

Stated Meeting, September 20, 1867.

Present, seven members.

Prof. CRESSON, Vice-President, in the Chair.

Letters were read from General John Meredith Read, dated Albany, July 30, and from N. B. Browne, dated Philadelphia, August 27, 1867, acknowledging the receipt of the notice of and their acceptance of membership; from the Imperial Geographical Society of Russia, the Hungarian Academy of Science at Pesth, the Public Museum of Buenos Ayres, the Harvard College Observatory, and Archibald Campbell, Commissioner of Northwest Boundary Survey, announcing donations; and from the Rhode Island, the Massachusetts, and Pennsylvania Historical Societies, acknowledging the receipt of publications of this Society. Also from A. Dick & Co., of Paris, in relation to the new metal, "Indium."

Donations for the Library were announced, viz.: From the Academies of Sciences—the Imperial at St. Petersburg, the Hungarian at Pesth, and the Royal at Berlin; and the Societies—the Imperial Naturalists' at Moscow, the Royal Danish Astronomical at Copenhagen, the German Geological at Berlin, the Imperial Geological at Vienna, the London Astronomical, the London Meteorological, and the Geographical of Paris, *Annales des Mines*. Also, from Dr. F. C. Noll, editor of the Zoological Garden, Frankfort-on-the-Main; Joachim Barrande, Prague; Dr. Gustav Waldemar Foeke, of Bremen; Dr. G. Rienold Treviranus, of Bremen; the Doctors' Union of Bremen; Dr. Franz Buchenau, of Bremen; Ch. Des Moulins, of Bordeaux; V. Alexis de Gourgues, of Bordeaux, and the Public Museum of Buenos Ayres. From Societies—the Rhode Island Historical, the American Antiquarian at Boston, the Boston Natural History, the Wisconsin State Historical, and the American Oriental at Boston; the Observatory of Harvard College, the Essex Institute of

Salem, Young Men's Mercantile Library Association at Cincinnati, and the Troy Rensselaer Institute; from Dr. Ruschenberger; from Archibald Campbell, of the N. W. Boundary Survey; from Hon. Charles Sumner; from the Editors of the American Journal of Arts and Sciences; from the Franklin Institute; and from the publishers of the Medical News. A donation to the cabinet of "Indian Relics," by Dr. Joseph Leidy.

The death of Sir Michael Faraday, a member of this Society, was announced as having occurred on the 25th of August last, in the seventy-ninth year of his age.

Mr. P. W. Sheaffer presented the following communication,—an account of the effects of lightning in the underground workings of the Short Mountain Company's coal mines in Dauphin County, Pennsylvania, by Gilliard Dock.

WICONISCO, PA., Sept. 5, 1867.

P. W. SHEAFER, ESQ.

DEAR SIR: On the 20th of June last, during a thunderstorm, the lightning struck the iron rails leading into the water-level drift, at Short Mountain Colliery, and passed into the mines.

A driver who was coming out with a train of coal-cars, distant about 450 yards from the mouth of the "drift," saw a flash of light at a point near him, where the continuity of the rails was broken; there was also a loud report, described as resembling the noise of a large shooting-cracker.

At a distance of 900 yards from drift mouth, there is a timber "chute," leading down to a counter-gangway, 102 yards below water-level; this "chute" also ventilates the lower part of the mines, and on that day there was a strong current of air passing down.

There are no iron rails, nor any other metallic bodies in this "chute."

The next appearance of the electric current was at the foot of this "chute," where it was seen to strike on the iron rails laid in this gangway. There was a very distinct flash and report when the lightning touched this rail; the noise was so loud as to frighten two mules standing near by, and they ran away from their driver.

It then followed the rails westward, still travelling in the direction of the ventilating current.

At a point 250 yards west of the "chute" there is a "turnout,"

where cars pass; here the rails were not in close contact, and there was another flash and report.

Some miners sitting near by, with their feet on the track, were startled by a very perceptible shock, and at the end of the gangway, 300 yards further west, the men saw the flash and heard the report, which was again compared to a shooting-cracker. The distance travelled by the fluid, from where it first struck to where it was last visible, was about 1550 yards.

On the same day, about 3 P.M., weather very warm and sultry, and raining very fast, the lightning struck the rails again at the slope-house, passed along through the building, and then down the main slope, 212 yards long; the men employed at the foot of the slope saw what they described as a ball of fire coming down, and when passing the switches at the foot of the slope, they heard a loud report, and saw a vivid flash of light.

At 70 yards from foot of slope, the men at the "turnout" saw the current flashing from one rail to another, with a noise as before described.

At 500 yards from foot of slope, at another "turnout," the same thing occurred; at 900 yards again. At 1000 yards from slope, two men were sitting on the bumper of a car, with their feet on the track; they felt the shock distinctly, were very much frightened by the strange sensation. Beyond this point no men were at work, and it was not traced any farther.

Mr. P. E. Chase made the following remarks concerning the strictures of a writer in the *North American Review* for July:

A philologist, whose profound and conscientious scholarship has earned a world-wide and well-deserved reputation, has honored me, in the July number of the "*North American Review*," with some severe strictures upon portions of my articles in the thirteenth volume of the *Transactions* of this Society. Criticisms from such a source, even if mistaken, must at least be honest, and should not be lightly disregarded.

Says the reviewer: "It is even now possible for a student to take the vocabulary of an African language, and sit deliberately down to see what words of the various other languages known to him he can explain out of it, producing a batch of atrocious identifications, whereof the following are specimens: *abetele*, 'a begging beforehand' (defined by the comparer himself as composed of *a*, formative prefix, *be*, 'beg,' and *tele*, 'previously'), and German *betteln*, 'beg' (from

the simpler root *bit*, *bet*, our 'bid'); *idaro*, 'that which becomes collected into a mass,' and English *dross*; *basile*, 'landlord' (*ba* for *oba*, 'master,' *si*, 'of,' and *ile*, 'land'), and Greek *basileus*, 'king!' And the comparer . . . gravely informs us that the calculated chances against the merely accidental character of the last coincidence are 'at least a hundred million to one!' More than one unsound linguist has misled himself and others by calculating, in the strictest accordance with mathematical rules, how many thousand or million chances there are against the same words meaning the same thing in two different and unconnected languages. The calculation is futile, and its result a fallacy. The indications of linguistic relationship are not to be reduced to precise mathematical expression."

E pur si muove! A wide interest has been awakened by a recent famous will case, in which a disputed signature was referred to one of the most celebrated mathematicians of our day, for his judgment as to its authenticity. After a careful examination and calculation of the chances of such a coincidence as is alleged to exist between the signature in question and one which is admitted to be genuine, the referee declares that "this phenomenon could occur once in the number of times expressed by the thirtieth power of five, or, more exactly, it is once in two thousand six hundred and sixty-six millions of millions of millions of times. . . So vast an improbability is practically an impossibility. Such evanescent shadows of probability cannot belong to actual life. They are unimaginably less than the least things which the law cares not for." This calculation is met, not by asserting that "the calculation is futile, and its results a fallacy," but in the only legitimate way, by attempting to show that the coincidence is not of the character which was assumed in the conditions of the calculation. The calculus of probabilities, whether it be applied to language or to any other subject in which definite relations are involved, is as infallible as any other branch of mathematics; but in all reasoning, the legitimacy of the premises and the logical accuracy of the successive steps which lead to the conclusion may be properly called in question.

I yield to no one in admiration of the splendid results which have followed the study of linguistic relationships under the guidance of grammatical affinities.* But, on the other hand, I am unwilling

* Witness the acknowledgment in the criticized article: "Grammatical analogy, when strongly marked, furnishes nearly demonstrative evidence of a common lineage, and it should, therefore, be the first object of search in all philological comparisons."—*Trans. A. P. S.*, xiii, 36.

either to ignore the labors of early philologists, or to confine the application of radical etymology within narrow limits. Independently of all grammatical and other considerations, if there are satisfactory evidences that the root *ma* is used to denote magnitude, *ta* to denote tendency, *cr* to denote curvature, and *r* to denote radiation, in each of two compared languages, it can be mathematically demonstrated that it is unreasonable to attribute these coincidences to mere accident. Evidence may be adduced as to their reality, arguments may be urged as to their probable origin, but if their existence is conceded, we should seek for some definite cause. A single accidental coincidence may be probable; that there should be more than one is improbable.

Of the three comparisons which are quoted as samples of "a batch of atrocious identifications," one (*idaro*) is given without any comment, as having no special importance; one (*abetele*), by the reviewer's own confession, is based on essential roots so nearly identical in form as *be*, *bet*; and only one (*bale*, or *basile*) is considered in any calculation of chances. Assuming this as a test example, let us see to what extent the resemblance is traceable, and what probable indications can be found of a common origin.

I. In the first place, there are many evidences of ancient commercial intercourse between the Yorubans and Egyptians, accompanied by traditions of settlements on the western coast of Africa by Egyptian colonies.

II. Such intercourse has been frequent in historical times, through the wandering Arabs and the slave-traders, who have overrun nearly all of Africa.

III. There is some grammatical affinity between the Yoruban, Egyptian, and Coptic languages.

IV. While there are well-understood natural causes for such changes as are instanced by the reviewer, from *episkopos* to *bishop* and *évêque*, and from *filius* to *hijo*, it is difficult to attribute to any other cause than a common origin, such analogues as Latin *dare*, *fere*, *finis*, *ibi*, *circum*, *curtus*, *rudimentum*, *sanus*, *teres*, *totus*, and their Yoruban synonyms *da*, *fere*, *fin*, *ibe*, *kiri*, *kuru*, *rudi*, *sang*, *tere*, *toto*,* all of which appear to be derived from roots which are still retained in the latter language.

V. Among the aboriginal dialects of America, the Algonquin and the Iroquois furnish a remarkable instance of the persistence of gram-

* Loc. cit. pp. 45-6.

matical forms after nearly all traces of radical resemblance have disappeared. Is it, then, reasonable to suppose, in view of the fact that all changes are more likely to produce difference than resemblance, that such coincidences as those above enumerated are merely accidental?

VI. Max Müller's classification of languages, as Aryan, Semitic, and Turanian (the "stream of language rolling on through centuries in these three mighty arms, which, before they disappear from our sight in the far distance, clearly show a convergence towards one common source"), questionable as it is, is at least as deserving of respectful consideration as the theory which assigns to the various dialects a variety of origin.

VII. The Yoruban root *da*, to create, and its derivatives *da...wo*, to consult an oracle, *onida*, a creator, appear to me to have an affinity, which is not merely accidental, with Algonquin "Moneda" and "Manitou," Egyptian "ma ntr," Chinese "mang taou," Latin "magnus deus," Greek "μέγας θεός," and Sanscrit "maha deva."

VIII. The association of the idea of power with the sun is so natural that it would, perhaps, of itself afford no evidence of linguistic unity; but there is strong evidence of a common origin for the embodiment of this association in such forms as Yoruba *rang*, to shine, *orung*, sun, heaven; Malay *orang*, sun, man; Bugis *arung*, king; Egyptian *ra*, *Phra*,* sun, ruler; Burman *Phra*, lord, *Phrahm*, Brahma; Sandwich Island *ra*, sun; Sanscrit *ravi*, sun, *radj*, to shine, to rule, *Rama*, *Brahma*; Latin *radio*, *rex*; Greek οὐρανός.

IX. Paternal and regal authority are also so naturally associated that there is strong presumptive evidence of family identity in the principal root of Hebrew *abba*, father; Chaldean *bel*, Phenician *baal*, Carthaginian *bal*, Yoruba *bale*, *basile*, Greek βασιλεύς, lord or governor; Yoruban *baba*, father, master, *oba*, king, father.

X. This presumption is strengthened by the fact that βασιλεύς is an introduced word which has no direct and evident etymological analogues in Greek. The primitive meaning of the Yoruba *bale* or *basile* is, however, unmistakably, "lord of the land." The subordinate roots also have probable Greek analogues in the genitive *ς*, the preposition *ες*, and either in the *λε* of ἀλέω and λεαίνω,† or the *λει* of λεῖος.

* *Phra*=*Pi ra*, "the sun."

† Compare Latin *mola*, *levigo*; Yoruba *lo*, Chinese *le*, *mo-le*, to grind; Greek μύλη; English *grind*, *ground*.

While these considerations would perhaps satisfy an unprejudiced mind that there are still etymological treasures in the mine which has been worked for so many ages, and that, in the radical comparison of apparently unconnected languages, there may be ample data for a calculus of probabilities, they may help to remind the most prudent and profound philologists, that the detection of errors in any popular method is apt to lead to an undue reaction, and to render useless, for awhile, an instrument, which, under proper direction, would prove a most valuable auxiliary. Accidental resemblances undoubtedly exist, and they are sometimes strangely deceptive, but they are by no means so numerous as is often supposed. The sooner this fact is generally admitted, the sooner may we hope for a satisfactory explanation of the many curious homophones which have outlived all traces of similarity in grammatical inflections, and, after such explanation, even a linguistic solution of the vexed question of human unity may cease to be regarded as an impossibility.

It is with great diffidence that I have felt compelled thus to dissent from the cautious conclusions of a student whose varied acquirements and diligent research have lent so much honor to American science. If the issue were merely philological, I should defer, without hesitation, to an authority for which I entertain so great respect; but mathematical inferences should be tested only by mathematical criteria, and, unless it can be shown that I have inadvertently taken some step which invalidates my conclusions, I must continue to believe that the comparison of well-established radicals constitutes a legitimate branch of linguistic science. When writing the previous articles, I could imagine no better crucial test than that of the Cherokee alphabet,* and the result of the test accorded so precisely with my theory that my views seemed, as they still seem to me, conclusive. While agreeing, therefore, on most points, with the reviewer, I think that the labors of well qualified lexicographers may be made auxiliary to those of well qualified collators, and that ends may thus be attained by combined scholarship, which would be, confessedly, beyond the reach of any single individual.

Mr. Thomas P. James laid before the Society a manuscript journal of a botanical excursion in the northeastern parts of Pennsylvania, and in the State of New York, in the year 1807, found among some of the papers of the late Dr.

* Loc. cit., p. 29.

B. S. Barton in the possession of the Society, which was evidently kept by Frederick Pursh, the eminent botanist, during an excursion at the instance of Dr. Barton. Although his name does not occur in the journal, it is clearly proven to be his, by a comparison of observations recorded with remarks published by Mr. Pursh upon plants which he discovered.

Pending nominations No. 576, 579, 580, and new nomination No. 581 were read.

And the Society was adjourned.

Stated Meeting, October 4, 1867.

Present, nine members.

Prof. CRESSON, Vice-President, in the Chair.

Letters were read from Major G. K. Warren, dated St. Paul, Minnesota, September 19, and from John Welsh, dated Philadelphia, September 20, 1867, acknowledging the receipt of the notice and acceptance of membership. From the Natural History Society at Emden; the Academy of Sciences, Arts, and Belles-lettres of Dijon; the Royal Society of London, severally acknowledging the receipt of publications of this Society. Also, from the Central Statistical Bureau of Sweden, Stockholm, June 26, and from the Royal Geographical Society of London, announcing the transmission of donations for the Library.

Donations for the Library were announced: From the Central Bureau of Statistics of Sweden; from the Naturalists' Society at Emden; from the Royal Prussian Academy of Sciences at Berlin; from Prof. Dr. Karl Köch, of Berlin; from Joachim Barrande, of Prague; from the Imperial Academy of Sciences at Dijon; from M. Delesse, of Paris; from the Royal Geographical Society of Paris; from the Royal Society of London; from the Zoological, the Geological, and Geographical Societies of London; from the Geological and



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