure of Engineering quantities.
Superficial acre of 10,000 square cubits contains 43,489 and $\frac{44}{100}$ square English feet, and differs from the English acre by $\frac{1}{8}$ of 1 per cent.

Adaptations for Rural and Commercial Purposes.

8 cubits = metric rod = 200 inches metric, for land, etc.
2 cubits = metric staff = 50 metric inches, for wood, etc. The metric cord = about $1\frac{1}{4}$ present cord.
Metric ell = 40 metric inches, for cloth, etc.

Circular Measure: Time, arc and angle measure.

Denomination.	Metric Degrees.	
Circle,	240.	The quadrant = 60 degrees metric.
Metric hour angle,	10.	The Zodiacal sign = 20 degrees metric.
" degree,	1.	= 1½ degrees, current division.
" minute, or prime		
" second,		
" third,		

Geographic: Road and sea measure.

Denomination.	Metric Miles.	
Mean great circle,	24,000.	} terrestrial, *upon radius of volume.*
" degree,	100.	
" offing,	10.	
Metric mile,	1.	]Value=5,472 Eng. ft. = } The true Turkish mile, ½ of ancient parasang. ½ sum of Jewish mile and Sabbath day's journey.
Metric stadium,	.1	= Stadium of Posidonias.
" road-chain,	.01	= { Knot-measure, glass $\frac{1}{100}$ of an hour. Mast-length, the height from which the horizon appears 10 miles away.
" fathom,	.001	= 3 Jewish civil cubits (Mosaic).
" span,	.0001	= 0.2624 cubits = 6 and $\frac{44}{100}$ inches metric.

Metric furlong, or cable length = 125 fathoms.
(Kilometre of France = $\frac{6}{10}$ of metric mile, very nearly.)

8 furlongs, or
10 stadia, or
328 rods,   } = one mile and { ¼ mile = 41 rods.
2,624 cubits, or   { ¼ furlong = 41 cubits.
6,560 feet metric   { $\frac{1}{10}$ stadium = 41 feet metric.

LETTER FROM C. PIAZZI SMYTH TO THE ANNUAL MEETING OF THE INTERNATIONAL INSTITUTE.

15 ROYAL TERRACE, EDINBURGH, October 27, 1885.

Dear Sir :—In reply to your invitation of the present month, and in the heartiest sympathy with your International Institute for Preserving and Perfecting Weights and Measures in its gallant resolve to do this year so eminently the right thing in the right place, I send you these few appreciating lines to greet you on the occasion.

And why " the right thing," and " the right place"?

The right thing because surely it is high time that the great Anglo-Saxon people of the whole earth should stand up for their ancient customs and heritages of antiquity ; when we see that the spirit of these days calls so frequently for popular demonstrations of what is wanted to be made, done or altered, as to allow even infant states of seven years old along the course of the Danube, not only to rise for such purpose, but threaten to levy war and embroil all Europe and part of Asia ; yet to draw thereby to themselves and their mushroom assumptions the solemn attention and respectful audience of the great ones of the political world.

Most surely, therefore, not a little attention is likely to be paid when the Anglo-Saxons of the western hemisphere arise, though in peacable defence, and as accords with the Christian religion, in friendly yet firm feeling that they will not be robbed by strangers of those beloved weights and measures running through all their civilization, and forming that system of metrology which has descended to them from an antiquity before written history, and as they have lately learned to believe from Divine inspiration communicated soon after the dispersion of mankind.

Now, the presence and confession of this last feature will undoubtedly be the strength of your movement. For the modern, the dreadfully modern, French metrical system, which an oligarchical few in your country are seeking to impose in all the spirit of despotism on the many who are still loyal to the traditions of their race and form the bulk of your great republic, has no religion either in it or for it. And hence, as with all the attempted

movements of mankind throughout history, without religion to guide them, the course of the French metrical system will be found full of vacillations, changes, alterations oppressions of the poor by the rich, and in the end a failure after the loss of invaluable time and wasted opportunity.

But from the standpoint you have happily taken up, you can demonstrate to your countrymen that the Anglo-Saxon weights and measures of to-day, excepting some adventitious adulterations of the dark ages which may easily be swept away, come to you with a noble antiquity and an assurance of solidity of foundation for the future, because they have lasted through 4,000 years of the past—viz., from the Great Pyramid standing geographically in, but not psychically appertaining to, the land of Egypt. Nor can that mighty duration, four thousand years, be shortened by anyone ; for if you apply to any of the modern Egyptologists, so-called, generally free-thinkers, evolutionists and French metrical schoolmen, they will tell you that the Great Pyramid is far older still than four thousand years ; and it is in the sizes, shapes and unalterable positions of its most vital and internal monumentalizations in pure stone, necessarily the work of its founders and authors, who were the honored recipients of Divine inspiration, knowledge as in the Bible, that the coeval character of Anglo-Saxon metrology and Great Pyramid masonry has been claimed and proved.

And, secondly, why is New York the right place for the International Institute, so long confined to Cleveland, Ohio, to make its first great stand in the face of the whole world ? Because New York is the head of the United States of America, and they again have become, or are year by year rapidly becoming, the gathering place and agglomeration of the greatest number of the most intellectually advanced and the most enterprising Anglo-Saxons in the world. The local habitation and authoritative abode, too, for the English language itself, because now spoken, written and read there in all its Shakesperian purity and biblical power by the greatest number of educated millions in any country whatever. While all the scientific improvements and economies of time in modern life, from astronomical observatories to telephones, and from trans-continental railways to sewing machines, are more widely appreciated, and have been more extensively invented in the United States than amongst any other people on the face of the globe.

Why, therefore, should the United States, especially when she has Great Britain to back her therein, come down from her high position, denude herself of her more than human metrological heritage ; and, like the rabble of little godless states of yesterday's birth, without a language of their own, or a history worth anything, be cajoled by a few semi-foreigners to inflict on her people the adoption of the French weights and measures, perhaps the French language, too, in the end, at the peril of fine, imprisonment and the point of the bayonet as well.

But this branch of the argument has been, and still may be, further described and illustrated by others with far more power and more right to do so than I can possibly have. Let me, therefore, rather confine myself, if a few more words may be allowed me, to the latest news touching that monumental foundation in primeval history for the best and most encouraging part of our views, viz., the Great Pyramid, the subject of my particular study at home and abroad, in Egypt and in England, through the last twenty years.

Although the British government has been lately so wonderfully put by a superintending Providence into actual possession of all the land and people of Egypt, from the very year A. D. 1882, as indicated by the Great Pyramid itself prophetically from the oldest of human historical time, yet it is certainly very surprising that that government, whether politically composed of Whigs or Tories, Radicals or Conservatives, holds itself steadily aloof from taking any visible interest in that one sublime monument there, which sanctifies Anglo-Saxon metrology, confirms the whole course of the Christian religion through

the Old as well as the New Testaments, and announces, through its very stones crying out, some of the leading events of the present and future time.

But the minds of individuals, as my daily correspondence (too extensive for me to fully attend to as I would) testifies, are becoming more and more exercised about the Great Pyramid in its religious and historical, as well as metrological, bearings. Not, indeed, all of those letter-writers are in favor of these views, as some are for and others against, according in general to their amount of knowledge of the subject, combined with some secret of predestination of their souls, known to God alone. But all classes of students seem increasing in fervor, each on their own lines ; and the attacks of the malcontents have sometimes been fierce and malignant to a degree, yet have they generally resulted in bringing out some additional testimony in favor of our *excelsior* views of the ancient building.

As to the latest and most striking example, I would allude to the author of a recently published London book, on that deeply interesting question to all earnest New Testament Christians—the expected rapture of the church, some years before the second advent of our Lord, and the beginning of his visible millennial kingdom on the earth.

From an author dealing favorably, Scripturally, religiously with such a subject, who would not have expected the best treatment for the Great Pyramid, which typifies so much of the very same sacred events ? But no ! the said author denounces it ; and then we remember Christ's own words to the effect that His doctrines were not to produce peace, but variance, even between those of the same household.

On what authority, however, does the author in question venture to assert that the Great Pyramid is of Satan, and is a fearful example of the pits of perdition into which the unwary Christians may fall ?

His supposed authority is most instructive, though not in the direction he intends. He works by Kabbalistic arithmetic, which none of the Pyramid examiners have ever found there, and by applying it in the following manner : Out of all the Pyramid's many numerically measured and carefully computed quantities of measure, he picks two, viz.: the supposed length from north end of grand gallery to the fiducial line in the entrance passage, and the length of the grand gallery from north to south wall as taken *through* the step, without regarding the other greater length taken *over* the same. Although the former length has been described as 2,170 and a fraction, in Pyramid inches, the author calls it 2.169 even ; and although the latter has been equally described as 1881.6 (meaning August, 1862), he, at his study table, turns it into 1881. And then, by dealing Kabbalistically with these two numbers of his own felonious perpetration, viz.: 2,169, 1,881— viz.: by summing up their digits in appearance, sideways, he makes them each $= 18$; and 18 he says $= 6 + 6 + 6$; wherefore, evidently to him, the building which contains them is of the Devil.

I have before me, at this moment, a large book with more than 2,500 pages, so that I could easily turn up a page numbered 2169 and another 1881. But would that circumstance annihilate all the other pages and all the information in the book, and prove it to have been concocted in the infernal regions for the destruction of human souls? I do not think so ; and the book is, after all, simply a Gazeteer, and descriptive largely of new towns and villages of the United States. Moreover, the Biblical 666 of evil repute, under certain conditions, is not composed of three digits, which make eighteen when added together, but as St. John takes the trouble to inform us, it is "six hundred, three, score and six," which in any honest arithmetic, or any admitted mode of paying one's debts, means something very different.

But the Great Pyramid is safer still from the Kabbalistic imputation, for the two measures taken by myself in 1865, which, within the limits of dishonest manipulation allowed to himself by the author, were brought to make up the Kabbalistic 18, were most fortunately remeasured by Mr. Flinders Petrie in his late attempt to invalidate the sacred

theory of the Great Pyramid, and were found to be in reality one of them nearly a unit and the other three whole units still larger than I had made them. Wherefore, the man who did not scruple to take one unit off an ancient number for a bad purpose, will yet hesitate before he ventures to abstract two, or three or four units, and consider himself justified before God.

Now, who would have thought, when Mr. Flinders Petrie's grand attack on the Pyramid was published so demonstratively and aggressively in New York and London on the same day, that it contained the most unexceptionable defence of the Great Pyramid against the Kabbalistic interpreter of the present year and his Satanic insinuations.

But thus it is that God causes even the wrath of man to praise him and testify to the holy purity of the one building on all the earth prepared from the beginning of the world, in order that it might become in the latter day, according to Isaiah, "a pillar and an altar unto the Lord."

If Great Britain still refuses to take possession of that primeval monument to Christianity in a land at present oppressed by Mohammedanism, will not the United States at last strike in and extend over it the shield of protection of her Pilgrim Fathers? And I remain, dear Mr. Latimer, in delighted admiration at the untiring manner in which you have been, year after year, working with all your might at this grand subject ever since you made acquaintance with it, your too weak fellow-worker,

C. PIAZZI SMYTH,
Astronomer Royal for Scotland.

"GREAT FISHES, ONE HUNDRED AND FIFTY AND THREE."

To the International Institute for Perfecting Weights and Measures:

If rightly I apprehend the business of your Institute, it is a sort of voice in the Wilderness, to make the crooked straight, to abolish chaos of sixes and sevens, and persuade men to the use of a "perfect and just measure;"—standards neither deteriorated by long ages of neglect, nor invented recklessly out of false refinements, but educed direct from the elementary functions of the kosmos. That is also part of the business of my life. As I cannot meet you face to face, you may be disposed to receive a written brief exposition of one of many cases, in which the elementary functions of the kosmos are interwoven in the Word of Him Who made the kosmos.

If a man believe in God at all, and if at the same time he be instructed in mathematic, and the relations of the kosmos, he should know well enough that the work of God is absolute in exactitude and precision; and that the ultimate refinement of

human mathematic cannot reach the exactitude of the work of God. He should understand that the precision of the relations of the kosmos of God, is simply the expression of the perfect righteousness of God; and that the noblest use of mathematic is simply to help us to get a far-off apprehension of the infinite righteousness of God.

But, then, how about the book we call the Word of God? There be priests and parsons who go about to apologize for what they say is the Word of God; to explain with more or less unction, by I know not how many and contradictory interpretations, that it may be "reconciled" with the "advanced

RATIO OF π ISOSCELES
= B : H :: π/2 : 1.

SCALE 100 CUBITS TO
1 INCH.

153+

153+

153+

BASE

365·242
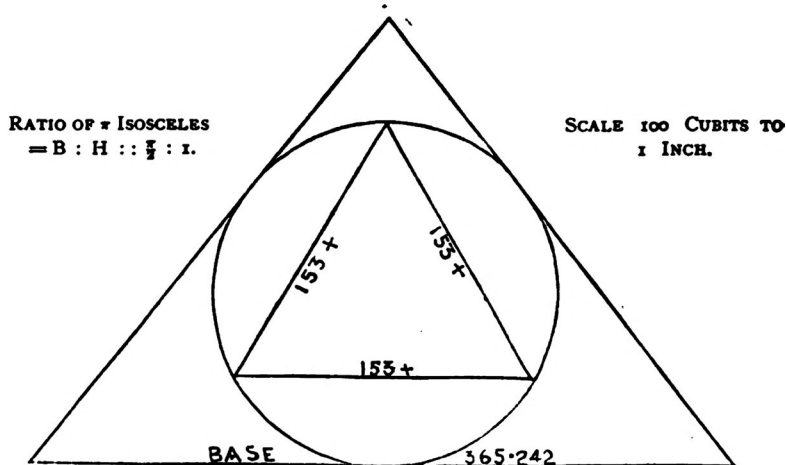
science," such as it is, of this nineteenth century. That surely is very strange! Surely if the book be of God, it can need apology no more than the kosmos of God. If it be of God, it must be in precise accord with His kosmos. If it contradict the kosmos, it cannot be the Word of God. That would be to make God a liar. He cannot lie.

What happens is, that science is unspeakably arrogant, and has not yet arrived at the knowledge of its ignorance of the kosmos. On the other hand, we read the Scriptures by the murky light of commentators and traditions of the elders.

For the hundredth time, I declare this thesis.—

That, in the very nature of the case, if the Scriptures be of God, they must be *in advance of the most advanced human science*.

A hundred times I have demonstrated that the Scriptures are certainly from God, *because* they are far in advance of the most advanced human science; a hundred times shown that they teem with irrefragable, final, absolute mathematical proofs that they are the very Word of Him Whose hand made the kosmos. In the nature of the case it must be so. God can work conceivably no other way than in absolute exactitude, beyond the last decimal of recorded computation.

Voice in the Wilderness indeed, in the midst of a shallow and slipshod generation, to cry out that "He maketh a weight for the wind, yea, He meteth out the waters by measure," is not a figure of speech, but a fact; that the "very hairs of our head are all counted" is not a metaphor, but a fact;—must, in the nature of the case, be so, if there be God at all.

Seven years ago, I showed that the recorded measures of the Tabernacle and the Temple form a system representative of the elementary kosmic quantities, founded on the earth's polar axis, and its mean density (which is 5.7 *exactly*, with no further decimal); and that the sacred cube of the Holiest is the expression at once of the Earth's volume to the last cube cubit, and of its weight to the last ton.

So now let us consider what we mathematical people call a "particular case" where, under the veil of a quantity that seems at first sight to be the measure of no known thing in the heavens, the earth, or the waters beneath, we find a function of the three elements of the kosmos which for us on the Earth are fundamental, to-wit, the ratio π, the time of the Earth's revolution round the sun, and its distance from the sun. These for us are fundamental, because they are the basis of all planetary and stellar computations.

There is a wondrous draught of fishes recorded by Luke. The fishermen had toiled through the weary night, and caught nothing. Then came Jesus, the Christ of God, who made both fishermen and fishes. At His word they run out the nets

again.   When they hauled home, the nets were so full that
they broke.   Make note of this—that *they broke*.   They were
so many that the two craft they filled began to sink with the
weight.   The men were astonished.   Well might they be.
This was before the men, Peter and his comrades, were called
to their apostolic office.   That was why their nets broke.
When the matter was ended, they received their apostolic
mandate.   Jesus said to them, " Henceforth ye shall be fishers
of *men*."   So then, by this act and mandate, the fishes were
constituted types of men.   That is the point to keep in mind.

A second wondrous draught of fishes is recorded by John.
This happened after the rising from the dead of Jesus the Christ
of God, who then had conquered Death and Hades.   Peter and
the rest had seen Him put to death, a shameful death ; and con-
cluded that there was an end of that business.   They went
back to their fishing.   They toiled again through the weary sad
night, but caught nothing.   Again came He who made both
them and the sea, and the harvest of it.   He without Whom
there was not anything made that was made, and commanded
to cast the net on the *right* side, the *right* side, remember, of
the ship.   So full was the net that they could not haul it home.
But a second time they hauled, and brought it ashore.   But
for all the haul of fish, the net this time was *not* broken.   Of
course not.   And there were of

Great Fishes One Hundred and Fifty and Three.

Observe particularly that the small fishes were so many that
we are not told their number.   Thus we have an integral quan-
tity, with an indeterminate interminable decimal remainder.

Why are we told the number of Great Fishes ?   Why is the
number 153 plus a remainder that no man can compute ?   This
is not a big territory, this of Britain ; but I have asked these
two questions of all the priests and the scribes that I could lay
hands on between Wick and Wight, and can get no answer.

The first answer to both questions comes from your side of
the sea that is the only thing that divides us.   The Hebrew
letters, as the Greek, served also as numerals.   By trans-
numerating words of the Hebrew Scriptures, as also of the
Greek,—that is by taking the sum of the numbers which the

letters of the word represent,—we arrive at quantities whose significance is startling. For example, the first two words of Genesis, *B'reshith*, " In the Beginning," give 913, the days of a quarter of the Earth's revolution round the sun ; and the initial figures of the length of the base of the Great Pyramid. If the Gospel of John, in which the draught of fishes is related, be read in Hebrew, it also will begin with *B'reshith* = 913, which is the initial quantity of all kosmic quantities.

Similarly, we may find the Hebrew words which correspond to a given number. One of your citizens has found that the words represented by 153 are *Beni h' Alehim*, Sons of God. Jesus, whom the common people heard gladly, spoke the vernacular of the people, the Aramaic, or lower Hebrew. At the first draught of fishes, He had constituted them types of men in general. He then constituted the catchers to be fishers of men. In the second draught, He makes the number of great fishes 153 to signify that the net of His Gospel, cast on the *right* side of the ship, shall bring an innumerabie company to get power to become *Beni h' Alehim*, Sons of God, by believing on His Name. That net cannot break, however full it be. This is the first, and paramount, answer to the questions why we are told the number, and why the number is so.

The second answer demonstrated that He Who made the kosmos, also gave the Word which rightly we call the Word of God ; since no man, nor angel, can conceivably have had the knowledge of the exact kosmic quantities involved, nor the wondrous skill to convey them by an expedient at once so simple, yet covering a vast area of computations whose boundaries Science has not yet determined, nor is ever likely to precisely determine.

There is a certain triangle, which I call the π Isosceles, because its base is to its height as $\frac{\pi}{2}$ is to 1. If such a triangle be constructed with a base of 365.242, the number of days in a solar year, its height will be the index of the precise mean radius (not "nearly" or "about") of the Earth's orbit, or its mean distance from the sun. A triangle of these dimensions is a right section of the Great Pyramid through its vertical axis. If then a circle be inscribed touching the isosceles sides

and the base ; and, lastly, an equilateral triangle inscribed in the circle, the length of each side of the equilateral triangle is 153, plus an indeterminate and interminable decimal; as all functions of π necessarily have. Obviously, then, 153+ is a function of the three fundamental elements of the kosmos, to wit: π, solar year, and sun's distance. That is easily proven. But the words were closed up and sealed until the time of the end. There is, however, nothing said that shall not be revealed.

The word *Alehim* (there is no such word as "*Elohim*") as also other names of the Most High God in the Hebrew text, is plural, to express the Holy and Undivided Trinity. Which Trinity is also absolutely in the nature of the case. Now, every man knows that, since time was, the Trinity of the Supreme is the heart of all creeds ; and that the equilateral triangle is always and everywhere the symbol of the Trinity. So then, we have *Beni h'Alehim* thrice repeated in the three-fold repetition in this particular equilateral triangle of the 153, plus the interminable decimal, representing the innumerable host hereafter to become sons of the Father in His Son by the power of His spirit.

We are to remember that this is written in the Gospel by John, which begins " In the beginning," B' *reshith*, 913, the initial quantity of all kosmic quantities. John was specially instructed for us in factors of length and factors of time. To him was given a reed to measure the temple of God. His Apokalypse sparkles with fundamental factors.

I reckon, then, we cannot go wrong in holding fast by the measures founded in the kosmos, given by Him Who made the kosmos, in His Word which precisely at all points accords with the kosmos (which thesis I will argue against all comers).

There is the mathematic of God. That is kosmos, order, unbroken and absolute. But also there is a mathematic of the devil (and the devil is not a myth, I tell you). That is chaos, disorder, broken and absolute; nevertheless very specious, insidious, not to say fascinating. Well, I have been doing little else for about forty years than measuring things, from the gauge of a screw to the distance of Neptune from the sun (which I found within a handful of miles); and I find it easier

to work with the measures given by God than with the "metres" given of the devil.

The salutations of the Most High God be upon you, and prosper you.

W. J. COCKBURN–MUIR.

Melrose, Scotland, 22nd October, 1885.

LETTERS.

LETTER FROM JOHN N. STOCKWELL.

1008 CASE AVENUE, CLEVELAND, November 7, 1885.

My Dear Sir :—In reply to your postal of the fifth, I would say that I find the length of the tropical year, B. C. 2170, was 365 days, 5 hours, 49 minutes, 7.26 seconds, or just 20.00 seconds longer than at present.

Truly yours,

JOHN N. STOCKWELL.

LETTER FROM COLONEL A. T. FRASER.

BELLARY, November 17, 1885.

My Dear Sir :—I received your letter of the 10th ult., and was glad to find that my communication of C. Iyer's pamphlet had excited so much interest. The reference to the lost star Revati was new to me, and attracted my attention.

Unfortunately it is extremely difficult to get from Indian natives precise information on such questions. Partly because of those who possess most not knowing English, and a peculiar indefiniteness in their scientific training which is not favorable to accurate thinking.

I have sent your letter to C. Iyer as it stood, through the native friend of his who had first shown me the pamphlet, and recommended he should send his reply to you at Cleveland direct, and I posted the *Plain Dealer* to C. Iyer himself. He has taken a B. A. degree at the Madras University, and is, I believe, a pensioned government servant, living in Madura.

The curious power that natives assert some of them have come to my notice almost simultaneously with 'Sinnett's Occult World,' Bentley, London.

I happen to have known Mr. Sinnett at Allahabad in 1872, when he was editor of the *Pioneer*, one of the principal Indian daily newspapers, and knew him to be the least liable to be duped of anyone of my acquaintance, or to arrive at hasty conclusions. The same opinions I had heard were held by Mr. Hume, home secretary to the government of India.

It appears that Madame Blavatzky, who is well known in America, somehow came across the Anchorites, who are reputed to live in the Himalayas, and some of them showed her how they could move incorporeally, and write letters at any distance. Colonel Olcott then established a society, now at Madras, and which took among the natives, who thought that by means of it they would find how Brahmins kept them in thraldom. I went to see Colonel Olcott a day. I was in Madras in April, and had a long conversation

on the possibility of the transference of matter, and some of the subjects treated in my pamphlet, 'Darkness in Egypt,' etc. He said a Mahatma appeared to him in New York ; that the real man was not there, that is he would have been found where he always lived, but the turban he threw and left on the table was substantial and actually conveyed.

I mentioned the difficulty in getting explanations from natives, at which he laughed. The fact is that we Europeans never see or come in contact with the really influential natives, who are this from having these powers, and it is only a few natives who even know their whereabouts. I did my utmost to get an example of the movement of distant matter, but was always put off with excuses. However, I was able to test the reality of their being able to see to a distance, and in a black composition given me was able to see enough myself to convince me the phenomenon was genuine. In consequence I was thrown back on a priori investigation, and rewrote and enlarged my pamphlet 'Darkness in the Land,' etc., which I heard by last mail has just been published in London as a second edition. In it there is an entirely new theory, accounting for seeing to a distance by electrical images.

You will get a copy of my other pamphlet. I have had an interesting correspondence with Mr. Courtenay on the subject of the Mosque of Omar being Constantine's Church of Anastasis I, and I almost think he is now inclined to maintain it is.

I am yours sincerely,

A. T. FRASER.

LETTER FROM LIEUT. C. A. L. TOTTEN.

GARDEN CITY, November 29, 1885.

Dear Sir :—I send you a clip from a newspaper which it would be well to publish for safe-keeping in the Magazine. Our meeting in New York was very enjoyable, and I trust will in time be productive of good results.

There is a circumstance connected with the burning of the Parliament building, or Palace of Westminster, London, half a century ago (October 15, 1834), which connects the present with the past in a curious way. At the time of the Norman conquest, 1066, the tally system of keeping accounts was introduced into England. It derived the name from the French word *tailler*, which means to cut, the tally-sticks being notched with a knife ; small notches representing pence, the large shillings, and the largest pounds. These sticks were square rods of hazel or alder, split longitudinally, so as to divide the notch marks, one-half of the sticks being laid away in the exchequer strong-room, and the other given to the creditor of the government. To prove the account when presented for payment the two halves were laid together to see if they tallied. English conservatism kept this cumbersome method of keeping accounts in vogue for more than five hundred years after the introduction of the Arabian numerals into England, about 1253, A. D. It was not until 1823 that it was finally determined to put an end to it. The question how to best dispose of the terrific pile of sticks, which had accumulated in those centuries, then arose, and it was not until 1834 that it was finally determined to burn them in a stove in the House of Lords. The burning was more effectually accomplished than was expected. From the stove the wainscoting of the House of Lords was set on fire, the fire spread to the House of Commons, and both were burnt to the ground—a grand funereal pile.

EXTRACT OF LETTER FROM C. PIAZZI SMYTH.

15 ROYAL TERRACE, EDINBURGH, December 14, 1884.

My Dear Sir :—That you have got Professor Stockwell to calculate the exact length of the solar year in B. C. 2170, is an excellent step, and I hope you will publish it with all necessary particulars—the final result, if you like, in letters of gold.

Some of your computations with that quantity will doubtless be important, and I must not damp your ardor, because I have not got a gift that way, but somehow I should like

to see a plain reasoning reason why the coffer's bottom should bear on the recondite questions of the earth's size and shape before going into the deductions of far larger fractions than the probable end of the measures will warrant. But, as I have said, I have not an aptitude for that most ingenious kind of calculation, while I verily believe Mr. James Simpson has, therefore I shall have great pleasure in forwarding your letter to him this evening.

But this very day behold a new man has started up, because apparently predestined to be one of the witnesses for the truth and the objects of the Great Pyramid. This person is Rev. C. Wotruba, C. M., Professor of Physics and Mathematics, Collegio de S. Quiteria, Felguerios, Portugal.

He begins his letter by asking where he can get a copy of ' Our Inheritance in the Great Pyramid.' He has seen notices of it in various scientific journals, and though they are usually abusive is not deterred thereby.

Of 'La Nature,' of Paris, of November 28, he says : "It is pretty angry on yourself, because you do not want to have the millimetric system adopted in England and the United States." Only think of the honor done my poor efforts to be denounced in Paris for being true to my country and "to the United States ! "

And Professor Wotruba bears this further testimony, saying of himself : " I spent four years (1879–83) in the United States, and I never could see any reason for such a fundamental change as the bringing in upon an Anglo-Saxon community of the French metricals, as I found the English system of weights and measures quite handy."

My wife appreciates your continued true-heartedness in the cause as well as I do, and I remain,

<div style="text-align:center">Yours truly,</div>

<div style="text-align:right">C. Piazzi Smyth.</div>

TRANSACTIONS OF THE OHIO AUXILIARY SOCIETY OF THE INTERNATIONAL INSTITUTE.

<div style="text-align:right">September 23, 1885.</div>

Judge J. T. Bernard, of Tallahassee, Florida ; Charles Ferguson Garland, Nelson Plain, Australia ; J. G. Gray, Medina, O. ; R. B. Murray, Youngstown, O. ; Edward G. Tyrell, Kingstown, Jamaica ; Robert W. Watson, Indianapolis, Indiana ; Leo S. Weil, Bradford, Pa., were elected members.

Letters were read from Rev. H. G. Wood, Jacob M. Clark and Thomas Bassnett. A paper by the latter was read and discussed.

<div style="text-align:right">December 30, 1885.</div>

Samuel Griffith, of Mercer, Penn., was elected a member.

The president announced the death of Mr. George Boyce, of Sharon, Penn., a valued member. Mr. and Mrs. A. M. Searles were requested to prepare an obituary notice of the late George C. Davies.

A letter was read from Colonel A. T. Fraser, of Bellary, India, with reference to the extraordinary power possessed by some native astronomers and philosophers.

The subject, "Are the Anglo-Saxon Measures found in the Great Pyramid, and does it Contain a Divine Revelation," was then taken up, the affirmative by Mr. Latimer, the negative by Mr. W. E. Bond.

Owing to the lateness of the hour at the close of the argument it was decided to continue the discussion at the next meeting.

OCTOBER 7, 1885.

Rev. H. G. Wood gave an address on the cabalistic use of numbers.

Mr. Latimer directed the attention of the members to the monetary conference in France, to assemble on the twelfth of the month.

A letter was read from Mr. J. N. Wing with reference to the annual convention in New York. Extracts were read from a pamphlet by a Hindu astronomer. The president acknowledged the receipt of a pamphlet, "Origin of the Stars and Stripes," sent to the society by Mr. Will M. Clemens.

At the close of the meeting Prof. N. B. Wood exhibited through the microscope the markings of the standard bar prepared for the society by Prof. Rogers, of Cambridge.

OCTOBER 21, 1885.

Rev. J. Swinburne Whedon of New York, and Charles P. Fisher of Waubaushene, Ont., were elected members.

Communications from members were read, after which a collection of precious relics from Egypt were exhibited.

Dr. Redfield then read a paper on "The Uses of the Great Pyramid."

NOVEMBER 4, 1885.

Beriah Magoffin was elected a member.

Final arrangements were made for the sixth annual convention of the International Institute.

Letters were read from Mr. Joseph Baxendell, astronomer, England ; Professor Bassnett, Jacksonville, Fla., and Samuel Beswick, C. E., Strathroy, Ont. The President acknowledged the receipt of a book from Professor Bassnett, "The True Theory of the Sun Distance."

NOVEMBER 9, 1885.

A special meeting was held at noon, Monday, November 9, for the election of officers of the Ohio Auxiliary branch of the International Institute. Charles Latimer was elected President, A. M. Searles Vice-President, and Mary B. Sanford Secretary and Treasurer.

NOVEMBER 18, 1885.

The meeting was small, and after a brief discussion was adjourned without accomplishing any special business.

DECEMBER 2, 1885.

Miss G. Kendall, New York ; George H. Taylor, Sharon, Pa. ; Samuel Tucker, Elizabeth, New Jersey, and Professor Ferdinando Borsari, Naples, Italy, were elected members.

A letter was read announcing the death of Lucian I. Bisbee, formerly secretary of the International Institute here. The president spoke of Mr. Bisbee's earnest and faithful discharge of his duties, and of his unfailing interest in the welfare of the society during his last illness. Other members paid feeling tribute to his memory and resolutions of regret for his loss were passed.

Several interesting communications were then read. Professor Piazzi Smyth gave an abstract of Mr. Gladstone's paper in the 'Nineteenth Century Magazine, entitled, "The Dawn of Creation and Religious Thought." Rev. H. G. Wood sent a criticism upon Mr. Samuel Beswick's paper, "The Sacred Cubit." Mr. G. A. Hammond, of Kingsclear, N. B., contributed an original poem, and J. R. Bryden, C. E., of Demerara, British Guiana, wrote upon the Identity question. Professor Ferdinando Borsari, of Naples, Italy, editor of a geographical review, expressed a desire to establish a corresponding membership in Italy.

DECEMBER 16, 1885.

J. H. Shumard, of Youngstown, and H. G. E. De St. Dalmas, of Peona, India, were elected members.

Mr. De St. Dalmas contributed a paper on "The Testimony of the Great Pyramid to the Date of the Dispersion." With reference to this paper a discussion took place upon the time passage theory of the Great Pyramid and the casing stones. A letter was read from Mrs. S. W. Libby, of West Minot, Maine, giving particulars of the death of the late Lucian I. Bisbee, formerly secretary of the Institute. Letters were also read from Rev. H. G. Wood and Samuel Beswick.

The president then announced the death of Mr. George C. Davies, the second secretary of the Ohio branch of the International Institute, and spoke of the valuable contributions of Mr. Davies to the literature of the Institute and of his interest in its work.

Mr. Latimer then gave upon the blackbord some illustrations of the time passage theory, after which a discussion took place with regard to the subject for the meeting on December 30. It was finally decided that it should be, "Are the Anglo-Saxon Measures found in the Great Pyramid, and does it Contain a Divine Revelation?" Members were requested to prepare papers on this subject.

RECEIPTS FROM SUBSCRIBERS TO THE INTERNATIONAL STANDARD FROM OCTOBER 1 TO DECEMBER 31.

October.—Miss Augusta Barr, $2 ; Mrs. Eunice Finch, $2 ; Mrs. Angie Damon, $10; J· K. Hornish, $2 ; Samuel Andrews, $2 ; Samuel Goodsell, $2 ; Charles P. Fisher, $2 ; Rev. J. S. Whedon, $2 ; Mrs. Emmet Austin, $2 ; J. Wylie Smith, $2 ; C. Schoenhut, $2 ; S. McElroy, $2 ; Cleveland News Company, magazines sold, $8.95 ; Mrs. E. B. Benjamin, $7 ; Joseph Wild, $2 ; A. M. Tucker, $2. Total, $51.95.

November.—Charles E. Bliven, $4 ; John Tod, $2 ; Robert McCurdy, $5 ; George Leach, $3 ; G. A. Hammond, $5 ; J. H. Shumard, $2.09 ; Jesse Fosdick, $2 ; Samuel Tucker, $2 ; George H. Taylor, $2 ; C. F. Coburn, $2 ; Miss G. Kendall, $2. Total, $31.

December.—B. Magoffin, $5 ; J. L. Dampier, $4 ; William Archer, $2 ; T. B. Mills, $3 : Thomas Basnett, $2 ; Mrs. Mary S. Bradford, $2 ; Miss M. D. Campbell, $2 ; A. V. Benoit, $2 ; Samuel Griffith, $2 ; J. G. Gray, $2. Total, $26.

TREASURER'S REPORT.

TWELVE MONTHS ENDING NOVEMBER 8, 1885.

Receipts from subscribers, members' dues, and donations....................................	$ 767 43
From Charles Latimer—Witch Hazel Mine and private account......................................	1,361 77
Balance last statement	27 28
	$2,156 48

COMPARATIVE STATEMENT.

CASH ACCOUNT—NOVEMBER 8, 1879, TO NOVEMBER 8, 1885.

1879—1880.

Receipts, estimated........................	$1,000 00	
Disbursements, estimated	1,000 00	
Balance on hand November 8, 1880...............		$0,000 00

1880—1881.

Receipts....................................	$3,287 76	
Disbursements...............................	2,326 39	
Balance November 8, 1881		961 37

1881—1882.

Receipts....................................	$ 761 34	
Balance last statement........................	961 37	
	1,722 71	
Disbursements...............................	1,636 85	
Balance November 8, 1882......................		$85 87

1882—1883.

Balance last statement........................	$ 85 87	
Receipts....................................	2,298 79	
	$2,384 66	
Disbursements	2,341 90	
Balance November 8, 1883......................		42 76

1883—1884.

Balance last statement........................	$ 42 76	
Receipts.........	2,975 60	
	$3,018 36	
Disbursements	2,991 08	
Balance November 8, 1884......................		27 28

1884—1885.

Balance last statement........................	$ 27 28	
Receipts....................................	2,129 20	
	$2,156 48	
Disbursements...............................	2,154 83	
Balance November 8, 1885......................		1 65

SUMMARY.

SIX YEARS ENDING NOVEMBER 8, 1885.

Receipts....................................	$12,452 69	
Disbursements	12,451 04	
Balance November 8, 1885......................		$1 65

FATHER OF ISRAEL, WHOSE WORD.

Father of Israel! whose word
Worlds—even the worlds unformed—have heard
In the rich missive from whose throne
The wondrous future is made known.

God—only puissant—the High,
Whose foot-mark is immensity;
Throned in the cycles beyond time,
Crowned with infinitudes sublime.

Camped in the light beyond all dream,
Girt with all magnitudes supreme;
Creator of all marvellous things;
Saviour—from whom all bounty springs.

Oh, bow thine ear and bend thine eye!
Scan Israel's lack, hear Judah's cry!
Thy chosen tribes, all outcast yet,
Their princely origin forget.

Even Judah knows not in his need
The priest who for his life must plead;
And Israel slights, discredits yet,
The glowing words before him set.

And neither of the twain can see
Their grand approaching jubilee,
When silver trumps and rapturous peals
Cite the roused earth to Him who heals.

Mercy and truth to God belong,
All state, all triumph, every song;
And Israel and Judah yet
Their shame and bondage will forget.

Oh, mountains! trampled down so long,
Revive with fruits, and ring with song,
In largess like the hills above,
Replete with grace, becalmed in love.

G. A. HAMMOND.

KINGSCLEAR, N. B., CANADA.

EDITORIAL NOTES.

We have on hand a large number of able papers and interesting letters which are reserved for a future issue.

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We have still several bound volumes of the magazine for 1883, and several hundred copies of all the back numbers for 1884 and 1885. These can be bound for persons desiring them, or sent unbound if preferred.

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We hear from friends in Canada that Mr. Edward Hine's work has met with gratifying success. He lectures daily and to large audiences, and has engagements for several months in advance. We have seen several complimentary notices in the Canadian press, and congratulate him on the success of his mission.

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In this last magazine of the year we appeal to the earnest workers and sustainers of "The International Institute," to aid us in printing it this year. So far the burden of meeting all deficiencies has been borne by one. This has been done cheerfully, without hope of reward. Those who are imbued with the truths that we are advocating, feel that it is important to the cause that the magazine should be sustained. Many literary men have assured us that it is second to none in the amount of original and instructive matter that it publishes. If one hundred members would each give ten dollars per annum it would insure the publication of the magazine. There is no failure of matter, many valuable papers are waiting for publication. We are grateful to those who responded so liberally to our appeal for aid last year, and we beg those who have not hitherto helped us to do what they can. We trust that there

is life enough and money enough in the Society to continue the
publication, but whether the magazine lives or dies the Society
remains. Its permanence is a necessity. Let the members not
be discouraged, but hold fast as an organization under all cir-
cumstances and through all vicissitudes. The membership fee
is the same whether the magazine is published or not, and
ought to be religiously paid, as we believe the Society is the
nucleus of a great organization, and that its work is divinely
appointed.

338 Cedar Avenue, December 31, 1885.

My Dear Sir:—I have long been anxious to pay something on my dues to the Anti-
Metric Society, and for the INTERNATIONAL STANDARD, which, in my judgment, is one
of the most valuable publications of the day, and for which I am indebted to your kind-
ness. My Christmas remembrances enable me to send the enclosed five dollars, which
please accept. Wishing you a Happy New Year,

I am, truly and gratefully, your sincere friend,

JAMES A. BOLLES.

We present in this number a diagram giving the measures
of the Great Pyramid. It is taken from a work by Mr. J. Ralston
Skinner of Cincinnati, entitled 'Crown Jewels of the Nations,'
a supplement to 'Source of Measures.' We desire to call the
attention of our readers particularly to these books because
they so clearly show the British inch to be the foundation of
the system of measures of the Great Pyramid, the measures
which have been apparently miraculously preserved and trans-
mitted through the Anglo-Saxon race.

Many Pyramid measurers claim that there is also a Pyramid
inch which exceeds the British inch by one-thousandth. Mr.
Skinner has always maintained that the British inch was the
true measure.

If there is a Pyramid inch agreeing with the solar time meas-
ures, there must be a difference every year, as the solar year varies.
According to Prof. Stockwell, this solar year 2170 B. C. was 365
days, 5 hours, 49 minutes, 7.26 seconds or 20 seconds longer
than the present. Now, if we say that the Pyramid inch agrees
with the solar period as it was 2170 B. C., it would not agree now
with our solar year, therefore we must have some fixed unalter-
able measure from which to count. If it be the polar axis, will

SUPPLEMENT TO SOURCE OF MEASURES

INTERIOR WORKS OF GREAT PYRAMID OF EGYPT

SCALE 1/240

J.R.S. March 15th 1870.

Measures in British Feet.

that polar axis always agree to the remotest fraction with the solar time? Prof. Stockwell asks "Why not take the sidereal year which is fixed, being by latest observations of Hanson 365.2563582?" Who will answer?

We pass these questions for the present and give the diagram of Mr. Skinner for the purpose of eliciting discussion and of giving credit where credit is due for the discovery of the main important fact that the British measures fit with the measures of the Pyramid and are correlated with the circle of 360. There is one important point which is to be specially noted, namely, that although Mr. Skinner does not deny that the southeast socket is the terminal point of the base of the Pyramid, yet he maintains that there is also a base indicated which is represented by 2400 divided by π for feet, which would give the base length of Howard Vyse of about 9168 inches. The measures of Petrie make the base length of the S. E. socket 9139.871258, while Mr. Skinner's measures in inches give 9167.32 at the lower level. Of course this would be proportional and near to the other with the same slope of the Pyramid. It is for pyramid students to compare the Pyramid chart and Mr. Skinner's diagram in British inches with subsequent discoveries to ascertain if it is possible for the base of the Pyramid to extend below the southeast socket. Whatever may be the conclusion in relation to that, the fact remains indisputable that the measures of the Pyramid given by Piazzi Smyth and by all other reliable measurers fit completely with the British measures in correlation with the circle of 360. The Pyramid chart published by the society was drawn by the advice of Mr. Skinner, to prove that the British measures were those primarily used by the architect, and we reproduce it here on smaller scale.

He does not deny the existence of the Pyramid inch, but insists that the British measures were the foundation. Without his discovery we should yet have been groping in the dark. Nevertheless there is a Pyramid inch agreeing with time and sacred chronology and the British measures. ﹨

OBITUARY.

LUCIAN IRA BISBEE.

Lucian I. Bisbee was born in Rutland, Vermont, February 6, 1807, at nine o'clock in the morning; was baptized in the Episcopal Church March 9, 1817, died at West Minot, Maine, November 24, 9:30 in the morning. He was connected with the International Institute for Preserving and Perfecting Weights and Measures from its organization. In 1879, while Mr. Charles Latimer was engaged in Cleveland in forming a society to investigate this subject, he received a letter from Mr. Bisbee stating that he had written to Prof. C. Piazzi Smyth, suggesting that a society should be formed in the United States for the purpose of preserving Anglo-Saxon weights and measures, and that Prof. Smyth had advised him to apply to Mr. Latimer. It was agreed they should meet in Boston and talk over the matter. Three persons, Lucian I. Bisbee, G. M. Hardy and Charles Latimer met, and sustained by the promise of assistance from a number of others, they entered into a compact to form a society. The result was a meeting in the Old South Church at Boston, on the eighth day of November, at noon, 1879, where a constitution and governing laws were adopted, under which the society was organized. The Old South Church was chosen for the meeting on account of its wonderful history, and because it contained the picture of "The Stars and Stripes and the Magi."

The formation of a society with so small a beginning would have appeared to some a source of discouragement, but the exaltation of Mr. Bisbee's mind partook of the character of inspiration, and his enthusiasm never flagged. He watched its growth with the most intense interest; he had a firm conviction that the work was divine and would be a source of great good to h   . He remained for a short time in Boston, then rem   Cleveland to do the work of secretary of The Inter-

national Institute. In October, 1882, on account of failing health, he returned to Boston. He held the position of Secretary of the International Institute till November, 1884. As his ill health would no longer permit him to take an active part in the work, he then left Boston and was made Vice-President of the Institute. The friend who wrote of his last hours said: "His love and anxiety for the success of his Society kept him above almost all suffering." Mr. Bisbee had remarkable artistic talent. He painted full-length portraits of Calhoun, Clay, Webster, Polk, Cass and other prominent men, which were pronounced excellent likenesses by the gentlemen who sat for him. He was also very successful in painting allegorical subjects. Though the announcement of his death was not unexpected, it was received with deep sorrow by his many friends in the Institute, and resolutions of regret were passed by the members.

GEORGE C. DAVIES.

Died, on the sixteenth day of December, 1885, in the city of Cleveland, George C. Davies, an active and earnest member of the Ohio Auxiliary Society of the International Institute for the Preservation and Perfection of Anglo-Saxon Weights and Measures.

Mr. Davies was born at Trenton Falls, New York, on the fifth day of September, 1813, and was therefore seventy-two years of age at the time of his decease.

In 1833 he came to Cleveland and engaged in business with his elder brother.

In 1844 he removed to Cincinnati, and for nearly twenty years was engaged in the insurance business, attaining an enviable reputation as a business man among all classes of his fellow-citizens.

In 1862, during the late war, he removed to Dayton, Ohio, for the purpose of engaging in the manufacture of textile fabrics from flax, as a substitute for cotton goods, which had become of such fabulous value as almost to exclude them from

use for common purposes. The process by which this was accomplished was an invention of his own, and consisted in reducing the fiber of the flax to a homogeneous condition, much like that of cotton, and spinning and weaving it in a similar way. The product was called eoline. The enterprise was successful until the close of the war, and the consequent reduction of the value of cotton.

Subsequently Mr. Davies organized the Dayton Screw Company, of which he was the responsible manager. This would doubtless have been a successful enterprise but for the failure of a prominent and principal stockholder, who carried the company with him into bankruptcy.

During his residence in Dayton, Mr. Davies married an accomplished daughter of the late Hon. Peter Odlin, one of the most popular and useful citizens of his time in that city

In 1879 he returned to Cleveland, and for a time was connected with a business journal as its editor, but relinquished this calling to engage in the manufacture of a valuable device in the way of a safety lock, of which he was the inventor. For the want of the requisite capital this pursuit failed him, and from that time onward all his efforts to secure a comfortable living were thwarted and unsuccessful. Mr. Davies was a man of great mechanical genius, and to him the recognition of an existing necessity was his only required inspiration by which to achieve and demonstrate the needed remedy, and, under more favorable circumstances, from this source alone he should have acquired fortune. His literary abilities were also of a high order, and his perfect familiarity with the history of the world rendered him an enviable companion in all social circles. Mr. Davies was a member of the Episcopal church, and attested his faith in the Christian religion in his life and death alike.

As a member of the Ohio Auxiliary Society of the International Institute, he allied himself to the affectionate regard of all his fellow members ; and his numerous printed papers on the topics suggested by the study of its objects, furnish the most conclusive proofs of his interest in, and devotion to, the cause it aims to promote. Its entire membership mourn his

loss, and by proper action have expressed their appreciation of his character and works, and hereby extend their sincere sympathy to his bereaved widow and fatherless children.

A. M. S.

REVIEWS.

OUR PLACE IN HISTORY. A lecture delivered in Poona, India, before the Young Men's Christian Association, by H. G. E. De St. Dalmas. Published in pamphlet form, thirty-six pages. Price sixpence. London, England. R. Banks & Son, Racquet Court, Fleet Street, E. C.

The author in his introduction says: "I purpose to trace the history of the world from the creation of man, step by step, from one period to another, till we meet with some historical event, the date of which is universally received. If, pursuing this plan, we can effect a junction by and by of the A. M. and B. C. dates, it will enable us, by adding these two together with our present A. D. date, to ascertain the number of years that have elapsed since the first appearance of man upon the earth, and thus to fix *our own place in history.*" With regard to the first appearance of man on the earth, he enquires: "How long is it since the creation of Adam? Was Adam the first man? Are all the inhabitants of the earth his descendants?" He argues that in Adam we have the beginning of human history, that he was the sole head of the human race, first of all, and Noah afterwards at the Deluge, and that the flood was universal. He reviews the periods of ancient history in connection with the chronologies of the Hebrew and Septuagint Scriptures, the Samaritan Pentateuch and the testimony of the Great Pyramid.

"The earliest *point of contact* between the Bible history and the annals of the nations, is given by an inscription in the palace temple of Karnak, relating to the exploits of Sheshonk, or Sesonchis, king of Egypt—the Shishak of Scripture." From his study of the varying chronologies, the author believes 7473 to be the total period of human history. He says this is a far longer time than the most ancient of the nations can boast with

any show of historic exactitude. He gives the following summary of results :

Periods.—From Adam to the Deluge, 2256 years ; Deluge to the Dispersion, 400 ; Dispersion to call of Abraham, 777 ; Abraham's migration to the Exodus, 615 ; Exodus to the Temple building, 480 ; Solomon's reign, 80 ; Rehoboam's reign to Shishak's invasion, 5 ; Invasion of Judah to before Christ, 975. Total from Creation to before Christ, 5588. Total from Adam to the present time, 7473 years. The book is remarkably clear and concise, and we recommend it to the attention of our readers.

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We have just received from Lt. Col. A. T. Fraser a pamphlet of sixty-three pages, 'An Historical Review of the Principal Jewish and Christian Sites at Jerusalem.' We will give extracts from this book in a future issue. It is published in London, England, by Edward Stanford, 55 Charing Cross. Price, one shilling.

We have also received from the same author, a second edition of his pamphlet, 'Darkness in the Land of Egypt and Light in the Dwellings of the Children of Israel,' revised and enlarged. In a recent letter Colonel Fraser says, "I was able to test the reality of the natives of India being able to see at a distance. In a black substance given me, I saw enough myself to convince me that the phenomenon was genuine." With reference to this we quote from his pamphlet : "We never see the whole of an object. Sight is always from the blunt apex of a cone of converging rays. There is no substance whose composition is yet identified, which, from having the property of separating the parallel from the slant rays, would show objects of their natural size, though there is some approach to it in using a microscope. Suppose a diaphragm could be made which would transmit only the nearly, and the quite, parallel rays, then the features of surfaces at any distances would be visible. The focus of a lens under such circumstances place infinitesimally for millions of

miles difference in remoteness, and the attendant range of vision is immensely great. Hence the problem said to have been solved practically in the east, of seeing at a distance, awaits its logical determination by the discovery of some 'medium impermeable to those inclined rays, on collecting which, at a focus, our present sight depends. But this is only one possible solution of distant seeing. . . . . It has been suspected by Sir William Thompson that man has a magnetic sense. There is no reason for—just as a certain number of vibrations of the ethereal medium of light a second are a particular color —the differences of electric potential not being colors of an electric spectrum; and by means of this magnetic sense, we would most certainly see, by the potential of their surfaces, all natural objects with their distinctive electric colors independently of the laws of optics altogether, and as clear, if not as bright, as in optical daylight in the dark, and indifferently to intervening bodies being opaque or transparent. Throughout such an electrical prospect it would be difficult to admit the foreshortening of perspective; all there would be would be the power our minds have by physical effort, however, of selecting what we will look at in a landscape, distance would have slight effect, only to be perceived by the time and trouble of pursuit. Viewing objects by their potential is consequently a second mode of accounting for seeing at a distance.

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'THE TRUE THEORY OF THE SUN,' showing the Common Origin of the Solar Spots and Corona, and of Atmospheric Storms and Cyclones. By Thos. Bassnett, author of 'Outlines of a Mechanical Theory of Storms.' G. P. Putnam's Sons. New York: 27 aud 29 West 23d street. London: 25 Henrietta street, Covent Garden.'

This is a book of 264 pages, illustrated by numerous maps and diagrams, and containing formulæ and tables for computing the maximum and minimum epochs of solar activity. We intended to publish copious extracts in this number of the magazine, but present instead a paper by the author. The book discusses the inception and early history of the theory of electric vortices; the ethereal medium—electricity the evidence of the existence of such medium; the solar surface; the solar

corona; the solar spots and spot theories; the light and heat of the sun; cometary phenomena. The author argues that the physical universe is not menaced with final extinction; that the great ethereal ocean is an infinite reservoir of kinetic energy; that the relation of finite to infinity guarantees the perpetuity of a finite creation.

THE SECOND ADVENT. A Lecture in Verse. By J. H. Weldon, J, P., Ash Hill Towers, Kilmallock. Published in London by Robert Banks, Racquet Court. Price, sixpence.

In his prologue the author tells his audience that he has given his arguments in rhyme, because it is impressive and more terse, and an aid to the memory. He believes the Second Advent of Christ to be pre-millenial; he reviews the signs of the times, and considers that they portend a coming crisis. He points out the folly of those who strive to solve the mysteries of God by the faculties of man, and finally exhorts his hearers to be prepared for that second coming. The lecture is contained in a little pamphlet of 52 pages, and is exceedingly comprehensive in style.

THE HINDU ZODIAC, OR THE DISCOVERY OF THE LOST KEY. By N. Chidambarum Iyer, B. A., F. T. S., President-Founder or the Jotistantra Sabha, Trivadi, Tanjore District.

We are grateful to our brother member, Col. Frazer, of the British Army, in India, for sending us the following paper from a Hindu astronomer, and we doubt not that it will be read with great interest by all of our members. Col. Frazer says:

Forwarded to the INTERNATIONAL STANDARD for review, in the light of the passage: *"And when I shall put thee out; I will cover the heaven, and make the stars thereof dark.'* —Ez. xxxii, 7.

And he adds: "The Eastern nations are guided by the stars in a way we have a faint idea about."

.We notice some very remarkable points in this paper. The author claims that he has the lost key which will enable the sacerdotal order of India to recover their lost power. He claims that the cause of the failure or frequent failure to predict accurately is on account of the loss of the position of the fixed first point of Aries. If this be true as to the Hindu

sacerdotal order, may it not also cause the entire cessation of prediction by all sacerdotal orders.* Certain it is that the astrologers of to-day have but partial success, and we have observed that they always calculate from the first point of Aries of 2,000 years ago. Our knowledge and belief in astrology began when we discovered that the picture of the Unveiling of Isis was astronomical, or astrological. The investigation of the time when the moon was at the foot of the constellation of Virgo —fitted to the historical date of September 9th, of 1774, 9 A. M.—showed that the position of the constellations must be taken naturally. It will be remembered that we had supposed that September 7th, 1774, was the time, but it would only fit to the 9th. Testing a noted astrologer subsequently, he insisted that the moon was at the foot of the constellation of Virgo on September 7th, 1774, then we found that he was calculating from one sign back which astrologers had adhered to for two thousand years.

Chidambarum Iyer challenges the western theosophists to a test of his key. I have sent him the birthday of General Garfield, which it will be remembered was fixed exactly at 2 A. M. of November 19th, 1831, at Solon, Ohio ; also the birth of Libberty, September 9th, 1774, 9 A. M., or 4 P. M., at Milton or Boston, Mass., latitude of Harvard.

I would call attention also to the very remarkable statement of M. Iyer in relation to the ' Nadigranthams' of India, of which he says he knew of five sets—a Sanskrit work, seventy volumes of which are now in the possession of two persons in Southern India, containing, it is claimed, the lives of all men.

The main object of this paper is to announce to the world the discovery of the exact position of the fixed Hindu zodiac, or, in other words, of the exact distance of the real first point of Aries from the vernal equinox—one of the two points where the ecliptic cuts the equator. This distance is known to the Hindu astronomers as the Ayanamsam. Before coming to this important subject, I find it necessary to say a few words to show that the Hindu; zodiac is fixed and not shifting in its position as was erroneously supposed

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* Few people are aware that the prophet Daniel is the author of the most complete soli-lunar cycle ever known. See the discovery of the distinguished Swiss astronomer, M. de Cheseaux, in Grattan Guinner's " Approaching End of the Age." , This cycle was called the Daniel cycle.

by Mr. T. Subba Row.[*] He confounds the shifting zodiac† of the western astrologers with the fixed zodiac of the Hindus. At page 41 of the 'Theosophist' of November, 1881, Mr. Subba Row says : " The Hindus were acquainted with the precession of the equinoxes, as may be easily seen from their works on astronomy and from the almanacs published by the Hindu astronomers. Consequently they were fully aware of the fact that the constellations in the various zodiacal divisions were not fixed." It is true that the Hindus were aware of the precession of the equinoxes, which is stated to be at the rate of 54 seconds a year according to Suriasidhanta ; 60 seconds a year according to a work entitled Grahalaghavam, and 50 seconds a year according to the wonderful discovery of Varaha Mihira. But it is wrong to suppose that the Hindu zodiac commences at the vernal equinox, and that in the almanacs published by the Hindu astronomers the positions of the planets are referred to such equinoxial point. The planetary positions are all calculated with reference to the fixed first point of Aries, which is at present about 20 degrees to the east of the vernal equinox.

I. This can be easily ascertained by a reference to the calendars published by the Hindu astronomers. Take, for instance, the Combaconum almanac for the current year, Chitrabhanu. It will be found that while the sun enters the vernal equinox as early as at about 4 A. M. on the night of the eighth Meena, corresponding to twentieth March, 1883, it enters the sign Aries only so late as at 1 P. M. on the first Mésham next (vide next year's almanac) corresponding to the twelfth April, 1883. The position of the planets calculated from the fixed first point of Aries is known as the Nirayanasphutam of the planets ; while the same calculated from the moving vernal equinox is known as the Sayanasphutam of the planets ; in other words, the longitudes of the planets. That the former is the only Sphutam required both for the calculation of nativities, and for the observance of various religious rites, will be apparent from even a superficial perusal of any work on astronomy, astrology and Dharma Shastra bearing on the subject. I shall quote a few authorities.

II. In chapter I. of the Suriasidhantam we find " the sidereal revolution of a planet ends with the fixed star Revati " which marks the end of the sign Pisces, and the beginning of the sign Aries. From this it is apparent that the fixed zodiac of the Hindus commences from this star and ends with the same.

III. Again, in the same book, we find the positions of the 27 stars along the ecliptic given from the star Revati,‡ where, of course, the zodiac, each of whose signs contains 2¼ of these stellar divisions, commences.

                    One star is 8° from the first point of Aries.
          Another   "   20   "   "   "
             "   "   38   "   "   "
             "   "   50   "   "   "
             "   "   63   "   "   "
             *   *   *   *   *   *
          Revati   "   0   "   "   "
thus making a fixed star the first point of Aries.

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[*] This assertion, however, does not in the least alter the main argument in the article alluded to, as the imaginary forms assigned to the constellations must necessarily be changing, on account of the variation in the position of the so-called 'fixed stars.' It yet remains to be seen whether Sayanasphutam or Nirayanasphutam is to be used in the Hindu astronomical and astrological calculations. If Mr. Chidambarum Iyer succeeds in showing from the Nadigranthams that astrological calculations are correct only when Nirayanasphutam is used, then his statement that a fixed zodiac should be the basis of our calculations can be taken to be correct.

                                        T. SUBBA ROW.

† At page 14 of William Lilly's introduction to Zadkiel's work on astrology we find the following : " The first sign Aries commences the zodiac, its beginning being that spot in the heavens where the sun is when crossing the equator in spring."

‡ The star intended is the faint star, Zeeta Piscium, of about the fifth magnitude, situated in the band which connects the two Fishes. It is, indeed, very near the ecliptic, having only 13' of south latitude. It coincided in longitude with the vernal equinox in the year 572 of our era.

IV. Again in chapter III of the Brihat Samhita of Varaha Mihira, we find the following :

"In the old Sastras we (Varahamihira) find that at one time the sun's southward march commenced when it reached the middle of the fixed star, and the . . . or the sun's northward march commenced immediately. It reached . . .

"Whereas, at present, the former commences at the beginning of sign Cancer and the latter at the beginning of sign Capricornus.

"If the sun should change his course (from south to north) before reaching . . he brings on evil on the west and on the south ; if he should change his course (from north to south) before reaching . . . he brings on evil on the north and on the east."

Thus it will appear that the sun's turning points are not always the beginning of . . and . . —they may be beyond these and as now within these, which will not be the case if the first point of Aries be identical with the vernal equinox.

V. Again the author, after stating that the ceremony should be performed immediately after the commencement, says :

"At one time the sun's northward march commenced immediately it reached ,
and its southward course lay between the middle of   , and the end of   ;
whereas at present the sun turns its course without reaching   and   ."

VI. Again we find :

"The Sayana month is not a proper one for adoption ;"therefore the tithees that fall within the Nirayana months and no other are to be adopted."

More authorities can be cited to show that the Hindu first point of Aries and the vernal equinox are two distinct places apart from one another over 20°, and that the Hindu zodiac commences at the fixed star Revati.

Now I come to the main subject of this paper. It refers to the final settlement of the Ayanamsa question, so well known to the astronomical world. The question in its unsettled state continued to torment the scientific instinct of the western as well as the eastern astronomer for several centuries. On it depended the success of the eastern astrological literature, and which, in no small measure, explains the errors astrologers so invariably fall into in their predictions both on the subject of nativity and on horary astrology—the two main departments of the science. The question is also popularly known as the Meenamesham question. So little was this question solved that the term Meenamesham has come to mean doubt and uncertainty. From what I have written it will be evident that in the Hindu almanacs the position of the planets are referred to the fixed star Revati. Now, those that are interested in a healthy condition of the sciences of eastern astrology and astronomy, will be filled with dismay and disappointment when I inform them that the star Revati which was supposed to be in the ecliptic has now disappeared ! Where has it gone ? It has not improbably receded into the dark and unfathomable abyss of endless space either by some unaccountable freak on its own part, or, more probably, by a vast and sudden withdrawal of the solar system itself from the star. At one extremity, then, of the little bit of increasing space known as the Ayanamsa we have the star Revati, and at the other extremity we have the vernal equinox. As will be shown further on, a correct knowledge of the Ayanamsa plays no insignificant part in the preparation of Hindu almanacs. This then appears to be an appropriate place to say a few words regarding the precession of the equinoxes. The precession was known to the ancient Hindu astronomers long, long before the time of the Varaha Mihira.

I. Here we find the following readings regarding the precession of the equinoxes, which supposes that the vernal equinox oscillates on both sides of the star Revati 27° on each side.

The stanzas therefore mean

In a Yuga the equinoctial point oscillates about the star Revati according to the several readings.

(1)   30 ×20=600 times.
(2)   30²   =900   "
(3)   30   "

Without entering into the details of calculation, suffice it to say that the first reading gives the annual motion of the equinoctial point to be 54″, the second gives it to be 81″, and the third gives it to be 2.7″.

II. According to another author we have the following :

" In one Kalpa, which consists of 4,320,000,000 years, the equinoctial point makes 199,699 circuits of the heavens." This gives 59″ as the annual rate of motion of the equinoctial point.

III. Again an author says that the equinoctial point moves westwards at the rate of 60″ a year.

IV. Lastly, Varàhamihira says that this point moves westwards at the rate of about 50″ a year. Now Varàhamihira lived between 1,400 and 1,500 years ago. Modern western astronomers say that the rate of retrograde motion of the equinoctial point is subject to an annual increment of .00024″. This in 1,400 years gives the increase as .34″ So that the rate of about 50″ as ascertained by Varàhamihira over 1,400 years ago should, at present, be 50.34″ ; whereas western discovery gives it as 50.26″. The difference is, then, only 0.08″. Now who will not bow in mute reverence to the wisdom and learning of this great astronomer who, with what rough instruments he could construct for the purpose, was able to achieve as much success in astronomical researches as the modern scientific men with all their valuable telescopes and sidereal clocks and with the records of past observations are able to do.

Now, to return again to the task on hand, I have already stated that this star Revati, which is of such immense importance to the Hindu astronomer and astrologer, has somehow disappeared. Are there no means of readily finding out its position? We shall try.

1. As already stated Varàhamihira says :

" In my time the sun changes his course at the first point of Cancer and at the first point of Capricornus."

In other words, the vernal equinox was at Revati in his time. Now we are not certain,

(1.) That the vernal equinox was exactly with the star, and not even a little to the east or a little to the west of the same.

(2.) We do not know the precise year when this line was written. An error of twelve years, for instance, will give an error of ten minutes in the Ayanamsa. It is, therefore, difficult to ascertain from the above what the exact Ayanamsa is at present.

II. Again, I have already quoted a passage to show the position of each of the twenty-seven stars along the ecliptic from the star Revati.

Now, as nearly all these stars, excepting Revati, are now known and can be identified, and as the exact position of the vernal equinox too is known, one might suppose that by subtracting from the actually observed distance of any of these stars, its given distance from Revati, the length of the Ayanamsa can be found out.

[NOTE.—The stanza quoted above gives the polar longitudes of the stars from Revati. Before subtracting these, as stated above, it is necessary to convert them into the ordinary longitudes for the year].

Unfortunately this method, which ought to be the best and most satifactory, is found to fail, for the method ought to give us the same Ayanamsa, the longitudes of how many stars so ever are taken into account. This, however, is not the case. The reason for this appears to be that either from some defect of observation, or from some other cause, the several longitudes above given are only very rough ones.

III. Now Bentley, in his work on astronomy, devotes much attention to the Ayanamsam question. As stated in the previous paragraph, he first calculated the several ayan-

amsas resulting by taking into account the longitude of each of the twenty-seven stars, and then took the average length of these, which he considers to be nearest to the correct ayanamsa.

IV. As Revati is stated to be on the ecliptic, the translator has fixed his choice on a certain star in Pisces, known as the Zeeta Piscium, which he considers as the Revati of the Hindus. This star, however, is not in the ecliptic, but has a latitude of 10 minutes from it, and its longitude now is 18° 14′ 20″.

V. Now placing implicit faith (a) in this discovery—as he was justified in doing so in the absence of any clue to the discovery of the lost star—Mr. Kero Lakshmana Chatrai, M. A., Mathematical Professor of the Deccan College, has been publishing for the last eighteen years an almanac with the help of the correct modern tables, according to which the Ayanamsa on the first of January, 1883, is 18° 14′ 20″.

VI. Again the late Mr. C. Ragunathachariar of the Madras Observatory, started a similar almanac* some thirteen years ago, in which he has taken the average length of the different Ayanamsas as adopted by several Hindu almanac publishers. This length is on the first of January, 1883, 22° 2′ 38″.

VII. Brahma Sri Sundaresvara Srauti, and Bra-Sri Veṅkatesvara Deckshitar, the best living astronomers of Southern India, have also been publishing a similar almanac for the last seven years, and that for Southern India, under the auspices of Loca-Guru Sri San-karachariar, of Combaconam. In this almanac they have adopted the average ayanamsa of the late Mr. C. Ragunathachariar.

VIII. Again, Brahma Sri Bapu Devasastri of Benares, has also been publishing for several years an almanac on the same principle, in which we find the Ayanamsa on the first of January, 1883, to be 21° 58′ 29″. He says† that he first calculated the Nirayanas-phutam of the planets, for a given time, after the method prescribed in such works as the 'Surya-Sidhanta,' and also noted down the Sayanasphutam, calculated with the help of the correct modern tables, and that, by subtracting the former from the latter, he arrived at the correct Ayanamsa. This sounds reasonable enough ; but our friend the Sastri cannot for one moment assert that the tables as given in 'Surya-Sidhantam' can at all be relied on, as they have not been corrected as they ought to be, as will be shown further on.

IX. Almanacs still continue to be published by several persons after the Vakya and Sidhanta methods of calculation. According to the former the ayanamsam on the first of January, 1883, is 22° 41′ 44″, and according to the latter it is 20° 46′ 15″.

[NOTE.—According to the Vakya school, in the year 444 of the Salivahana era, the vernal equinox was at Revati, and the annual motion assigned to it was 60″. According to the Sidhanta school the vernal equinox was at Revati in the year 3600 of the Kali era, and the annual motion assigned to it was 54″.]

Now, to sum up these, we have the following lengths of the Ayanamsa on the first of January, 1883 :

(1)	Bombay	Almanac	18° 14′ 20″
(2)	Madras	"	22° 2′ 39″
(3)	Combaconnm	"	
(4)	Benares	"	21° 58′ 29″

(a.) In a note of his to Mr. C. Ragoonathachariar, F. R. A. S., of Madras, Mr. Kero Lakshmana Chatrai writes nine years ago as follows : " The position of Zeeta Piscium is assumed to be the zero of the zodiac. Thus the longitude of Zeeta Piscium at any time shows the precession of the equinox or ayanamsam. For Shaker 1796, 18° 7′ —". And in the table published by him (page 325, last line, columns 1 and 2), he calls the Zeeta Piscium of the western astronomers as the star revati of the Hindus.

* The publication is being continued by his son, Mr. C. Raghava-Chariar.

† *Vide* preface to his ' Punchangum.'

(5) Vakya   "   ....22° 41′ 44″
(6) Sidhanta   "   ....20° 46′ 15″

Now, it is necessary to remark here that in the first four almanacs the Sayanasphutam is first calculated, and the Nirayanasphutam is deduced from it by subtracting the Ayanamsam therefrom. The tables on which the calculations are based are of course very correct; and not only the annual retrograde motion of the vernal equinox, but the annual increment in the rate of its motion is known; but as it is not known where the star Revati is, the entire body of Nirayanasphutam falls to the ground.

Again, although according to the Vakya and the Sidhanta methods of calculation the Nirayanasphutam of the planets is obtained independently of the Ayanamsa,* yet the tables in the form in which they are being now employed are, for want of certain corrections,† to be applied to them as required by eminent Hindu astronomers, at this distance of time very incorrect. Hence, also, the Nirayanasphutam given in these almanacs falls to the ground.

Now I shall proceed to state what the correct Ayanamsam was on the first of January, 1883.

It ranges between 20° 23′ 8″ and 20° 25′ 22″. By adopting the mean 20° 24′ 15″ the maximum amount of error will only be 1′ 7″ (a). Now the difference between this correct ayanamsa and the various ayanamsams above given will be seen from the following:

(1) Bombay...... ....— 2° 9′ 55″
(2) Madras   ⎫
(3) Combaconum ⎬ ....+ 1° 38′ 24″
(4) Benares.. ......+ 1° 34′ 14″
(5) Vakya.......................... ....+ 2° 17′ 29″
(6) Sidhanta... +0° 22′ 0″

To express the same in other words: the Ayanamsam error, as it affects the planetary motions in point of time given in the first four almanacs, will be found to be as follows:

PLANETS.	Bombay (Before.)		Madras and Combaconum (After.)		Benares (After.)	
	d.	hr.	d.	hr.	d.	hr.
Sun..................	2	5	1	16	1	14
Moon	..	4	"	3	"	3
Mars........	4	3	3	3	3	3
Mercury		13		10		9½
Jupiter...............	26		19	17	18	21
Venus.....	1	9	1			23
Saturn.................	64	16	48	23	46	20
Moon's Node..................	40	21	31		29	16

* The error in ayanamsa, however, affects (1) the rising and setting of the planets; (2) Their conjunctions. I may remark here that in the case of the other almanacs the calculations regarding these are very correct irrespective of the errors in the ayanamsa.

† He that incorrectly calculates is guilty of the sin of Brahmahayta, the murder of a Brahmin. Therefore it behoves the astronomer to note the daily culmination of a planet and ascertain its law of motion.

[NOTE.—This is as much as requiring the construction of an observatory.]—*Ed.*

[NOTE (a).—I am taking steps to reduce this to a minimum.

Now, while the above shows the only corrections to be applied to the four almanacs mentioned in the table, the corrections to be applied to the Vakya and Sidhanta almanacs cannot be so easily ascertained owing to the incorrect tables that are being employed in the calculation of the planetary motions.

This state of things sufficiently accounts in my opinion for the numerous failures in astrological predictions observable in modern times, and, if I may be allowed to speak the language of an orthodox Hindu, also for the fall—the ever accelerating fall—of the sacerdotal order from the eminence they at one time occupied in the pyramid of Hindu community. For the Sastras say that when an enjoined religious rite is either not observed or observed at an improper hour it brings on evil and misery.

" He who omits to perform Sradha on the anniversary of the day of death, will be born a chandala a crore of times."

I shall proceed to dispose of the one question which now naturally engages the reader's attention, viz.: how did I discover the correct ayanamsa. I have discovered this by a process as sound and as satisfactory as any employed in the discovery of some of the sublimest truths in the world. I have only to ask the public to patiently hear and then judge.

Now this lands me on one of the gold coasts in the vast continent of Aryan literature. Very few of the modern Hindus—and fewer still of the so-called educated Hindus—are aware of the existence of what are called Nadi Granthams, which contain a faithful record of the lives of—to the utter amazement of the public I declare emphatically— *all men*—all men that ever lived, all men that are living, and all men that will come into existence! Smile not, reader, in derision of what might appear to you at first sight to be the man in the moon. Is it possible, one might ask, that such a work can exist—a work which can hardly afford space for the *names* of all mankind?* The Indian census was taken—thousands of hands were at work in taking it, in tabulating its results, and it took over two years ; and what was the information the voluminous records could supply us regarding each man? It is simply this : his age, caste, religion, profession and, I grant freely, in addition, whether he was married or single, and yet the work referred only to a particular time and to a particular country. Can, then, Nadi granthams exist? I reply emphatically that such a work (1) can exist and (2) does exist. A fact puts down a thousand texts. I know from personal experience of the existence of five nadi granthams, and I have heard of five more works. Of those that I have seen, a Sanskrit work —about seventy volumes of which are now in the possession of two persons in southern India—by Sathyachariar, the celebrated Hindu astronomer, is the best. I have taken my life from it, and the lives of many friends, both young and old and of different districts, have been similarly obtained.

As my paper has already become too long, I do not, on the present occasion, wish to explain on what principle the Nadi granthams have been prepared. Let me therefore hasten to close my article.

From what I have stated already, it will be clear at once that the different ayanamsams adopted by several publishers of almanacs cannot *each* be correct. If any one of them is considered to be the correct one, it is for the publisher who adopts it to prove satisfactorily its correctness. I have no doubt that Mr. Kero Lakshmana Chhatre and Brahma Sri Bapu Deva Sastri will frankly own that they have no means of proving satisfactorily

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* As the workings of the mighty current of life sweeping throughout our planetary chain have been thoroughly examined by the ancient adepts, and as the number of the planetary rounds, the various races and sub-races of humanity on each planet, and the number of incarnations of every spiritual monad floating along the current of life, were long ago ascertained with mathematical precision, as already indicated in the *Fragments of Occult Truth*, it would not be beyond human power to bring into existence a book giving all the particulars which a Nadi grantham is stated to furnish.—ED.

the correctness of their ayanamsam. As for the other two gentlemen, I can't suppose for a moment that they consider their ayanamsam as resting on a satisfactory basis.

Now, I have to remark here

(1) That the Dhruva Nadi contains a correct record of the lives of men.

(2) That it gives the nirayanasphutam of all the planets at the moment of birth of each individual.

Now, as a horoscope constructed with the help of the correct modern tables contains the only error already pointed out, viz.: that resulting from an incorrect ayanamsam, and no other, my attempt to find out my life in the said dhruva nadi led me to a portion of the work which contained the lives of five or six persons, of which mine was one. I went carefully over all of them, and with little or no difficulty found out mine. I found the Nirayanasphutam of all the planets at the moment of my birth given in it ; and as the sayanasphutam of the same had been calculated correctly with the help of modern tables, by subtracting the former sphutam of the sun from its latter sphutam I arrived at a certain ayanamsam ; and what was my surprise when I discovered that the ayanamsam thus obtained from the two sphutams of the moon, Mars, Mercury, Jupiter, Venus, Saturn, and the moon's nodes was identically the same ! This led me to suspect that this must be the correct ayanamsam. This suspicion was confirmed when I beforehand calculated with the help of this ayanamsam and of the correct modern tables the nirayana-sphutam of the planets in several cases, and found out on opening the Dhruva Nadi that the same sphutams were given in it ! To crown all, the lives recorded in the nadi were found to be correct to even the minutest details.

All this, then, points to a period in the annals of India's greatness when Jothisha Sastra (astronomy and astrology) was cultivated to a degree of perfection. What a change do we see now ! The science throve well in the Indian soil, under the warm sunshine of the Indian rulers ; it began to lose its luxuriance under the cold, piercing blast of Afghan invaders ; and its ruin is now being completed under the colder blast of our Anglo-Saxon rulers ; and what is most to be deplored is that this ruin is being brought about through India's own children !

Bode's discovery of the law of planetary distances, though empirical in its nature, was accepted because, on application, it proved to be correct. I crave of the astronomers of the west and the east, for a similar indulgence to my discovery of the ayanamsam, whose correctness may easily be tested. I think the indulgence ought to be granted the more readily, seeing that so many vain attempts have been made by astronomers for several centuries to arrive at anything like a satisfactory solution of one of the most important problems of the science, viz.: the discovery of the correct ayanamsam ; lo ! the key was after all found stuck to the side of the box itself !'

TRIPLICANE, January 23, 1883.

P. S.—I showed my paper to Brahma Sree Sundareswara Srouthy, who is equally versed in the eastern and western systems of astronomy, and who was assisting the late Mr. C. Ragoonathachariar for four years. He admitted (1) the necessity that existed for the discovery of the correct ayanamsam ; (2) the incorrectness of the ayanamsam adopted by the several almanac publishers, and (3) the probability of the ayanamsam discovered by me being the correct one.*

He further remarked that in Southern India, at least, no almanac publisher would now boldly introduce the correct ayanamsam in the almanac, owing to the difficulty of over-

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* I may here add that Sundareswara Srouthy was himself of great help to me in the discovery of the correct ayanamsam.

Editor's Note.—A few of our European brother theosophists are invited to test the assertion of our Brother Chidambaram Iyer, by furnishing to him the necessary information from their horoscopes.

coming the prejudices of the people ; for the correction would first be felt in the case of the sun, as it will affect the Samkramana Punyakala.

As the present rulers of British India will take no interest in the matter, several of my friends are of opinion that the work should be undertaken by the enlightened native princes. In this view I perfectly concur ; for here is what Bhagavan Garga says on the subject :

(1) As the night is without a lamp, and the sky without the sun, so is a prince without an astronomer, and he gropes his way in the dark.

(2) If there should be no astronomer, the Muhoorthas, the Thithees, the Nakshatras, the ruthoos, the ayanas and the like will go wrong. It therefore behooves a prince to find out a learned astronomer.

(3) He that loves victory, fame, wealth, enjoyment and renown, ought not to live in a country devoid of a good astronomer.

(4) He that knows the hora, the ganitha and the samhitha sastras deserves to be supported by the prince who loves victory.

(5) That service which an astronomer can render to a prince cannot be effected by thousand elephants and by four thousand horses.

(6) That good which an astronomer can do to a prince will not be done to him by his father, mother, relations and friends.

Therefore their highnesses, the Maha Rajas of Travancore and Mysore, for instance, will do well to convene meetings for the purpose of ascertaining the correct ayanamsa, and of testing the correctness of my discovery. They will confer an invaluable benefit on the country by directing their court astronomers and almanac publishers to introduce the ayanamsa correction in their almanacs. This will pave the way for the eventual adoption of the correction in the almanacs published in British India.

In connection with this subject I need hardly impress on the mind of these and other native princes of India the importance of having an observatory in the capital of each prince and presided over by native astronomers learned in the systems of eastern and western astronomy and in the Dhurmasastras, and trained in the Madras Observatory.

THE HINDU ZODIAC.

In the November, 1881, issue of the 'Theosophist,' Mr. Subba Row stated that the zodiac of the Hindus was not fixed owing to the precession of the equinoxes, "as may be easily seen from their works on astronomy and from the almanacs published by the Hindu astronomers." That these works and publications did not support Mr. Subba Row's statements was clearly proved by me. If Mr. Subba Row wants more proofs, I shall give him a score more.

Mr. Subba Row now says that only if I succeed in showing (this, of course, I can do at any time, because I know where the books are to be found) "from the Nadigrandhams that astrological calculations are correct only when Nirayana Sphutam is used, then his (my) statement that a fixed zodiac should be (and not is ?) the basis of our calculations can be taken to be correct." This is curious. Independently of the correctness of nadigrandhams, the question was, not as Mr. Subba Row now says, whether Nirayana Sphutam is preferable to Sayana Sphutam (this is another question altogether), but whether Hindu astronomers and astrologers adopted and are still adopting the former as I stated, or the latter as Mr. Subba Row thought.

Besides, I should like to know whether Mr. Subba Row means to state that Sayana calculations give, in his experience, more correct results.

I never meant to deny the esoteric meanings he attaches to the names of the zodiacal signs. Here Mr. Subba Row is in his element, and it is a question with which I have nothing to do.

Yours obediently,

MYLAPORE, April 5, 1883.   N. CHIDAMBARAM IYER, F. T. S.

'The Gospel According to St. Matthew.' Translated from the Greek text of Constantius De Tischendorf and other standard textual authorities. By Charles Gardner, M. A. Printed on extra heavy, tinted paper, elegant cloth binding. Postpaid, only sixty cents. C. H. Jones, 77 Clark street, Chicago, Ill.

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'The Waters Above the Firmament, or the Earth's Annular System.' Address Isaac N. Vail, Barnesville, Belmont county, Ohio.

The Messenger—A weekly journal devoted to the elucidation of prophecy and the identification of the British nation with the house of Israel, God's chosen people, his inheritance. Edited by Annis Unwin, 84 Oxford street, Sheffield, England, and published by John Heywood, 11 Paternoster Buildings, London, E. C., England. Yearly subscription, 10s. 10d.

The Banner of Israel—A weekly paper advocating the identity. Edited by Philo Israel and printed by Robert Banks & Son, Racquet court, Fleet street, London, E. C., England. Annual subscription for one copy weekly, including twelve double numbers, post free, 7s. 6d.

Israel's Hope and Destiny—This magazine, which has been published for five years as a monthly, will henceforth appear as a quarterly. It advocates the identification of the Anglo-Saxon race with the house of Israel. The editor is Douglas A. Onslow, J. P.; publisher, Robert Banks, Racquet court, Fleet street, London England.

'OUR REST,' a monthly paper, devoted to the subject of Christ's Second Coming and preparation of the Church for that event.

It is edited and published by C. H. Jones, 77 Clark street, Chicago, at $1 per annum.

The Restitution—Issued weekly by the Christian Publishing Association, Plymouth, Indiana. Terms, two dollars per year, payable in advance.

'The Coming Age: Its Nature and Proximity.' Price $3.00. Send to C. H. Jones, 77 Clark street, Chicago, Ill.; to the *Restitution*, Plymouth, Ind.; or to J. P. Weethee, Millfield, Athens county, O.

NOTES.

Professor C. Piazzi Smyth writes that he is bringing out a pamphlet for an Australian, entitled "Why we do not Adopt the French Metric System." The "why" is founded largely on Pyramid teaching, and the "we" are Anglo-Saxons everywhere. At the end of the pamphlet he is introducing an appendix of eight pages, descriptive of "The International Institute for Preserving and Perfecting Weights and Measures," its labors, publications and membership. We sincerely thank Professor Smyth for this addition to his many acts of kindness.

We have received from Mr. George Kellogg a copy of *The Students' Journal*, a phonographic paper published by Andrew Graham, 744 Broadway, New York, containing an admirable article on Anglo-Saxon weights and measures.

As the Magazine is closing we have received from Mr. J. N. Wing, secretary of the New York and New Jersey branch of

the International Institute, a copy of the *American Druggist*, containing an editorial upon the recent paper of Professor Oscar Oldberg in the *Pharmacist*. We consider this of such importance that we hold the Magazine to present both the article of Professor Oldberg and the editorial upon it to our members, and beg them to give it as wide a circulation as possible in the newspapers of their towns.

The paper by Professor Oldberg on page 222, is unquestionably the most important contribution to the literature of the metric system that has appeared for a long time in this country. The facts referred to, the position held by the writer and his reputation as the most earnest advocate, heretofore, for the introduction of this system of weights and measures into practical pharmacy, cannot fail to put a stop, for some time at least, to any further increase in the employment of this system outside of laboratory work.

We venture to predict, also, that Professor Oldberg makes so good an argument for the relative perfection of the system now generally in use in the United States, that no one will take the trouble to modify it even so slightly as he suggests, to make it conform in any way to metric standards. The general opinion will be that the variation would, for all general purposes, be so slight that it will be better to let well enough alone than to run the risk of confusion.

When this journal was changed from a quarterly to a monthly issue in January, 1876, we announced our intention to express quantities, as far as practicable, in the terms of the metric system, and we have since, on numerous occasions, published extended tables and comments which were calculated to aid the comparison of one system of measurement with the other. After ten years of hopeful effort toward the introduction of the metric system, we fail to appreciate any decided increase of feeling in its favor among our readers, and it becomes a question of some importance whether, for most purposes, the end will justify the trouble, or, to use an old saying, "whether the game is worth the candle." Within the ten years past "metric bureaus" have been established and gone out of existence. Societies have resolved to adopt the metric system and still continue to use the one left to us by our fathers ; hundreds of papers and discussions have been published, and a few physicians have taken the trouble to learn the posology of their remedies so that they could use the metric system with some facility. Not one medical school in the country has taught the metric doses of medicine in a manner to render students as familiar with them as they are with the ones generally used ; and, on the other hand, the liability to mistakes resulting from the use of the system when the prescriber and dispenser were not equally familiar with the metric notation, has had several lamentable illustrations.

As an example of the practical working of many efforts to render the metric system popular among physicians, we will mention the experience of the largest county medical society in the United States. Largely through the influence of one of its members, a committee of three was appointed to report upon the subject, and in time the result of its labor appeared at length and in various forms. An investigation of the *personel* of the committee showed that its prime mover and chairman was not actively engaged in practice, and rarely had occasion to write a prescription. Another member, upon being questioned with regard to his own practice in using the system, said he did use it occasionally, but not often ; and the third, while advocating its use by others, never used it himself.

We shall feel reasonably sure that the great majority of our readers will not be grieved if, in the future, we express quantities in grains, drachms and ounces, and we shall not

consider it desirable to devote much space to advocating the system proposed by Professor Oldberg, until the sentimenr in favor of a drachm of sixty-two grains, etc., has become pretty general.

THE METRIC SYSTEM AND OUR APOTHECARIES' WEIGHTS AND MEASURES.

The writer has for several years been an earnest advocate of the adoption of the metric system in this country for medical and pharmacal purposes. Upon closer study, however, of the special requirements of medicine and pharmacy as to weights and measures, I am led to believe that the decimal system does not fulfill these requirements. The question as to what system of weights and measures we shall use in medicine and pharmacy is one of such great importance that the facts herein presented ought to receive earnest consideration.

Believing that my past activity in attempting to further the introduction of the metric system in the practice of medicine and pharmacy in the United States is somewhat generally known, and in view of the fact that my efforts in this direction have for several years been the subject of warm praise from some, and equally unstinted condemnation from others, I deem it proper to publish briefly the reasons which have impelled me to reverse my opinions. I have not arrived hastily at these conclusions, and I have to frankly acknowledge that my former position on this question was possible only from my then insufficient knowledge of some of its important but not so obvious bearings.

In order to construct a practical system of weights and measures for the purpose of the physician and pharmacist, it would seem to be of the highest importance to determine what would be the most suitable and convenient smallest unit of fluid measure. The fact cannot be ignored that fluid measures are necessary in the administration of liquid remedies, and that, therefore, consistency demands the use of fluid measures also in prescribing, dispensing and preparing medicines. The *drop*, no matter how variable in size it may be shown or admitted to be, still remains a convenient and familiar object by which to not only fix in the mind an approximate quantity but to actually measure doses. Any quantity less than a drop would clearly be an impracticable unit ; whilst the *minim* has by long experience been found a most useful unit, *solely because of its nearness to the average drop of most liquids*. The metric system has no unit of fluid measure less than the cubic centimeter, which is equal to 16.231 minims, and therefore much too large. Fractional parts should be avoided as much as possible, and hence a minim is none too small.

The next step is to fix upon a weight unit which shall be commensurable with our smallest unit of fluid measure. The nearer approach then to a drop of water would be about one grain. The metric system has nothing to offer but the decigramme, equal to about one and one-half grain.

For fixing the strength of medicinal preparations, especially liquids, and for the easy subdivisions of doses, it is most convenient to have units of weight and measure which shall be not only parallel and commensurable, but also capable of several progressive subdivisions by two into smaller units without fractions until the number *one* is reached. The metric system has several parallel and very nearly commensurable units of weights and measures—the liter and kilogramme, the deciliter and hektogramme, the cubic centimeter and gramme, etc.—but, being a decimal system, its units are divisible by two into the next lower units only once without striking fractions. Our American apothecaries' weights and measures are in this respect preferable to the metric system, and if so modified as to render the several units (already parallel) commensurable, our ounces, drachms and grains, and fluid-ounces, fluidrachms and minims would give us a very satisfactory system. This might be done by making our troy ounce exactly equal to the weight of one fluidounce of water at the most common-room temperature—that temperature at

which we ordinarily do our work in our laboratories and drug stores—our drachm exactly equal to a weight of a fluidrachm, and the grain equal to the weight of a minim of water at the same temperature. If, in addition, we should change the subdivision of the drachm and fluidrachm so that one drachm shall be sixty-four instead of sixty grains, and a fluidrachm sixty-four instead of sixty minims, this system would be perfect. We would then have:

> 1 U. S. Apothecaries' Ounce = 1 U. S. Apothecaries' Fluidounce.
> 1 U. S. Apothecaries' Drachm = 1 U. S. Apothecaries' Fluidrachm.
> 1 U. S. Apothecaries' Grain = 1 U. S. Apothecaries' Minim.
> Also 64 Grains = 1 Drachm.
> 8 Drachms = 1 Ounce.
> And 64 Minims = 1 Fluidrachm.
> 8 Fluidrachms = 1 Fluidounce.

The ounces would be divisible into halves, quarters and eighths, expressed in drachms without fractions, and into sixteenths, thirty-seconds, sixty-fourths, etc., expressed in grains or minims without fractions; and the drachms would be divisible into halves, quarters, eighths, sixteenths, thirty-seconds and sixty-fourths, expressed in whole grains or minims.

In the metric system we find it inconvenient to write for any of the subordinate units. The gramme and the cubic centimeter are universally used. Hence fractions are unavoidable. Of late it has been shown that the use of the decimal point is fraught with danger to human life, which certainly ought not in any way or degree be dependent upon a frequently misplaced, misinterpreted, omitted, duplicated or illegible dot.

Whilst we have assumed that the gramme and cubic centimeter are commensurable, it is to be remembered that a cubic centimeter of water weighs one gramme only when at the unusual temperature of $+4°$ C. and *in vacuo*, and that unfortunately the kilogramme of the archives is too light by about nine grains, so that in reality a liter of water at $22°$ C., which I assume to be the mean temperature of our work-rooms, is not 1,000 Gms., but only about 997.4 Gms.

The value of our fluidounce should be first fixed. It might be made exactly equal to 32 cubic centimeters, in order to provide at once a convenient and simple connection between the metric system and our apothecaries' weights and measures without materially altering the present value of the fluidounce.

If we assume that the wine gallon is 231 cubic inches, then our present United States fluidounce is equal to 29.573 cubic centimeters. To increase it to 32 cubic centimeters would be to make it about $\frac{1}{12}$ larger than it now is. Inasmuch as the fluidounce is a unit referred to almost exclusively for stating the quantities of diluents and menstrua, this change would surely not be a serious one. If we should then make our apothecaries' ounce the exact equivalent of the weight of one such fluidounce of pure water at $22°$ C., weighed in air, this would be equal to 31.91 Gms., instead of 31.1035 Gms., which it now is. This would amount to a difference of about 2½ grains for every 100 grains, or about 2½ per cent.; or in other words, the present troy ounce would be $\frac{1}{40}$ smaller than the new ounce.

Next, we could divide the new fluidounce and the new ounce into eight fluidrachms and eight drachms, respectively, the difference between the old and new drachms and fluidrachms being, of course, proportionately the same as between the old and new ounces.

Finally, the new fluidrachm might be divided into 64 new minims, and the new drachm into 64 new grains. The new minim would then be exactly $\frac{1}{2}$ cubic centimeter, or about $\frac{1}{6}$ larger than our present minim; and the new grain would be only 2.46 milligrammes, (or about) $\frac{1}{17}$ smaller than our troy grain.

A new fluidounce equal to 32 cubic centimeters, and a new ounce of 32 Gms., would not be as desirable as a fluidounce weighing exactly one ounce when referring to water at

22° C. (71.6° F.), as 32 cubic centimeters of water does not weigh 32 Gms. either at +4° C. or at +22° C.

In my little manual of 'Weights, Measures and Specific Gravity,' just published, these data will be found more fully commented upon. On pages 45 and 46 of the manual referred to, the exact difference between the several corresponding old and new units is stated, and on page 36 it is suggested that if these reciprocal relations between our unit of weight and measure should be established, our old grain weights and fluid measure graduates could still continue to be used until gradually replaced by new ones without the slightest confusion or disadvantage. The difference between [the new ounce and the troy ounce would be less than 13 grains ; between the new drachm and the old drachm about 1½ grains ; betweee the old grain and the new grain the difference would be as if 26 grains had been taken instead of 27. As to the fluid measures, the differences between the old and new fluidounce would be less than 40 minims ; between the old and new flui-drachm less than 5 minims ; and between the old and new minim the difference would be as if 40 minims should be taken instead of 41. Yet, with these trifling modifications in the accepted values of our units of weight and fluid measure, we could at once insure : 1. Parallel units ; 2. Commensurability ; 3. Divisibility of the larger units into halves, quarters, eighths, sixteenths, etc., expressed in whole numbers of the lower units, and thus the avoidance of fractions to the greatest possible extent.

Even if our present apothecaries' weights and measures should remain unchanged, they are to be preferred to the metric system, because they are so nearly what they ought to be that it would seem to be a grave error to discard them in favor of a system which has been found to be so hazardous by reason of its unavoidable decimal fractions and decimal point.

In the absence, however, of any fixed legal standards for the United States, why should we continue to use the troy ounce with the peculiar (apothecaries') subdivisions adopted by the London and Edinburgh colleges, and their special apothecaries' fluid measures (all of which we inherited from England in colonial times, and which have since been abolished in Great Britain), without either legalizing them, fixing the values of their units, or modifying them so as to serve their special uses as perfectly as possible, especially as those weights and measures are used by no one but physicians and pharmacists?

A new, complete and harmonious system of weights and measures for this country such as would merit permanent adoption, would, of course, be preferable ; but in view of the prevailing diversity and confusion, it may be considered sufficient to remodel the special weights and measures used in medicine and pharmacy independently of those used in general commerce.

The plan here suggested is not the only one which seems practicable ; but if we would have the weights and measures of pharmacy bear simple relations to the weights and measures of modern science, the methods open to us are to either make our fluidounce exactly 32 cubic centimeters and to make the troy ounce equal to the weight of the fluid-ounce of water at whatever may be deemed the most suitable standard temperature, or to make an apothecaries' ounce of such size that 32 of them shall correspond to the weight of a liter of water at 22° C. One liter of pure water at 22° C. weighs 32.067 of our present apothecaries' ounces, and the size of the ounce might be slightly increased so that only 32 ounces (instead of 32.067) shall represent the liter. Then the fluidounce could be made to represent the volume of one ounce of water at 22° C. The first-named plan is preferable.

Either of these plans would connect our weights and measures with the metric system and its primary basis. If we were to attempt the construction of an entirely new system from beginning to end, based upon either the seconds pendulum or the quadrant of the earth, ignoring all weights and measures at this time in use, the task would probably be accomplished in vain, if at all.—*Prof. Oscar Oldberg, in The Pharmacist.*

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