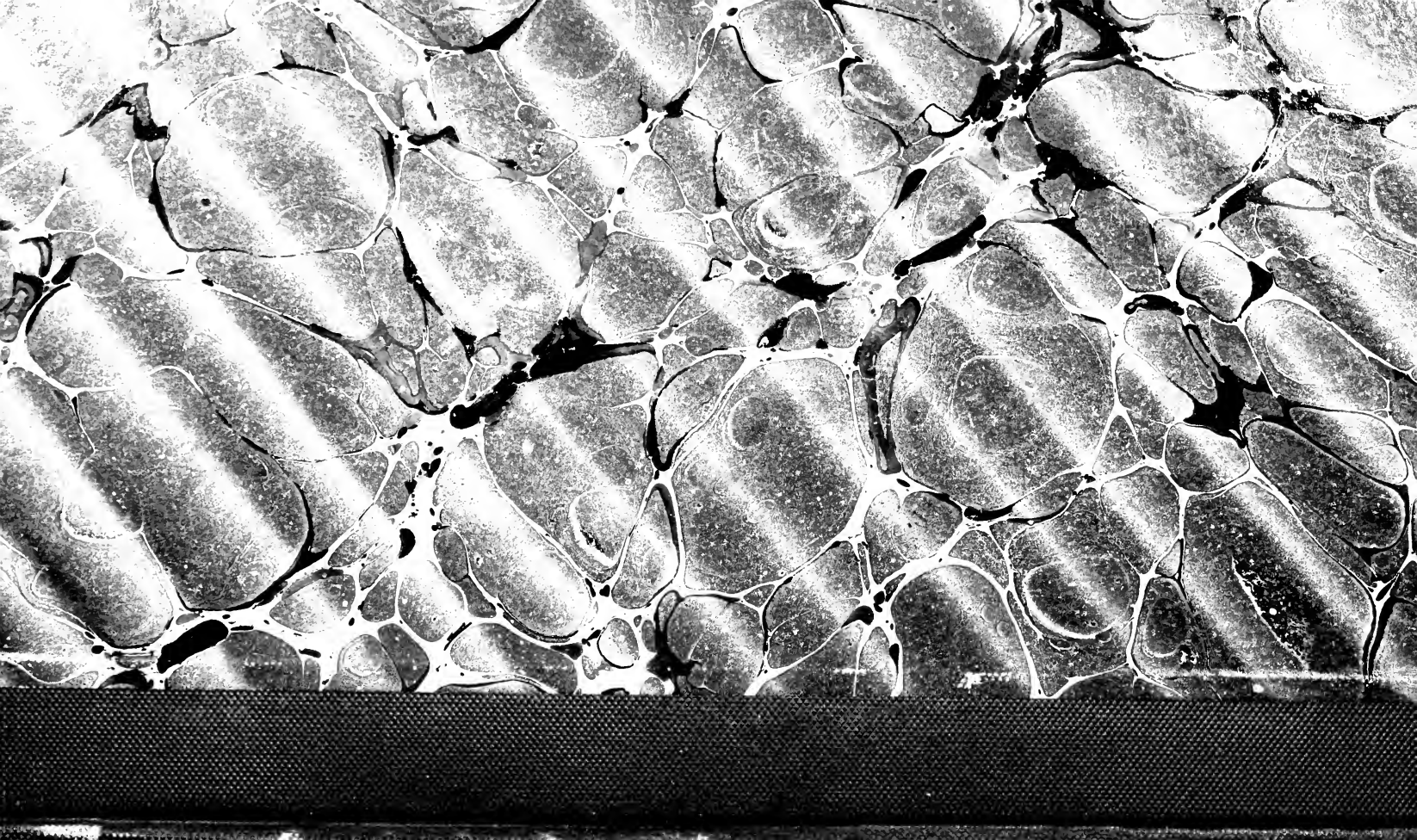

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA

FOR

PROMOTING USEFUL KNOWLEDGE

VOL. XXXVIII.

JANUARY TO DECEMBER, 1899

PHILADELPHIA:
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PHILADELPHIA:
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1899.

It is requested that all correspondence be addressed

To the Secretaries of the

AMERICAN PHILOSOPHICAL SOCIETY,

104 South Fifth Street,

Philadelphia, U. S. A.

Members will please communicate to the Secretaries any inaccuracy in name or address as given on the wrapper of this number.

It is requested that the receipt of this number of the Proceedings be acknowledged to the Secretaries.

Members who have not as yet sent their photographs to the Society will confer a favor by so doing; cabinet size preferred.

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVIII. JANUARY, 1899. NO. 159.

Stated Meeting, January 6, 1899.

Vice-President SELLERS in the Chair.

Present, 16 members.

Acknowledgments of election to and acceptance of membership were read from Messrs. Edward P. Crowell, Henry S. Pancoast, Edward H. Keiser, Ernest W. Brown, Francis Rawle, Paul Leicester Ford and Charles M. Hall.

The decease of Prof. Ezra Otis Kendall, at Philadelphia, on January 5, 1899, was announced and it was ordered that the President be requested to appoint a member to prepare an obituary notice of the late Vice-President of the Society.

The Judges of the annual election for Officers and Councillors held this day between the hours of two and five in the afternoon reported that the following-named persons were elected according to the laws, regulations and ordinances of the Society to the offices for the ensuing year:

President.

Frederick Fraley.

Vice-Presidents.

Coleman Sellers, Isaac J. Wistar, George F. Barker.

Secretaries.

I. Minis Hays, Frederick Prime, Samuel P. Sadtler, Richard A. Cleemann.

PROC. AMER. PHILOS. SOC. XXXVIII. 159. A. PRINTED JUNE 17, 1899.

Curators.

J. Cheston Morris, Benjamin Smith Lyman, Henry Pettit.

Treasurer.

Horace Jayne.

Councillors.

(For three years.)

William A. Ingham, Charles S. Wurts, George F. Edmunds, James T. Mitchell.

(For one year to fill an unexpired term.)

Henry C. Trumbull.

Dr. I. Minis Hays read a "Note on Penn's Commission for the Government of Pennsylvania during his Visit to England in 1684."

Dr. I. Minis Hays was nominated for Librarian for the ensuing year.

The Society was adjourned by the presiding officer.

A NOTE ON WILLIAM PENN'S COMMISSION FOR THE GOVERNMENT OF PENNSYLVANIA DURING HIS FIRST VISIT TO ENGLAND IN 1684.

(Plates I and II.)

BY I. MINIS HAYS, M.D.

(*Read January 6, 1899.*)

On March 4, 1681, Charles II granted a charter, in which he made William Penn full and absolute Proprietor of that dominion which is now called Pennsylvania, and invested him with the powers of government of the same. Penn sailed for America on the 6th of August of the following year and landed at New Castle, on the Delaware, on October 24. He at once set about establishing his government and aiding the Quakers, who had emigrated under his auspices, in regulating their affairs in the colony, until in 1684 the dispute between Lord Baltimore and himself concerning the boundary of their respective provinces and the critical condition into which other of his important affairs had been thrown by his enemies

during his absence in America rendered his presence in England necessary.

He therefore departed for home in June, 1684, but before so doing it was necessary to provide for the government of his province in his absence, and to this end, he executed a commission on the same day that he set sail, lodging in the hands of the Provincial Council the powers of government vested in him, and he appointed Thomas Lloyd, who also held a commission to keep the great seal, its President.[1]

In the Minutes of the Provincial Council it is stated that "at a Councill held at New Castle the 18th of ye 6th Month 1684 a commission from ye Govr was read, Impowring the Provll Councill to act in the Governmt in his Stead, Ths. Lloyd being Presidt of ye same."[2]

In the Minutes of 31st of January, 1686, P.M., it is also stated that "The commission from ye Govr to ye Provll Councill Impowring them to act in his stead, with ye memorandum on the back side thereof was Read."[3]

Neither the text of this commission, nor the important memorandum on the back is given, nor, so far as I can learn, have they ever appeared in print. I have been so fortunate, however, as to find the original document among some unarranged papers in the possession of this Society, and it bears no marks upon it to show that it was ever recorded. It seems, therefore, desirable that the text of this important document should now be made available to students of the history of this Commonwealth, as well as the memorandum on its back, which is referred to in the second record in the Minutes of the Provincial Council, which was executed on the same day on board the Ketch Endeavour just as Penn was about to sail for home, and which very materially restricted the large powers he had just previously on the same day granted in the original instrument. It constitutes another example of what has frequently been observed, that man's first impulses are more generous than his second thoughts.

The following is the text of the commission:

---

[1] Minutes of the Provincial Council of Pennsylvania. Published by the State, Vol. i, p. 66. Harrisburgh, 1838.

[2] *Ibid.*

[3] *Ibid.*, p. 120.

"WILLIAM PENN PROPRIETARY AND GOVERN^{R} OF Y^{E} PROVINCE OF PENNSYLVANIA AND Y^{E} TERRITORIES THEREUNTO BELONGING.

"To y^{e} members of y^{e} Provincial Councill of y^{e} Province of Pennsilvania & y^{e} Territories thereunto belonging.

"Since it hath pleased God so to dispose of me as to call me by his Providence into England and 'y it is requisite that y^{e} Power I have should be left to maintain & exercise Govern^{t} for y^{e} Good of the Province and Territories: To y^{e} end that y^{e} People may be sensible of y^{e} Intire Confidence I have in them w^{ch} which I hope will begett the like in them, to me & mine, I doo hereby committ y^{e} Power vested in me to you their chosen Provinciall Councill & do hereby Nominate & appoint my Trusty & Loving Friend Thomas Lloyd President of y^{e} same, he & you to Act & doo all things, that by Law and Charter you may doo for y^{e} Good of y^{e} Province, & not to y^{e} Detriment of me my Heirs & Assigns, which power shall remain as Granted, till further Ord^{d}. Given at Philadelphia y^{e} Sixth day of y^{e} Sixth Month One Thousand Six Hundred & Eighty-four being y^{e} Thirty-Sixth Year of y^{e} King's Reign & y^{e} Fourth of my Government.

"WM. PENN."

On the back of the commission is the following inscription in a different handwriting:

"Memor^{d}

"By the Power within expressed & mentioned I understand y^{e} use of the executive power cheifly as chuseing officers &c. Intending y^{t} all law y^{t} shall or may be made should receive and have my further determination, confirmination and consent or else to be voyd in themselves.

"Given y^{e} day of y^{e} within date on board the Ketch Endeavour.

"6th 6th mo. 1684. "WM. PENN."

A facsimile of the commission and of the memorandum endorsed thereon is appended:

Stated Meeting, January 20, 1899.

Vice-President SELLERS in the Chair.

Present, 12 members.

The death of Major Jedediah Hotchkiss, of Staunton, Va., a member of the Society, was announced.

A verbal communication was made by Mr. Wadamori, of Japan, upon "A New System of Mnemonics."

A paper entitled "Photometric Researches," by Prof. Hugo Seeliger, of Munich, Bavaria, translated and edited by Prof. A. W. Myers, of the University of Illinois, was offered for the *Transactions*, and on motion was referred to a Committee consisting of Profs. E. C. Pickering, C. L. Doolittle and M. B. Snyder.

A communication for the *Proceedings* from Mr. A. Radcliffe Grote, on "Specializations of the Lepidopterous Wing: the Parnassi-Papilionidæ. I," was read.

Dr. I. Minis Hays was elected Librarian for the current year.

Pending nominations Nos. 1477, 1478, 1480, and new nominations Nos. 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488 and 1489, having been read, the meeting was declared adjourned.

SPECIALIZATIONS OF THE LEPIDOPTEROUS WING; PARNASSI-PAPILIONIDÆ.

I.

BY A. RADCLIFFE GROTE, A.M.

(*Read January 20, 1899.*)

This communication embodies results obtained from a study of the neuration of the types of genera proposed in literature in the Papilionides. It may be considered as a contribution to phylogeny in the group, from the fact that it exhibits the characters of specialization recognized by me in the structure of the wings, while the inference is accepted that the more specialized are also the younger

forms. It may also be looked upon as a contribution to taxonomy, because the differences noted may find their place in generic descriptions and serve to regulate the extension of minor groups of the species.

I have divided (February, 1897) the Butterflies, or diurnal Lepidoptera, into two major groups, which may be thus defined:

Vein ix of fore wing present; not more than one internal vein on hind wing . . . . *Papilionides.*
Vein ix of fore wing absent; at least two internal veins on hind wing . . . . . *Hesperiades.*

The characters given above to the Papilionides seem, at least in combination, exclusive of all other hitherto discovered Lepidoptera. The opposed characters will not exclude larger groups of the Moths from the Hesperiades. With the latter the present study is only incidentally concerned. Following modern classificatory notions, I have given to the names of these two major groups of the Butterflies an accepted termination (*ides*), and I would attach to each the taxonomical value of a superfamily. This course seems to be additionally warranted if we accept my assumption that the two groups are not immediately connected, their phylogeny distinct and that no nearer blood-relationship exists between them. These two major groups of the Butterflies have, I am led to believe, developed themselves independently, so that the obvious characters which would unite them have been secondarily acquired, and constitute a parallelism in development. The absolute character of a primary nature which separates the Papilionides from the rest of the diurnals is the presence of vein ix on primaries. The neurational characters, used here to divide the Papilionides into family and subfamily groups, are in their nature secondary, gradational and recurrent; in other words, characters of specialization only.

Characters of Specialization.

The first direction in which specialization shows itself lies in the suppression of the media on both wings. In this generally expressed direction the Papilionides show a course parallel with that undertaken by the Pieridæ, with the difference that the middle

branch of the media, vein iv_2, becomes cubital; whereas in the Pieridæ it becomes radial, as in the Hesperiades generally, with the exception of Leptidia, an aberrant pierine form in which this branch also becomes cubital on the hind wings. In the Lycænidæ-Hesperiadæ it remains central, while it becomes radial in the Nemeobiidæ, as in the Pieri-Nymphalidæ. The upper branch of the media, vein iv_2, ascends the radius in the specialized forms of the Papilionides, as in the Pieridæ, and does not remain permanently attached to the cross-vein, from the upper corner of the cell, as in the Nymphalids.

The second direction in which specialization shows itself lies in the suppression of the branches of the radius on the fore wings. The five-branched radius, exhibited in a generalized state in the Papilionidæ, becomes four-branched in the most specialized butterflies of the group I have yet examined, in *Parnassius apollo* and its very close ally, *Doritis mnemosyne*.

For the rest, the specializations of the neuration generally show themselves in absorption, so that I have laid it down as a principle that the amount of the specialization is measured by the extent of the absorption or disintegration.

The so-called "tails" to the hind wings in this group are prolongations of vein iv_3. They are probably to be regarded as characters of specialization, and they possibly had their origin as secondary sexual ornaments of the male sex, although now most of the females have followed suit. In certain Papilios in which the female is mimetic, the "tail" in this sex may have been abandoned after having been originally acquired.

Nomenclature and Homology of the Veins.

The ancestors of the Papilionides must have exhibited vein ix of the primaries, since this is evidently a retained and not an acquired character. I follow Comstock in numbering the loop at the base of vii as viii in the Hesperiades and other groups. This vein viii is absent in the Papilionides, where there is no place for it. It may have originated in a splitting of vii at base, and not be a relic of a longitudinal separate vein. In this case the number assigned to ix would be incorrect, but the numbering having been introduced, to change it would make confusion, although the vein

itself would be homologous with vein viii of hind wings and not with vein ix of the same pair.

The cross-vein between cubitus and vii very gradually fades out in the more specialized forms of the Papilionides and finally disappears. It fades from its base, where it joins on to vii, upwardly, becoming a mere remnant in the Teinopalpidæ, extending below the cubitus. Mr. Quail has discovered a similar slight blotch in *Anosia*, and I believe correctly homologizes it with the cross-vein of *Papilio*. I have found it still more extended in *Heliconius*, where it reaches, running a little obliquely downward, to about the place where vi would be had this latter vein not faded completely out. In my preparation and the original photograph of *Heliconius* this fragment of the cross-vein is with difficulty to be seen, and I overlooked it at the time. I also failed to notice that *Heliconius* shows a trace of vein viii.

The presence of relics of a cross-vein below cubitus in the Limnadidæ and Heliconiidæ, homologous with that in *Papilio*, does not necessarily imply consanguinity between the groups. The hypothesis has suggested itself to me that the lepidopterous wing may have originally shown a series of longitudinal and independent veins, connected by a system of cross-veins, and without the present furcations of the branches of the media and radius. The disappearance of the cross-veins would allow of the contact of the longitudinal veins, and probably assist the shifting movements we now perceive in action (PROC. AM. PHIL. SOC., Jan., 1898). The cubital cross-vein would be a relic of these.

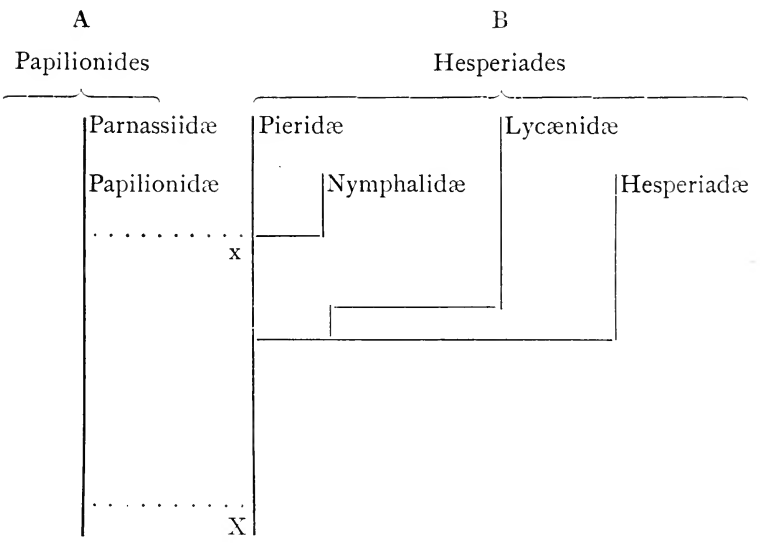
GENERAL CLASSIFICATION.

If we assume vein viii of the fore wing in the Hesperiades to be a splitting of the vein vii at base, it might not be held to be homologous with the vein viii, occupying the same position, in the Sphingides and other groups of moths. This supposition seems to me untenable. In the lycænid genera *Aurotis*, *Zephyrus* and *Feniseca* I do not perceive any difference in this vein from its appearance in the Hesperiadæ. It becomes simply more prominent and somewhat less strap-like and rigid in the moths. In any case, this vein viii, while allying the Hesperiades to the higher groups of moths, is absent in the Papilionides and is replaced by

what I consider to be the undoubted relic of a true longitudinal vein, taking an opposite direction to vein viii, and running outwardly and downwardly to the inner margin of the wing, and which I have called vein ix. If the view is accepted that vein viii originates in a splitting of vein vii at base, then it might be held that this splitting occurred after vein ix had been gotten rid of, and that consequently butterflies with vein viii represent a succeeding stage in this respect. I believe to have shown that, in certain of the more specialized of the Hesperiades, vein viii gradually fades out. In the Nymphalids I find very faint traces of it only in certain Argynninæ. I have found no trace of it in any Satyrid. It has vanished in *Leptidia*, is present in *Pseudopontia*, and, while strong in *Colias*, is fainter in some of the other Pierinæ. Certain Lycænidæ appear to have lost it, or it is very faint, and this may be the case also with some Hesperians, though in this latter group it is usually quite legible. Conceding its variability, no better evidence perhaps of its power of extinguishment can be offered than that it is strongly marked in *Libythea* and *Limnas*, and that it is incomplete in the related *Heliconius*.

Let our theories as to viii be as they may, one thing seems clear: that no traces of vein ix of the Papilionides have been found in the Hesperiades, and that this latter group is held together, as opposed to the former, by the negative character of its absence.

My attempt therefore, to connect the Papilionides with the rest of the diurnals, has failed. In my first draft of the genealogical tree (1896–1897), and which is still pinned above my desk, I supposed that the point of contact might be with primitive forms, less specialized than the Hesperians. These would have all exhibited vein ix, which the Papilionides had retained, while the other ascending branch had lost it. I reproduce here this sketch, the readier since Dr. Chapman, in letters to me, has queried whether an analogous scheme might not work.



The point x is supposititious and, in my original sketch, marked with a query. I had endeavored also to connect the Papilionides with the Nymphalids. Aside from the major difficulty, the only point of similarity I could then find was the five-branched radius, which in both the Papilionidæ and in the Nymphalids was in a generalized condition. To this must be added traces of the cubital cross-vein in the Limnadidæ and Heliconiidæ. While too much importance should not be paid to a suppression of branches of the radius now in a fluid state, as in the Pieridæ and Saturniadæ, stress must be laid on the fact that throughout the Nymphalids the five-branched condition is retained, while in the Parnassians we have also a four-branched type, in which the more generalized five-branched condition has been very clearly abandoned. The only movement I have found in the Nymphalid radius consists of a transference of iii_2 to beyond the cell in the Heliconiidæ and certain long-winged forms, or in forms perhaps tending in that direction, such as *Thalerope*, *Araschnia*, *Melitæa* and *Euptoieta*; while in the long-winged forms, *Agraulis*, *Dione*, the vein iii_1 has followed suit. A trace of this movement is seen in *Argynnis*, but not in *Issoria lathonia*. I was also impressed by the fact that in the Papilionidæ vein iii_4 did not attain the apex of the primary wing,

but this condition is not constant in the Nymphalidæ, and is abandoned in the Satyrids and *Libythea*. On the other hand, the differences between the Papilionides and Nymphalidæ are numerous. Vein iv_2, the middle branch of the media, becomes radial in the latter, in the former cubital, in specialization. Vein iv_2 also leaves the lower outer corner of the cell in the Papilionidæ, and, although this position is abandoned in the higher genera of the Parnassiidæ, still it may have been a primitive one, since it occurs now with the more generalized forms. The peculiarities of the papilionid wing are very strong, and notwithstanding the discovery of a remnant of the cubital cross-vein in *Anosia* (Danaus) by Mr. Quail, and by myself in *Heliconius*, I cannot find evidence sufficiently weighty to connect the groups from the neuration. But while the coincidences allow of some comparison of the Papilionides with the Pieri-Nymphalidæ, although an affinity appears to me to be illusory, it is impossible to consider them as representing in any nearer way an ancestral form of the Lycæni-Hesperiadæ.

Upon the generalized condition of *Hesperia* too much stress has, perhaps, been laid in literature. All the forms of which I have examined the neuration seem relatively specialized upon their peculiar plan of venation, of which the more modern and advanced outgrowths are to be found in the Lycænidæ, culminating in *Thecla*. But all the butterflies belonging to the Lycænid-Hesperid phylum seem relatively too specialized as to represent adequately the primitive form of the diurnals. Whatever the primitive form was like, the only character in which it may have resembled *Hesperia*, or the primitive form of the Charaxinæ, is that of the separation of the longitudinal veins. The primitive butterfly may have had separated veins, together with cubital cross-veins, of which we find a trace in the Heliconians and Limnads, and an anal vein, like the Papilionides, on the primaries. And, perhaps, by conjuring up a creature rejoicing in apparently residual features, we might attain to a picture in somewhat like manner as Gabriel Max has painted Haeckel's *Pithecanthropus alalus europæus*. But the muse of morphology, as I am now able to understand her, abandons me at this juncture, with the unconnected threads of the groups A and B, the Papilionides and Hesperiades, dangling downwards into the abyss of Time, kept apart by the presence of vein ix of primaries in the one and its absence in the other.

The object of my communications upon the wings of butterflies,

of which this series is the last, has, however, been attained in demonstrating that modern classificators (I need not recapitulate their names) have been in error in intercalating the Swallowtails between the Blues and the Skippers. In thus doing violence to the characters of the insects, they have separated two allied groups by the interpolation of a third, not at all nearly related to either. I have further shown that we cannot bring in the Papilionides *after* the Hesperiadæ, since this course would break the sequence of character which allies the Hesperiades with the higher groups of the moths, the Sphingides, Saturniades, Bombycides (Agrotides). I do not assert a belief that the Hesperiades have sprung from common ancestors with these, but I find nothing in the neuration to render the idea improbable. And I am compelled to add, upon such evidence as is accessible to me, that I cannot say the same of the Papilionides, all connection of which with any of the above-mentioned groups appears to me to present a high degree of improbability. What discoveries await us in the future no one can say, and a naturalist can only come to a conclusion upon the material before him.

The notion that the Papilionides are generalized forms appears to me to be alike overstated. I lay especial stress upon the fact that the hind wings show but one internal vein, whereas all the Hesperiades show two at least. How the outer vein has been gotten rid of is plainly to be traced in the Papilionides, viz., in the same manner as the shortening and weakening of the inner vein has been gradually effected, from where it is stout and long, as in *Ornithoptera*, to where it becomes weaker, more curved and shorter, in *Parnassius*. This shortening of the vein is accompanied by a hollowing away of the tegument along the inner margin. A perfect parallel in this movement is sustained between the Papilionides and Saturniades. More than this: I believe I have found in the rounded and full inner margin of the secondaries in *Ornithoptera* an earlier stage of the hollowed margin of *Papilio*. For this reason, among others, I look upon *Ornithoptera* as being a relatively generalized form in the group. The ancestors of *Papilio* might have had two internal veins on secondaries, and in this they would have resembled the Hesperiades. From this point of view the inference is irresistible that we should commence our lists with the Papilionides. The specialization of the radius on fore wings keeps pace with the shortening of vein viii on hind wings in the Parnassiidæ.

In taking a fresh view of the evolution of the neuration, one is only too liable to overlook minor characters, or again to lay undue stress upon them. But, if I am correct in my major conclusions, if the theory in the main adequately explains the facts, such faults may be eliminated and forgiven. A well-founded division of the butterflies into two larger groups, of equal morphological value, must be considered as a gain to taxonomy, while it eases the study of the waste of butterflies to a hitherto unknown extent. I try to show, not only that the Parnassi-Papilionidæ belong together, but that all the rest of the butterflies are correctly associated in a second group. I have broken the Papilionides away, not only from their supposed affinities with the Whites, but from their incongruous placement with the Skippers also. In the former case I differ from Mr. Reuter, in the latter from Mr. Scudder. It seems to me that light is thus thrown upon a subject on which much has been written which must now appear purposeless, while the new course would enable us to carry with greater certainty the apparatus of classification along the road of phylogeny.

Material.

The authority for the generic names and types which I have here consulted, is Mr. Scudder's *Historical Sketch of the Generic Names Proposed for Butterflies*, Salem, 1875. I regret not to have been able to procure information or material of several generic types published since this date in the Papilionidæ. For specific determinations I am largely indebted to Dr. O. Staudinger and A. Bang-Haas, Blasewitz, Dresden. As far as possible I have studied the neuration of the female sex, since here the question of secondary sexual character is for the most part excluded. Where the male alone has been examined the sex is indicated. Following Mr. Scudder's work, I have omitted to cite the author to the generic type.

Classification of the Papilionides.

The characters are taken from the position of the veins and their condition. These characters are offered by the neurational movement peculiar to the Papilionides, of which they constitute existing stages, and are hence secondary and characters of specialization only. They are here amplified from my original communication

contained in *Mittheilungen aus dem Roemer-Museum*, Hildesheim, No. 8 (February, 1897).

On primaries vein iv_1 is radial or radially inclined, vein iv_2 is cubital.
- No traces of cubital cross-vein . . . . PARNASSIIDÆ.
  - Radius four-branched, specialized *Parnassiinæ*.
  - Radius five-branched, generalized *Zerynthianæ*.
- Traces of cubital cross-vein . . . . . TEINOPALPIDÆ.

On primaries vein iv_1 from, at or near middle of cross-vein; vein iv_2 from the lower outer corner of cell equidistant, or nearly so, between iv_1 and iv_2.
- A cubital cross-vein reaching vi or vii . PAPILIONIDÆ.

Fam. I. PARNASSIIDÆ.
Subfam. 1. *Parnassiinæ*.

The radius is four-branched, specialized. There appear to be only two genera in this subfamily, since *Doritis*, with the type *mnemosyne*, does not seem distinct from *Parnassius*, with the type *apollo*. These two genera may be separated as follows:

Vein iv_1 from radius beyond the cell . . . . 1. Parnassius.
Vein iv_2 from cross-vein . . . . . 2. Hypermnestra.

Parnassius apollo.

In all the species of *Parnassius* I have yet seen, vein iv_1 issues from radius, but since in the succeeding group this vein is fluid in *Zerynthia*, the character may not always hold. In both *apollo* and *mnemosyne* vein iii_2 arises a little before the point at which the cross-vein joins the radius, but, in *Hypermnestra*, *at* this point. I have been hitherto in error as to the absorption of i and ii at base in *Parnassius*. The lower vein is partially degenerate, but distinctly present in both *apollo* and *mnemosyne*. My figures must be corrected in this respect. This Papilionid feature is then retained throughout the group. It is the lower branch, the base of vein ii, which here seems to fade away. The upper branch, vein i, is united by a cross-vein, according to Comstock, with vein ii in *Papilio*. This short cross-vein appears then to become fused with and a continuous part of vein ii, its real base, while all that remains of it is the "præcostal spur." This may be the true termi-

nation of vein i, the alternative being that the "præcostal spur" is homologous with the shoulder veins of the Lachneidæ. But, in *Papilio machaon*, it is the base of vein i which clearly shrinks, vein ii being strong and continuous. In *Parnassius* the præcostal spur appears to emerge from vein ii, and the cross-vein has become absorbed.

Hypermnestra helios (♂).

Characterized by the extreme diminution of the humeral cell of secondaries, which is so reduced as at first to escape notice. The position of vein iii_2 shows an advance upon *Parnassius*, while in that of iv_1 it lags behind its ally. Else the neuration of the two generally agrees.

Subfam. 2. *Zerynthianæ*.

This subfamily must take its name from *Zerynthia* Ochs., 1816, because *Thais* Fabr., 1807, which is the older title for the same type, is preoccupied (Scudder, *l. c.*, 279). Not observing this, I originally used for it the name *Thaidinæ*. No other author, so far as I know, had proposed this division of the Parnassiidæ, which in itself seems a natural one. The Zerynthianæ are intermediate, in the specialization of the wings, between the Parnassiidæ and the Papilionidæ.

Radius five-branched, generalized :
Internal vein (viii) of hind wings relatively short, not reaching anal angle ..... *Archon.*
Internal vein (viii) of hind wings reaching anal angle :
Hind wings without special prolongation of vein iv_3 ..... *Zerynthia.*
Hind wings with slight special prolongation of vein iv_3 ..... *Luehdorfia.*
Hind wings with a long "tail" to vein iv_3 and also shorter prolongations to veins v_1 and v_2 ..... *Armandia.*
Hind wings with only a long "tail" to vein iv_3 ..... *Sericinus.*

Archon apollinus.

A character of specialization is found in the shortened and bent internal vein of secondaries which follows the inward

curve of the margin, as in *Parnassius* and the Saturniades. This character is probably more recently acquired. The neuration else shares the main features of that of its group. The humeral cell is narrow and reduced, the lower vein (base of ii) being weaker. On primaries vein iv_1 springs from the cross-vein. Although the pallor of the ground color of the wings suggests the preceding subfamily, the pattern of ornamentation (on the value of which for taxonomical purposes I have been insisting upon for more than thirty years past) is distinctly Zerynthian. The discal blotches are intermediate between the bands of *Zerynthia* and the spots of the Parnassians and show the origin of the latter. The subterminal red-marked fasciæ are like *Zerynthia*. *Archon* may be regarded as a generalized form of *Parnassius*, showing the origin of the latter from *Zerynthia*-like ancestry.

Zerynthia polyxena.

The material examined shows that vein iv_1 is in a fluid state. In a female this vein leaves the extreme upper corner of the cell. In the male it has passed beyond the cell and issues from the radius. In a female of *rumina*, figured by me (*Mittheilung a. d. Roemer-Museum*, No. 8, Taf. 1, Fig. 2), it leaves the cross-vein. Not only this vein varies in position, but also vein iii_s, which is further removed outwardly in the specimen in which vein iv_1 leaves the radius. Sufficient material has not been examined to gauge the extent of these variations, but it seems unlikely that they are sexual. As compared with *Archon*, the internal vein of hind wings is less bent and reaches the anal angle, the humeral cell is a little wider, else the neuration generally agrees. Traces of a splitting of vein ii at base appear on fore wings.

Luehdorfia puziloi.

The neuration of the female examined agrees exactly with that of *Zerynthia rumina*. Except that the margin of secondaries is more uneven, and that vein iv_3 is produced into a short "tail," no differences whatever have been noted. Vein iv_1 leaves the cross-vein. The forms in which vein iv_1 is still attached to the cross-vein must be regarded as more generalized than those in which it has ascended the radius and is thrown off beyond the cell.

Armandia thaitina.

Vein iv_1 leaves the radius at the junction of the cross-vein. Vein iii_3 is well removed beyond the cell. In these characters *Armandia* attains the specialization of *Zerynthia*, but on secondaries the humeral cell is much extended. Vein iv_3 of secondaries is extended, forming a long and slightly spatulated "tail." The extension to vein v_1 is shorter, and that to v_2 is still more abbreviated. The internal vein reaches the anal angle, but it is curved as in the preceding genera, thus more specialized than *Sericinus*, in which it is straight. The long primaries and the tailed secondaries strongly remind one of the Papilionidæ. The pattern of ornamentation and the neuration are those of its group.

Mr. Scudder (*l. c.*, 121) spells the name of this butterfly "*thaidina*," but Staudinger (in litt.) gives the spelling which I have above adopted.

Sericinus telamon.

In this type the sexes differ greatly in color and markings. In the two specimens examined (det. Staudinger) it is, strange to say, the female which shows the more advanced type. But I infer that the differences noted are individual. In both, vein iv_1 leaves the cross-vein, a generalization as compared with *Armandia*, as is also the still larger humeral cell of the secondaries. But in the white male, vein iii_3 leaves the radius *before*, in the yellow, black-striped female just *after*, the point of jointure of the cross-vein. The internal vein on hind wings is straight, and this is a generalization as compared with all preceding generic types. The prolongation to vein iv_3 is very long and quite even in width, not spatulate. In this genus and *Armandia* the cubitus shows a slight scar, the relic of the vanished cross-vein.

So far as I am able to ascertain from accessible literature, I have here discussed the neuration of all the generic types yet proposed in the Parnassiidæ. It becomes quite clear, I hope, that the neuration assumes a more specialized type in the Parnassiidæ, as compared with the Papilionidæ, while retaining the essential feature characterizing the entire group. So far as I am aware, no contradiction exists to the view that, commencing our lists with the more specialized members of any group, we should in this case allow the Parnassiidæ to take precedence.

Fam. II. Teinopalpidæ.

Specialization has carried this family, which consists of but a single type, entirely beyond the range of generic differentiation in the Papilionidæ. The neuration has submitted to changes similar to those characterizing the Parnassiidæ, changes of which I find no more than an indication in the Papilionidæ, so that in some respects it affords an intermediary type. The disintegration of the series of the median veins on primaries has progressed far beyond the present condition of any generic type in the Papilionidæ which I have been able to examine. Vein iv_1 has become radial, vein iv cubital, and the latter has abandoned its approximately central position and forms an unbroken curve with the cubitus. Thus the whole shape of the cell and cross-vein has undergone an important modification and the proper papilionid type of these parts has been abandoned. The cross-vein is much degenerate across the wider interspace which now intervenes between veins iv_1 and iv_2. The wing also recalls in its present condition that of *Charaxes*, except that iv_2 is cubital, while the long furcation of iii_4 and iii_5 accentuates the resemblance. The cubital cross-vein has practically vanished. There is a feeble notch on the lower edge of the cubitus and a clouding or thickening of the tegument as far as the submedian fold (vein vi). This submedian fold is always stronger at base, and, as we shall see in genera of Papilionidæ, the cubital cross-vein first disappears between it and vein vii, fading upwardly. The internal vein of hind wing is continued to anal angle and is straight. The "tail" to vein iv_3 is narrow and even (♀). Studying this type, it becomes clearer how the wing of the Papilionidæ may have given rise to the wing of the Parnassiidæ. It may be regarded as a lateral offshoot from the Papilionidæ.

With regard to the propriety of making *Teinopalpus* Hope a family type, there can be no question from the neuration, and when we add to this the peculiar structure of the mouth parts and body it should remove doubt. For, as I tried to show in 1883 (Papilio, 3, 36), it appears certain that our categories are quantitative. The quantity assigned to the Papilionidæ is here in all respects exceeded. Alone the shape of the wing, a "superficial" character, remains papilionid, but this is approached by some Parnassians and shared by other Lepidoptera. With regard to the name, it has been proposed by Felder to change it on account of

its hybrid character. It seems to me safer to keep the original term proposed by Hope, the discoverer of the insect, since this course avoids all philological discussion, with which zoölogists are not primarily concerned and perhaps not always competent to enter upon. It seems likely also that in the future *all* rules limiting the action of the law of priority upon the published name will of themselves fall from lack of authority, and that preoccupation will remain the only bar to the use of the original title.

Teinopalpus imperialis.

Radius five-branched, generalized; iii_3 at or just beyond the point of juncture of cross-vein; iii_4 and iii_5 a long furcation. Vein iv_1 radial, nearing radius; cross-vein between iv_1 and iv_2 inwardly curved, degenerate. Vein iv_2 distinctly cubital, continuous. Submedian fold (vein vi) indicated, strongly so at base; between the fold and cubitus obliquely placed and faint traces of the vanished cubital cross-vein. On secondaries humeral cell narrow, elongate; the marginal veins subequally strong, the upper slightly thicker, a Parnassian character. Cell entire on secondaries, vein iv_2 cubital. Internal vein straight, continued to anal angle.

Contrary to what has seemed to me elsewhere the almost general rule, the primaries appear here, as also in the Parnassiidæ, more specialized than the secondaries. The falcate fore wings, the sharp outlines, while imparting to this butterfly an artificial look, remind one of the Charaxinæ. The movement of the media in disintegration is Parnassian, while the presence of vein ix on primaries decides at once its position as a member of the Papilionides.

Stated Meeting, February 3, 1899.

Vice-President SELLERS in the Chair.

Present, 19 members.

A letter was read from the President announcing the appointment of the Standing Committees for 1899, as follows:

Finance.—Messrs. Philip C. Garrett, William V. McKean and Joel Cook.

Publication.—Messrs. Daniel G. Brinton, Henry C. Baird, Patterson DuBois, I. Minis Hays and Joseph Willcox.

Hall.—Messrs. Horace Jayne, Joseph M. Wilson and Harold Goodwin.

Library.—Messrs. George F. Barker, T. Hewson Bache, Samuel P. Sadtler, Albert H. Smyth and Joseph G. Rosengarten.

To fill vacancy on Michaux Committee, Prof. Joseph T. Rothrock.

Announcement was made of the death of Mr. J. Blodgett Britton, at Warrenton, Va., January 19, 1899.

Vice-President Sellers then delivered the Annual Address, his subject being "Electrical Transmission of Energy."

Prof. Keiser made a communication "On a Liquid Acetylene Diodide," which was discussed by Dr. Sellers.

The Society was adjourned by the presiding officer.

Stated Meeting, February 17, 1899.

Vice-President SELLERS in the Chair.

Present, 11 members.

Minutes of stated meeting held February 3 were read and approved.

The minutes of January 20 were amended to show that nominations 1488 and 1489 were then read for the first time.

Donations to the Library were announced.

A letter from Dr. Frazer was read, presenting the obituary notice of Prof. E. D. Cope, which was also read to the Society. Remarks on the same were made by Messrs. Sellers and Cleemann.

On motion of Dr. DaCosta, the thanks of the Society were voted to Dr. Frazer for the great care he has taken in the preparation of the obituary notice of Prof. Cope.

The Clerk of the Council reported that, no quorum being present on February 10, no business was transacted.

Dr. Hays offered a resolution that a Conversazione be given

by the Society at a date to be subsequently fixed, and that a Special Committee of seven members be appointed by the President to arrange for the same. Carried.

The Society was adjourned by the presiding officer.

Stated Meeting, March 3, 1899.

Vice-President SELLERS in the Chair.

Present, 15 members.

A letter was read from Dr. Cyrus Adler, on behalf of the American Committee of the Second International Conference on a Catalogue of Scientific Literature, requesting the Society to appoint a Committee to study the various questions relating to the Catalogue and to give its counsel on or before April 1, *proximo*. On motion, the President was authorized to appoint the Committee as requested, and he subsequently appointed Prof. Barker, Dr. T. H. Bache, Prof. Sadtler, Prof. Smyth, Mr. Rosengarten and Dr. Hays.

Prof. W. B. Scott presented for the *Transactions* a paper by the late Prof. Baur and Dr. Case, entitled "The History of the Pelycosauria, with a Description of the Genus Dimetrodon, Cope," which was discussed by Dr. Sellers and Messrs. Wistar and Morris, and was referred to the following special Committee: Prof. Scott, Dr. Jayne and Mr. Arthur E. Brown.

The Society was adjourned by the presiding officer.

Stated Meeting, March 17, 1899.

Vice-President Dr. SELLERS in the Chair.

Present, 23 members.

Mr. Henry S. Pancoast, a newly elected member, was presented to the Chair, and took his seat.

Correspondence was submitted as follows :

From Hon. John Hay, accepting membership in the Society.

From the President, announcing the appointment of the following Committee on the Scheme of Classification proposed by the International Conference on Scientific Literature, to wit, the Library Committee and the Librarian.

From Vice-President Sellers, announcing the appointment of the following Committee on the paper of Prof. Baur and Dr. Case : Prof. Scott, Dr. Jayne and Mr. Arthur E. Brown.

The Librarian presented a list of donations to the Library.

The report of the Committee on Prof. Seeliger's paper was presented and accepted, and it was ordered that the decision of the Society thereon be reported to Prof. Meyers by the Secretaries.

Prof. George F. Barker made a communication on Hertzian waves.

Pending nominations Nos. 1477, 1478, 1480 to 1487, 1489 to 1495 and new nominations Nos. 1496 and 1497 were then read.

The Society was adjourned by the presiding officer.

Stated Meeting, April 7, 1899.

Vice-President WISTAR in the Chair.

Present, 5 members.

The minutes of the stated meeting of March 17 were read and approved.

An invitation of the Imperial Academy of Sciences of St. Petersburg to attend the fiftieth anniversary of the establishment of the Central Physical Observatory, on April 1–13, was read.

On motion of Dr. Hays, the Secretaries were requested to acknowledge receipt of the same and express regret that the

time was too short to permit of sending a delegate to attend the anniversary.

The deaths of Prof. Othniel Charles Marsh, of New Haven, on March 18, in his sixty-eighth year; of Richard A. Tilghman, of Philadelphia, on March 24, in his seventy-fifth year, were announced.

On motion of Mr. Prime, Gen. I. J. Wistar was appointed to prepare an obituary notice of Mr. Tilghman.

A paper was read on "Specializations of the Lepidopterous Wing: The Parnassi-Papilionidæ, II," by A. Radcliffe Grote, A.M.

The Society was adjourned by the presiding officer.

SPECIALIZATIONS OF THE LEPIDOPTEROUS WING: THE PARNASSI-PAPILIONIDÆ.

II.

(Plates III, IV and V.)

BY A. RADCLIFFE GROTE, A.M.

(*Read April 7, 1899.*)

Fam. III. Papilionidæ.

The cubital cross-vein is always distinct, while in certain forms it does not connect inferiorly with vein vii, but is arrested at the submedian fold (vein vi). This latter is bent downwards to vein vii, beyond the cross-vein, in those types in which the cross-vein attains vein vii (see Comstock's figure in *Evolution and Taxonomy*, Plate ii, Fig. 2), and appears again within the cross-vein to base of wing. In certain forms the submedian fold is continuous from base to external margin, and the cross-vein then rests on this fold and does not reach vein vii (*e. g.*, *Eurycus cressida*, *Pathysa antiphates*, *Iphiclides podalirius*). The following table separates neurational groups, and, as far as possible, the genera. The hairy male pockets on the hind wing I have not specially examined. In the nomenclature of the veins I continue to follow Comstock.

1. Vein iii_3 of primaries out of iii_4 beyond the cell halfway to apex:
   2. Cell of hind wings disproportionately reduced:
      Hind wings greatly developed inferiorly, with long, pointed tail.....(1st Group) *Leptocircus.*
1. Vein iii_3 of primaries arises from radius more or less exactly opposite to the point of junction of discal cross-vein:
   2. Cell of hind wings subequal, narrowed outwardly by a downward curve of cross-vein between iii and iv_1:
      3. Vein iii_1 of primaries anastomoses with ii:
         Hind wings produced inferiorly, with short, sharp tail... (2d Group) *Idaides.*
         Hind wings produced inferiorly, terminating bluntly, without tail.....*Zetides.*
         Hind wings not produced inferiorly, rounded, tailless... *Arisbe.*
         Hind wings not produced inferiorly, with long, narrow, equal tail.....*Pathysa.*
   2. Cell of hind wings subequal, not narrowed outwardly (except in *Iphiclides*):
      3. Vein iii_1 of primaries free to costa:
         4. Internal vein of hind wings shorter, running out on internal margin before the longer excision at anal angle:
            Hind wings tailless.....(3d Group) *Eurycus.*
            Hind wings tailed.....*Pachlioptera.*
         4. Internal vein of hind wings longer, attaining the internal margin before the shorter excision at anal angle: (4th Group)

[*Papilio, Iphiclides, Jasoniades, Euphoeades, Heraclides, Laertias, Menelaides, Achillides, Orpheides, Nestorides, Calaides, Priamedes, Parides, Ithobalus, Iliades, Troilides,* with the types given by Scudder, I am unable to separate by adequate neurational or wing characters in a table. They all generally agree, most of them exactly except by relative characters so obscure as to be of hardly more than specific value.]

1. Vein iii_3 arises from radius above the cell and just before the junction of the cross-vein.....(5th Group) *Trogonoptera.*
1. Vein iii_3 arises from radius above the cell and well before the point of junction of discal cross-vein:

4. Internal vein of hind wings reaching to anal angle, internal margin full and rounded.....
(6th Group) *Ornithoptera*.

From the foregoing table we may extract the following neurational diagnoses of the principal genera in the different groups:

(1st Group.)

Gen. *Leptocircus* Swainson, 1832.

Type: L. curius.

= *Lamproptera* Gray, 1832 (preoccupied).

Vein iii_3 of primaries arises out of iii_4 beyond the cell halfway to apex of wing. Cell of hind wings disproportionately small and reduced. Hind wings greatly developed inferiorly, with long, pointed tail. On primaries the cubital cross-vein does not attain vein vii, but is arrested at submedian fold (vein vi). Vein "ix" of primaries present, as everywhere in the Papilionides.

The neuration of primaries, owing to the advanced position of vein iii_3, presents very striking analogies with the Sphingidæ, but a relationship with this group is absolutely excluded by the presence of vein "ix" and absence of viii on fore wings. An habitual resemblance to *Goniloba* and other Hesperian genera is offered by the coloration; this is perfectly contradicted by the neuration which is Papilionid. How great must be the phyletic value of vein "ix," if it persist in this isolated and aberrant form! In none of the generic types examined by me do I find any probable indications of the more immediate phylogeny of *Leptocircus*.

(2d Group.)

Gen. *Idaides* Hübner, 1816.

Type: I. codrus.

Vein iii_3 of primaries arises from the radius more or less exactly opposite the point of junction of the discal cross-vein. The discal cell of secondaries is subequal, but is narrowed outwardly by a downward curve of the cross-vein, between radius (iii) and first branch of media (iv_1). Vein iii_1 of primaries, the first radial branch, anastomoses with vein ii. The cubital cross-vein is degenerate, narrow, and does not reach vein vii. The hind wings are produced inferiorly, and vein iv_2 terminates in a short and sharp tail.

This term has priority for a well-defined group characterized by the junction of the first radial branch with the subcosta. It is also marked by the downward scoop of the cross-vein between veins iii and iv_1 on hind wings. The genera *Idaides* and *Zetides* are closely allied, and appear merely to differ by the details of specialization of the outer margin of secondaries. *Arishe* stands further apart by the rounded, not produced, hinder margin of secondaries. It possibly represents an older form of the group. *Pathysa* differs by the frail, testaceous veins, as well as by the tailing of the normally proportioned hind wings. In all of these characters, as well as in the striped ornamentation, it recalls *Iphiclides*, belonging to a different group having vein iii_1 free to costa. A further character, and one which suggests that *Iphiclides* presents an intermediary type, is that this latter genus has also the cross-vein of secondaries downwardly curved, between radius and first branch of media on hind wings. The intersection of the radial branches with the subcosta, which characterizes this group, is paralleled in the Charaxinæ. Nevertheless, I think we cannot regard this common feature as indicating more than an analogy between the Nymphalids and Swallowtails.

(3d Group.)

Gen. *Eurycus* Boisduval, 1836.

Type: E. cressida.

Vein iii_3 of primaries arises from the radius at a point more or less exactly opposite that of the junction of the discal cross-vein. The discal cells are subequal on both wings. Vein iii_1 of primaries free to costa. Internal vein of hind wings shorter, running out on internal margin before the long excision at anal angle. On primaries the cubital cross-vein expires just before vein vii. Humeral cell of secondaries large, subquadrate. Hind wings subovate, without tail.

This group is interpolated in this place on account of the extreme specialization of internal margin of secondaries and the shortening of vein vii. Thus the same tendency is manifested here as in the Parnassiidæ, to hollow out the margin and shorten the anal vein of the hind wings. The group is probably a lateral specialized branch from early forms of the succeeding and more typical group of the family. The genus *Pachlioptera* Reakirt, 1864, with the type *aristolochiæ*, differs very slightly. I regret not to have been able to examine *Blakeia gundlachianus* (columbus, grotei).

(4th Group.)

Gen. *Papilio* Linné, 1758.

Type: P. machaon.

Vein iii_3 arises out of radius more or less exactly opposite to the point of junction with discal cross-vein. Cells subequal. Vein iii_1 of primaries free to costa. Internal vein of hind wings inwardly curved, attaining the margin just before the short excision at anal angle. Cubital cross-vein joins with vein vii.

Except *podalirius*, the types of the genera arranged under this rubric agree in main features, while differing in small details which it is optional to consider as of generic value. In *machaon* the humeral cell of hind wings is small and narrow. The præcostal spur has a lateral extension. There is a moderate, narrow tail, not spatulate.

(5th Group.)

Gen. *Trogonoptera* Ripp., 1890.

Type: T. brookeana.

Vein iii_3 arises just before the point of junction of cross-vein with radius. Cubital cross-vein not attaining vein vii. Fore wings long and narrow, pointed, entire. Hind wings reduced, rounded, tailless. Internal margin full, the vein straight, continuous. From the characters of the radius this genus is nearer to *Papilio* than to *Ornithoptera*. It is remarkable how persistent the neurational features are in the group of *Papilio*, and especially that vein iii_3 is so immovable in its position nearly exactly opposite the cross-vein. It must be therefore considered an important feature that this vein arises much beyond the cross-vein in *Leptocircus*, and before it in *Ornithoptera*. In *Trogonoptera brookeana* it has not quite attained the Papilionid position, but it has decidedly abandoned that of *Ornithoptera*. The structure of the hind wings resembles that of the latter genus.

(6th Group.)

Gen. *Ornithoptera* Boisduval, 1832.

Type: O. priamus.

Vein iii_3 arises out of radius above cell and well before the point of junction of cross-vein. Discal cells subequal. Vein iii_1 free to costa. Internal vein of hind wings reaching anal angle; no anal excision.

The comparative characters are those of generalization, so that *Ornithoptera* presents features which the rest of the Papilionides have probably abandoned. In the same way I assume that the species of *Eurymus* (*Colias* Auct.) have passed through a *Meganostoma* stage, and the entire extant Pieridæ an *Anthocharis* stage, in which latter the Radius was five-branched and generalized. There is a strangeness about *Ornithoptera*, suggesting a separate origin. This disappears with the higher forms of the Papilionides, which have come to look much like other butterflies. The remaining generic types may be now gone over in review. As far as possible I take the generic titles in their chronological order.

(2d Group.)

Zetides sarpedon.

Agrees with *Idaides*, except that the secondaries are bluntly produced inferiorly and are without a tail. Vein iv_2 lies somewhat nearer iv_3 at base. In both genera the excision at anal angle is long, owing to the produced wing, but vein vii is not relatively shorter, as in *Eurycus* (3d Group). *Zetides* appears more specialized than *Idaides*. The differences are small, but may be considered as of generic importance.

Arisbe similis.

Agrees with *Idaides*, except that the secondaries are not produced inferiorly; the outer margin is rounded, without salient projection. The anal excision is shorter. The position of iv_2 on secondaries is more central, and this appears a more generalized form than either *Idaides* or *Zetides*.

I am indebted to the kindness of Dr. Karl Jordan for material of this species. Notwithstanding the differences in shape of hind wings, these three genera are undoubtedly phylogenetically nearly related. The veins are opaque and strong.

Pathysa antiphates.

Agrees in one essential neurational feature, the fusion of the first radial branch, with the preceding genera, to which, notwithstanding "superficial" discrepancies, it may thus be distantly related. The cubital cross-vein is attenuate, and does not reach vein vii. On the secondaries the position of iv_2 is nearly central. Vein iv_3 is produced into a long tail, not spatulate. In shape of wing this genus resembles *Iphiclides*, as also in the slender, transparent

veins, and in the striped character of the ornamentation. It probably occupies an independent intermediate position. The colors in this group, brown and greenish yellow, are peculiar, and, in preparing the wings in the usual manner, they are persistent. *Pathysa* has striped wings. In *Arisbe* the bands are indicated by scattered blotches. These latter are gathered into a single series of interspaceal spots in *Idaides*, on the primaries. These spots coalesce and broaden into a band, which also obtains over the hind wings, in *Zetides*.

The coincident characters of *Pathysa* and *Iphiclides* allow of no other conclusion than that the two are somewhat nearly phylogenetically connected, notwithstanding the fact that in *Pathysa* the first branch of radius joins subcosta, while in *Iphiclides* it is free. Assuming that the Second Group contains younger forms, we might have in *Iphiclides* a type representing a stage through which *Pathysa* has already passed. But *Iphiclides* and the members of the Second Group are in one character more generalized than *Papilio* and its immediate allies, *i.e.*, the straight internal vein of hind wings. We have probably to do with divergencies from a common stock in different directions, in part retaining characters of generalization. It is sufficient here that we show that *Iphiclides* and *Papilio* constitute totally distinct genera, having probably a different immediate ancestry. And it remains a possibility that the fusion of the first radial branch with subcosta is a more recent feature, here engrafted upon a wing in other characters representing an older type than *Papilio*. Thus the *Idaides* group may be a lateral branch, thrown off before the tendency of the internal vein to curve and shorten on hind wings was developed. And to this branch, as represented by *Pathysa*, *Iphiclides podalirius* and allies may be related. In respect of the curved inner margin of the hind wings, *Papilio machaon* and allies are more specialized than *Iphiclides*.

(3d Group.)

Pachlioptera aristolochiæ.

The shape and neuration of primaries agree exactly with *Eurycus*, except that the cubital cross-vein, while narrowing inferiorly, appears to reach vein vii, forcing the submedian fold down to the vein. On secondaries the humeral cell is smaller and vein iv_3 terminates in a spatulate tail. Veins iv_2 and iv_3 are not so near at

base as in *Eurycus*, than which this form appears more generalized. I do not doubt the validity of the genus.

(4th Group.)

Iphiclides podalirius.

Compared with *Papilio machaon* the veins are more slender and transparent. Veins iv_2 and iv_3 on secondaries are nearer together at base. The internal nervure is straight and the margin fuller on hind wings. On primaries the cubital cross-vein is slighter and does not attain vein vii. The discal cross-vein is downwardly curved on hind wings between iii and iv_1. The humeral cell is larger than in *Papilio*.

By the free first radial branch this genus agrees with *Papilio* and the other genera of the group. Otherwise it is more nearly connected with *Pathysa antiphates*, and its generic distinction as compared with *Papilio* is beyond question. The straight internal vein of secondaries is a character of generalization as compared with *Papilio*.

Jasoniades turnus.

Agrees very closely with *Papilio*. The humeral cell is larger, the tail shorter and a little spatulate. The internal vein is curved, as in *Papilio*, with which it so closely corresponds as to make the propriety of its generic separation doubtful. The two forms appear to belong to the same immediate phylogenetic line.

Euphœades troilus.

The tail is a little shorter and spatulate; otherwise this form agrees so exactly with *Jasoniades* that I find no distinguishing character whatever. Belongs to the same branch and group.

Heraclides thoas.

The tail is a little longer than in *Jasoniades* and spatulate. Vein iv_2 on secondaries is a little farther from iv_3, so that *Heraclides* is more generalized. Otherwise I find no differences whatever. From *Euphœades* I find only the slightly longer tail to distinguish it.

The separation of the preceding forms, except *Iphiclides*, from each other and from *Papilio* seems difficult from the neuration. All have the internal vein of secondaries curved and are evidently very nearly related, belonging to the same phyletic branch of the family.

Laertias philenor.

Agrees with *Papilio* and preceding genera, except that the internal vein of secondaries is straighter and the margin fuller. I think this feature important. The tail is shorter and hardly spatulate. While otherwise resembling *Jasoniades*, the relative position of iv_2 is a little more removed from iv_3 at base. Appears a slightly more generalized type than any of the foregoing, and to represent a stage from which it is probable the preceding (except *Iphiclides*) have emerged.

Menalaides polytes.

Differs from *Laertias* only in that the tail is shorter and broader, somewhat spatulate.

Achillides paris.

Agrees with *Laertias* and *Menalaides*, except that the humeral cell narrows a little more outwardly. The tail is a little longer than in *Menalaides*, from which I cannot otherwise satisfactorily separate it. These three "genera" appear to be related by the straighter vein vii of secondaries.

Orpheides demoleus.

Appears nearest related to *Jasoniades*. It only differs by the absence of a tail, and in that the præcostal spur is continued, in an even curve, quite to the shoulder of the wing. The internal vein of hind wings is bent as in *Jasoniades* and allies, with which it should be apparently associated.

Nestorides gambrisius.

Not distinguishable structurally from *Orpheides demoleus*. The præcostal spur is equally continuous, and, although the proportions of the humeral cell are very slightly different, I am of opinion that no sufficient generic characters can be supplied by the neuration.

Calaides androgeus.

Agrees well with the preceding, but differs by the median and cubital branches of the hind wings forming sharp projections, of which that to iv_3 is, as usual, the longest. On primaries vein iii_3 yields very slightly to the tendency to be outwardly removed, and arises beyond the exact point of junction of cross-vein.

The following three generic types stand rather apart and by themselves. There is, except the straighter anal vein, nothing in

the neuration to contradict main features in the definition of *Papilio*. They appear, on the whole, to be somewhat generalized forms, from the usually straight internal vein of hind wings.

Priamides pompeius.

Primaries rounded at tips; outer margin even, medially hollowed out, so that the wing may be described as subfalcate. Cubital cross-vein continuous to vii. Secondaries with præcostal spur continued to the margin, humeral cell moderate, internal vein somewhat bent, no tail, outer margin regularly scalloped.

Ithobalus polydamus.

Agrees with *Priamides* in shape of primaries, outer margin a little scalloped. Secondaries with internal vein straight, outer margin as in *Priamides*. Præcostal vein shorter, not reaching margin.

Parides echelus.

Primaries pointed, with sharp tips; external margin even, nearly straight. Hind wings with the outer margin produced between iv_2 and v_2, scalloped, without prominent tail. Internal vein straight, or even a little bulging. Vein iii_3 arises a little beyond cross-vein, and herein is this form specialized.

The following type seems related to those immediately preceding:

Iliades memnon.

The fore wings are intermediate in shape between *Priamedes* and *Parides;* the apices are blunt, while the outer margin is nearly straight. The tailless hind wings have the outer margin very slightly scalloped. The venation generally agrees; the internal vein of secondaries is straight.

I have been unable to obtain material of the butterfly "*Troides helena* L.," which Scudder gives as the type of Hübner's genus *Troides*, Verz. 88, a generic name which has then apparently been wrongly used for the type *Ornithoptera priamus* L. Specimens of "*Papilio helenus*," received from Dr. Staudinger and examined by me, do not differ from *Menelaides polytes* in venation; the "tail" is merely a little longer.

The last type I have been able to examine is:

Troilides torquatus.

The neuration agrees in every detail with that of *Heraclides*

thoas, so that I cannot distinguish the two in any way, and I must suppose this generic title to be invalid.

In all these generic types of the *Papilio* group the third radial branch arises just opposite the point of junction of the discal cross-vein, with a tendency to remove beyond it. The progress of this branch along the radius, outwardly, may be apparently taken as an index of the specialization. In the Papilionides there is a general correspondence between the movement of this vein and the specializations of the abdominal field of the secondaries. The bending of the internal vein of hind wings is secondary in its nature, has been probably attained along divergent lines, and is a separate and well-marked feature in the specializations of the wings of the Papilionides.

The question as to the value of generic characters becomes simplified when we reflect that there is no criterion, save that of quantity, by which we can divide them from specific characters. For practical purposes it is well to break up such extensive genera as *Papilio*, and to do so we must take slighter variations as the basis of the division. It may be remembered that none of our categories could apparently exist except for "missing links," and our species thus appear as the momentary results of an average of arrested development, with wider or narrower breaks between them. This is one of the irrelevant generalities which it is well to bear in mind, in order to avoid insisting too categorically upon the absolute value of our divisions and terms.

The generic types above discussed appear to group as follows:

Iphiclides.	Papilio.	Lærtias.	Priamides.
	Jasoniades.	Menalaides.	Ithobalus.
	Euphœades.	Achillides.	Parides.
	Calaides.		Iliades.
	Heraclides.		
	= *Troilides*.		
	Orpheides.		
	Nestorides.		

Systematic Position of the Papilionides.

The argument as to the rank and position in the system of the Papilionides may be recapitulated here: All the generic types in the Parnassi-Papilionidæ that I have been able to examine have

vein "ix" of primaries well developed. This vein arises at base next to vii, runs outwardly and downwardly, in a more or less strongly given curve, to internal margin. I am inclined to regard this vein "ix" as the remnant of a longitudinal vein which has become shortened, in the same way as vii becomes shortened and bent on the hind wings of the Papilionides, and of which latter the stages between the long, straight vein and the shorter curved vein are extant. This vein "ix" is opposed in position to vein viii of the Hesperiades, which appears as a slender fork to vein vii at base and is more or less distinct in the Pieridæ, Limnadidæ, Heliconiidæ, Libytheidæ, Nemeobiidæ, Riodinidæ, Lycænidæ and Hesperiadæ. I have found traces of it in *Argynnis* and *Vanessa* among the Nymphalidæ proper, but no indication of it in the Agapetidæ. Where it is wanting in otherwise related forms I adopt the view that it has faded out. It has faded out, then, in *Morpho*, while the cubital cross-vein is persistent.

While vein "ix" appears to be a character of a primary nature, the hind wings of the Papilionides display two other features, which, since they recur in other butterflies or moths, may be considered as characters of convergence. These are the humeral cell and the single internal vein. The three neurational features of the Papilionides together are wanting in all other butterflies, but the single internal vein appears again in the Saturniades, the humeral cell in the Limnadidæ and Bombycides, while nowhere throughout the higher Lepidoptera, so far as I yet know, is the primary character of vein "ix" repeated. The ancestry of the Papilionides is not yet made out by the discovery of surviving forms.

It is impossible to leave the Papilionides in a classificatory position between the Blues and the Skippers, because such a position violates the integrity of the Lycænid-Hesperian branch. The diurnals, as a whole, are susceptible of a tripartite division upon the neurational characteristics. These three divisions are, severally: the Parnassi-Papilionidæ, the Pieri-Nymphalidæ, and the Lycæni-Hesperiadæ. The first of these is isolated by the presence of vein "ix," the last two have a common bond in the presence of vein viii of the fore wings. Therefore the value of the divisions is unequal, and the first outweighs either of the two latter. If the Hesperiades are, then, to be forced at any point to admit the Papilionides, that point might be selected between the Pieri-Nymphalid and Lycæni-Hesperid groups. But the principal

defense for such an interpolation would be the common survival of the cubital cross-vein, which the Parnassians have lost. This is distinct in the Papilionidæ, and more or less so in the Nymphalid group, in the Limnadidæ, Heliconiidæ and Morphidæ, these latter appearing to be otherwise specialized Satyrids. Thus this survival is shown in groups primarily differing in the presence of "ix" or viii on fore wings. I conclude, then, it is here an independent survival in unrelated groups. Nothing can show more clearly the overstress that has been laid upon the generalized features of the Papilionid wing than the demonstration that this residual character is shared also by the brush-footed butterflies, with which Mr. Scudder would head the sequence of the diurnals. There appears to be nothing in the neuration to contradict the monophyllism of the brush-footed butterflies, unless we are prepared to assume that the Agapetidæ and Morphidæ have parted with vein "ix" and not with viii.

The forked anal vein (viii) of primaries is absent in the Satyrids, and this feature seems, outside of the sexual character of the swollen veins (traces of which I meet in certain of the Nymphalidæ proper) and the generalized radius, to distinguish these from the Pierids. But the character is repeated in other groups of the brush-footed butterflies, and it seems impossible to find positive neurational characters upon which the Pieri-Nymphalidæ might be divided. And only the general pattern or plan of the veining—*i. e.*, the more parallel neuration and equal spacing, the retention of the middle median branch in position, an indisposition in the veins to approach and furcate—distinguishes the wings of the Lycæni-Hesperiadæ from those of the Pieri-Nymphalidæ. The Blues show a radial specialization on a wing which is fundamentally Hesperian. This points to the fact that the Lycænidæ and Hesperiadæ are members of a common phylogenetic branch, however remote the point of divergence may lie. I assume that this branch joins the main stem of the Pieri-Nymphalid butterflies, because in the Charaxinæ I find an approach to the separated longitudinal veins of the Hesperiadæ, while vein viii of fore wings of the Whites and brush-footed butterflies is repeated in the Lycæni-Hesperid group. Whether future studies in ontogeny render a presumed connection of the Papilionides with the Nymphalids entertainable or not, we are equally warranted, from the opposed directions of the last anal vein of primaries, in classifying the diurnals as either Papilionides or Hesperiades.

I conclude, then, that no sufficient reason can be shown for interrupting the sequence of what has been called the Macrolepidoptera, which all alike possess vein viii, and that for a group of butterflies having, on the contrary, vein "ix," the proper place in the system is by themselves at the commencement of the series. It must be recollected that our phylogenies are largely suppositional, and that, practically, whatever their origin, the diurnals should be kept together in collections and catalogues. No gain in scientific accuracy is attained in discarding the general lines of the Fabrician sequence of 1787. The correspondences of the Papilionides do not lie with the Hesperiadæ, as urged by Mr. Scudder, but with the Pieri-Nymphalidæ: the suspension of the chrysalis with the Pierids, the neurational analogies with the Nymphalids. If these are acknowledged as affinities, not as analogies, then there is also no sufficient reason for changing what is practically the best sequence and which has the advantage of being long accepted. It is an innovation to place the Papilionides between the Blues and the Skippers, and one which I show to be destitute of reason, from the neuration as well as from a weighing of the value of other features which appear on the surface to justify such a conclusion (see my papers in *Natural Science* for January and February, '98). It must, then, appear to me that no greater mistake has as yet been made in classifying the butterflies than that which associates the Swallowtails with the Skippers. And this is the main part of my argument, that whatever relationship may be made out for the Papilionides with the other butterflies, the connection of the Blues and the Skippers should not be disturbed by the Swallowtails being thrust in between them.

An unwarranted use of the terms "superficial" and "structural" has been repeatedly made in lepidopterological writings, sometimes for the mere purpose of invidious comparison. The assumed antithesis, as between classes of external characters, is entirely illusory. Uncritical studies of the shape of the genital pieces, as of any other of the appendages, lead to common and unsatisfactory results. I conclude that a phylogenetic classification cannot be reached until primary and secondary features are distinguished and the characters indicating relationship separated from those of convergence.

The neurational characters of convergence which appear in certain Papilionides, and again in groups of the Nymphalids, may

be summed up as follows: The first radial branch may intersect with subcosta (*Idaides* and *Anæa*); the cubital cross-vein or its traces occurs in both series (in the Nymphalids in *Limnas, Heliconius, Morpho*), while traces of the humeral cell of secondaries of the Papilionides are found in the Limnadidæ and Heliconiidæ. It is remarkable that just in these two latter families the resemblance is contradicted by the fact that both display the forked vein viii, in contradistinction to the downwardly curved vein "ix" of the Papilionides. It is this fact that allows me to consider the characters of resemblance as residual and common to the lepidopterous wing, and as undecisive of questions of a nearer relationship. These characters, the traces of the cubital cross-vein, etc., allow of the view that the Limnadidæ and Heliconiidæ retain primitive features and may more nearly represent early stages of the Nymphalids proper. Genera like *Dione* may supply a connection between the Heliconians and *Argynninæ* and render the view probable that the brush-footed butterflies are monophyletic.

Variability in the Veining.

I have shown (*Trans. Ent. Soc. Lond.* 1897, 342) that the variations in the neuration within the limits of a species take the same direction with those used to define distinct species or genera. In other words, they follow the chief directions which underlie most changes in the neuration. These latter lie in the breaking up of the median series and the suppression of the radial branches. For instance, in the five-branched forms of the Anthocharini there will be found a tendency to discard one vein in the direction of the four-branched forms of *Tetracharis*. In a variable species standing between *Euchlœ* and *Tetracharis* the disappearing vein may be discarded by anticipation (specialization) or retained by reversion (generalization). In *Pontia* we have the three-branched form definitely assumed, and we may consider that the ancestry of *P. daplidice* has passed through the *Euchlœ* and *Tetracharis* stages. In the same way the passage of *Mancipium* to a three-branched form is in process of accomplishment; sufficient material has not yet been examined of *brassicæ* to determine whether the short apical veinlet is discarded or not in the majority of individuals. In the *Zerynthianæ* we find individual variation in the direction of the breaking up of the median series; sometimes vein iv_1 ascends the radius; again, in generalized individuals, it retains its older position

on the cross-vein. It is a mistaken view to consider these variations "abnormal." They have a definite end and object, and show us how the changes in the venation have been slowly attained. All the species we take cognizance of are seemingly in a certain stage of progression, which temporarily assumes an apparent greater or lesser stability as the insect and its environment are equalized. In *Crinopteryx familiella* Spuler considers that we have a now variable form in the final stages of discarding the many-branched radius of the secondaries, thus showing us how the wing of *Eriocephalus* may have passed into that of the aculeate *Tineidæ*.

Conclusion.

I have taken the present opportunity to review my publications upon the neuration of the diurnals, to compare the figures again with the photographs and preparations. After supplying the missing details in the figures of *Parnassius apollo* (in which the lower incomplete margin of the humeral cell was omitted) and of *Heliconius antiochus* (in which the traces of the cubital cross-vein and internal vein were left out), I find nothing to add or alter. The method employed by me prevents errors of commission, but, owing to defects in the preparations, overlooked at the time, it has happened that the above details were not reproduced on the stone.

My studies were entered upon with the view of bringing our classifications into a nearer correspondence with a probable phylogeny. It was unexpected that the result was to confirm the general sequence of Linné and Fabricius, no less than that of the modern authors, Wallace, W. H. Edwards, the Catalogue of Staudinger, at least so far that we may commence with the Papilionides. Since the Parnassians belong beyond question to this stem, and are more specialized than the Swallowtails proper, we should begin with this family. I may reply to comparisons that have been made, that no results obtained in this way, as between ultimate specializations of the same organ in different groups of butterflies, can affect the phylogeny brought out by me. For this latter rests on the primary character offered by vein "ix," and not upon coincidences in ultimate structure, which are not exclusive, and may well have been independently reproduced upon separate phylogenetic lines. These are characters of convergence, and are not properly used as an index to relationship.

A review of the general neuration shows that the hesperid wing

is the simplest existent form with the veins all separate. A movement in specialization of the radial branches, normal with the lepidoptera, changes this wing into that of the lycænids. Both are now specialized and hardened types, and the position of the median branches has become so fixed that, in their specialization, the middle branch will not yield and submits to extirpation *in situ*. The condition of the hesperid wing is nearly reproduced in *Charaxes*, and proves that this was the original condition also of the Pieri-Nymphalid branch. It has been abandoned in specialization through the process of absorption and furcation of the veins; thus the hesperid type of wing becomes the unit underlying all the wing types of the Hesperiades. Into this group, so closed, and having the internal vein (vii) forked at base (viii), we can nowhere properly interpolate a group possessing an additional vein ("ix") and having no fork (viii) to the internal vein (vii), although, as a matter of theory, we may contend that the papilionid wing had also primarily separated veins.

I conceive, then, the Hesperiades to be monophyletic, a development of a single branch or stem of the lepidopterous tree, and as being independent of the Papilionidæ and their ancestry. As compared to the Papilionides, the rest of the butterflies are in the position of the Noctuid branch when compared with the Saturniades. This parallel is not a little exact. The development in evolutionary changes of the Papilionid wing is closely copied by the Saturniadæ, which have but one anal vein on hind wings. We have the same hollowing out of the inner margin in both groups among specialized forms. The Hesperiades resemble generalized moths in having two or more internal veins, and although these are convergent characters, not of phyletic value, they sustain the parallel. The exclusiveness of the Papilionides is supported by vein "ix" of primaries. When we take into account their total wing-structure, the idea that we have to do with a radically different development of the lepidopterous type becomes more and more reasonable. I separate, therefore, not the Hesperiadæ, but the Papilionides from the rest of the butterflies, and herein I differ from other authors, no less than from Comstock.

The general inequalities of all the specializations preclude, to a great extent, the question of rank, which practically becomes a matter of more limited importance within the confines of a single group. And I may repeat here, that the specializations of the

larvæ are neither homologous nor dependent upon the specializations of the imago. The external influences by which the different stages are surrounded are radically diverse. It is demonstrable that in *Apatela* the larvæ are more specialized, as larvæ, than are the moths, as moths. These latter are simple Agrotids, or Hadenids. The larvæ rank with the Arctians in specialization. Generic differences between imagos are not necessarily shown *also*, but may be displayed independently in the earlier stages of the insect. A specialized chrysalis may be attained by a form which, in the imago state, lags behind its fellows. I ventured first to give this view of the independence in specialization of the stages as early as 1876. Mr. Butler's paper on *Apatela* remains, at least, an exquisite satire on a generic classification from larval characters alone.

However, I seem to differ from Mr. Scudder (*Hist. Sketch*, 103), who holds that generic distinctions are as easily traced in the larva as in the imago, thus assuming a parity in specialization. Nevertheless, in the case of the forms of *Agrotis* Led., we may have moths which offer characters upon which generic distinctions have been founded, while the larvæ are so much alike that no such characters appear with them. And again we find species of *Apatela*, feebly differentiated in the imago state, proceeding from strongly diverging larvæ. The whole group of Acronyctid genera is held together by specializations of the larva alone. No intimate characters hold *Panthea* and *Apatela* united as moths, and here it seems possible that the larval specializations common to both are non-phyletic, convergent, they have been acquired along different routes, and thus the basis of the family Apatelidæ would be artificial. Where no such contradiction is offered the development may be assumed as monophyletic, the classification as natural. This view does not militate against the validity of Dyar's general classification as based on the larval tubercles in position. This character, as pointed out by me in '97, is valuable from its indifference to external influences.

In the case of the Papilionides there appears to be the alternative that either vein "ix" has developed subsequently to the disappearance of viii or before its appearance. If we accept the latter, then the Papilionides have branched off, as Prof. Comstock says, long before butterflies assumed their present form (*Evolution and Taxonomy*, 112). In this case all traces of an immediate ancestry

have, however, vanished. No concession to this fact is made by placing the Papilionides, as Prof. Comstock does, between the Blues and Skippers, clearly, even if distantly, related groups, offering at least no such contradictory characters as do the Swallowtails. Prof. Comstock in his able treatise, to which I am much indebted, does not entertain the view that the Papilionides may *not* have branched off from the immediate stem of the other butterflies, nor does he apparently insist upon the morphological value of vein "ix."

The diphylism of the diurnals is founded by me on the following characters:

A. Butterflies having a short anal vein on primaries, running from base to internal margin; on secondaries only one internal vein.....PAPILIONIDES.

B. Butterflies wanting the anal vein on primaries, instead vein vii is forked at base (viii), this fork sometimes wanting through degeneration, and having more than one internal vein on secondaries.....HESPERIADES.

All the Hesperiades examined by me have two internal veins to the hind wings, except *Pseudopontia*, which has three. This peculiar butterfly has the radius strongly specialized, and the retention of the third internal vein may have been necessitated by the circular shape of the wings. Theoretically it may be considered that all the diurnals possessed primitively three internal veins, in addition to the fold (vi), of which the Hesperiades, with the exception above noted, have parted with one, the Papilionides with two veins. In this particular the latter group are more specialized than all the other butterflies. The Saturniadæ, among the higher moths, have reached the same grade of specialization in this particular with the Papilionides. A diminution in the number of internal veins characterizes also certain of the more specialized groups of the Bombycides. The monotypic character of the Papilionides is evinced by the possession of vein "ix" of primaries, in which they appear to differ from all other butterflies, not by the number of internal veins, or by any other characters which they can be shown to share with other lepidoptera. Throughout my writings I have tried to show the direction of the evolution taken by the neuration, and I have accounted for the principal changes in position of the veins by their following these directions in spe-

cialization. The branches do not move backwards and forwards, but always tend to remove outwardly. None of these movements affect vein "ix." This remains stationary in the Papilionides, undisturbed by the changes in the radial branches, or of those marking the breaking up of the "median" system of the wing, as designated by Comstock.

For it does not affect the conclusions I have reached whether Comstock's nomenclature be ultimately adopted or not, while I favor its adoption. Whether the costal thickening be homologous with the veins, whether what I have called vein ii should not be rather called after Haase and Spuler vein i, or even whether Comstock's "radius" should be called the subcostal—and the "media," the radius—all these are questions of names and homologies with which my results are not primarily concerned. Whatever names are adopted, I believe to have shown that specializations are evidenced by the absorption of the veins, by the reduction of the radial (Comstock) branches and their progression along the main vein, by the opening of the discal cell and the fusion of the branches of the media (Comstock) with the radial or cubital systems of the wing. And whether we call the last, downwardly curved vein of the primaries of the Papilionides "anal," "internal," or "submedian," or number it, does in no way affect the argument, deducible from its presence, that the group possessing it occupies an exclusive position. I have further relieved the Papilionides from the vague charge of generalization, by showing that their residual characters are shared by the brush-footed butterflies, and that in the presence of but one internal vein to the secondaries they possess a character of specialization raising them above all the rest. Not the Swallowtails, but the Blues, are, from the neuration, the allies of the Skippers, and, having thus endeavored to divorce the Papilionides from their enforced association with the Hesperiadæ, I conclude that their fittest place is "at the head" of our linear systems and collections.

Finally (*Natural Science*, Feb., '98) I have ventured to suggest that certain changes in color run, in a general way, parallel with the specializations of the neuration. The white pigment colors appear to mark advanced forms. This is illustrated, in the Papilionides, by the fact that the Parnassiidæ, as a whole more specialized than the Papilionidæ, are also paler, more white in general hue. The most generalized group of the latter, *Ornithoptera*, contains species of the darkest, most intense coloration.

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Corrigenda.

To paper on the *Specializations of the Lepidopterous Wing: the Pieri-Nymphalidæ*, in these Proceedings, Vol. xxxvii, No. 157.

Page 23, line 6 from foot of page, *for* "Ager" *read* "Ageronians."

Page 24, line 25, *dele* the sentence commencing, "No trace of vein viii," etc.

Page 30, line 12 from foot of page, *insert* the words "a strong" before the words "vein viii of primaries."

Page 41, line 10 from foot of page, *for* "is" *read* "has."

Page 42, in the explanation of Plate I, Fig. 3 should refer to *Euchlœ cardamines*, Fig. 4 to *Anthocharis ausonides*. The numbers 3 and 4 are transposed on the plate.

Explanation of Plate III.

The figures are obtained by an improved photographic process. The veins are numbered according to the system Redtenbacher-Comstock: iii = radius, iv = media, v = cubitus. Vein "ix" of primaries, a principal character of the Papilionides, is numbered in red. The figures are of the natural size.

Fig. 1. *Parnassius apollo.*—Type of genus and family. The specialized form of the Papilionides, as shown by the following characters: On fore wings the first median branch (iv_1) has left cross-vein and arises from radius; the radius itself is four, instead of being five-branched; the cubital cross-vein has disappeared; on hind wings the lower margin of humeral cell has faded out superiorly, the internal margin is hollowed out, and vein vii is greatly shortened. *Doritis mnemosyne* does not differ generically from this type. *Hypermnestra helios* agrees by the four-branched, specialized radius, and I limit the subfamily to these two genera, since here the demarcation is abrupt, not, as in the Pierinæ, undefined.

Fig. 2. *Archon apollinus.*—Type of genus and belonging to the subfamily Zerynthianæ, of which it is the specialized form. Radius five-branched, generalized. The first median branch springs from cross-vein; lower margin of humeral cell complete; vein vii longer, as compared with *Parnassius*. The ornamental bands have not been broken up into the spots of *Parnassius*. The white color of the Parnassians and Pierids has been developed independently and is here a general character of convergence. *Archon* is seen to be a generalized form when compared with *Parnassius*.

Fig. 3. *Zerynthia polyxena.*—Type of genus and subfamily. Radius five-branched. In this species and its varieties vein iv_1, the first median branch, is in a fluid state, sometimes issuing from cross-vein, sometimes ascending radius. Compare figure of *Zerynthia rumina*, Schm. von Hildesheim, Taf. i, Fig. 2. Vein vii of hind wings is but little shortened.

Fig. 4. *Luehdorfia puziloi.*—Type of genus. Agrees well with *Zerynthia*. In both this and *Armandia* the cubitus shows a very inconspicuous scar, a relic of the vanished cubital cross-vein. The gradual disappearance of this cross-vein, from the Papilionidæ to the Parnassiidæ, demonstrates the greater specialization of the latter. Compare text.

Fig. 5. *Armandia thaitina.*—Belongs to Zerynthianæ. Type of genus. Radius five-branched; iv_1 from upper corner of cell. A beautiful and interesting form, owing to the papilionid shape of wings.

Fig. 6. *Sericinus telamon* ♀.—Type of genus. Radius five-branched. First median branch (iv_1) from cross-vein, and herein more generalized than *Armandia*. Vein vii of hind wings hardly shortened. Compare these Parnassian types with the ensuing Papilionidæ. Note the equal presence of vein "ix" of primary wings and the survival of but one anal vein (vii) on hind wings, and that the two types mainly differ in the breaking up of the median system in the Parnassians. It seems probable that, in extinct types of Papilionides, the vein "ix" was lengthened and sought the anal angle of the primary wing.

Explanation of Plate IV.

The figures are obtained by an improved photographic process. The veins are numbered according to the system Redtenbacher-Comstock: iii = radius, iv = media, v = cubitus. Vein "ix" of primaries, the principal character of the Papilionides, is numbered in red. The figures are of the natural size.

Fig. 7. *Teinopalpus imperialis* ♂.—Type of genus and family. The neuration is specialized, as compared with the Papilionidæ. The cubital cross vein is represented only by a residual mark. An intermediate type, with the breaking up of media on primaries taking the Parnassian direction, but an isolated offshoot from the Papilionid stem.

Fig. 8. *Leptocircus curius*.—Type of genus. A specialized form of Papilionidæ with the hind wing inferiorly enormously developed and the cell reduced.

Fig. 9. *Pathysa antiphates*.—Type of genus. On hind wing the discocellular cross-vein is downwardly bent between ii and iii. *Iphiclides* agrees with this type, except that the first radial branch is free. In *Pathysa* the first radial branch fuses with subcosta. Eimer, in his work, does not regard the neurational features of *Pathysa*.

Fig. 10. *Zetides sarpedon*.—Type of genus. Agrees in certain structural neurational points with *Pathysa*, differing by the inferior development and absence of "tails" and by the shorter anal vein of hind wings. This group is specialized by the inferior discontinuance of cubital cross-vein.

Fig. 11. *Arisbe similis*.—Type of genus. Agrees with *Zetides* in structural points, differing by the rounded hind wings. Compare text.

Fig. 12. *Eurycus cressida*.—Type of genus. Specialization is shown by the shortening of vein vii of hind wings and by the inferior degeneration of cubital cross-vein. *Eurycus* and *Pachlioptera* are interesting from the way they reproduce, upon a different type of wing, the specialization of the abdominal margin of the secondaries of *Parnassius*, a character of convergence, by which the margin becomes inwardly curved and the internal vein shortened. This direction crops out, among otherwise distinct forms, throughout the Papilionides. Again, as a character of convergence we meet it in the Saturniades (Grote, *Beitrag zur Class. aer Schm.*, S. 198, Fig. 1, *Callosamia*; S. 204, Fig. 9, *Rothschildia*; S. 206, Fig. 11, *Samia*).

Explanation of Plate V.

The figures are obtained by an improved photographic process. The veins are numbered according to the system Redtenbacher-Comstock: iii = radius, iv = media, v = cubitus. Vein "ix" of primaries, the principal character of the Papilionides, is numbered in red. The figures are of natural size, except Fig. 15, which is reduced one-half.

Fig. 13. *Iphiclides podalirius.*—Type of genus, to be compared with figure of *Pathysa antiphates.* Cubital cross-vein degenerates inferiorly. Between ii and iii of hind wings the discocellular is downwardly bent, as in the *Idaides* group. Radial branches free to costa, a character which brings this genus into the typical group of *Papilio*, with vein iii_3, the third radial branch, opposite cross-vein. Thus the genus is partly intermediate and appears, on the whole, nearer allied to *Idaides*, or rather to *Pathysa*, than to *Papilio.*

Fig. 14. *Priamides pompeius.*—Type of genus and belonging to typical group of *Papilio.* Compare text. [*Drurya antimachus*, mimetic of *Acræa*, not examined; probably belongs to the *Papilio* group as a specialized form.]

Fig. 15. *Ornithoptera priamus* ♂.—Type of genus. Note position of the third radial branch, which is thrown off before cross-vein. The furcation of iii_4 and iii_5 is long, so that the primitive condition which I assume, in which the longitudinal veins were all separate, is nearly attained. The total evidence is that *Ornithoptera* retains characters of the primitive form of the Papilionides. Compare wing with that of *Charaxes*, Schm. Hild., Taf. iii, Fig. 17, and Stein d. Weis., x, 282.

Fig. 16. *Heliconius antiochus.*—Type of genus and family. Belongs to the Hesperiades. Reproduced here to correct omissions in former figure; consult text. A more generalized form than the succeeding. Vein viii of fore wings partially degenerate; compare with figures of *Limnas* and *Libythea* in this respect, Proc. Am. Phil. Soc., xxxvii, Pl. iii.

Fig. 17. *Dione iuno.*—Generic type. Vein viii of primaries lost, but traces of cubital cross-vein retained. Belongs apparently to the Nymphalidæ. Consult figure of type in Proc. Am. Phil. Soc., xxxvii, Pl. ii. The open cell and condition of cross-vein on secondaries evidence the grade of specialization. Note that these figures of Hesperiades have two anal veins on hind wings, in contrast with the single vein of the Papilionides.

Fig. 18. *Tragonoptera brookeana.*—Section of ♂ primary wing, showing point of origin of third radial branch just before cross-vein. The position of *Papilio* has not been quite attained, while that of *Ornithoptera* has been abandoned.

CHAIRMAN'S ANNUAL DISCOURSE FOR 1899, ON THE TRANSMISSION OF ENERGY BY ELECTRICITY.

BY COLEMAN SELLERS, E.D., VICE-PRESIDENT.

(*Read February 3, 1899.*)

Gentlemen:—According to the old Rules of Administration and Order of the American Philosophical Society held in Philadelphia for the Promotion of Useful Knowledge, it was specified that some time during each year the President of the Society was expected to "deliver a discourse on some literary or scientific subject, accompanied by such suggestions with regard to the affairs of the Society as he shall judge proper." By the new rules, recently adopted, a date has been fixed for this discourse, with the further proviso that the President be authorized at his option to appoint one of the Vice-Presidents to take his place in carrying out the purpose of the rule. On January 14 of this year I received notice from our respected President that he had appointed me to this duty. I have selected as the subject of my discourse "Electricity as Applied to the Transmission of *Energy*," for a reason to be presently explained.

When the late Dr. William Pepper was elected a Vice-President he made much personal effort to excite an interest among the resident members in a scheme of quarterly meetings to be devoted to subjects of acknowledged importance, at which meetings a paper or papers on a subject selected for discussion should be presented, and a further effort made to insure the presence of, or correspondence from, all members who had given thought to the subject selected. He called on me soon after his election to induce me to prepare a paper on the transmission of *power* by electricity, or if I preferred not to do so, to have me suggest some one capable of carrying out the idea. At that time, about two years ago, he expressed some surprise that I should consider the subject-matter not yet far enough advanced practically for intelligent presentation or discussion. I promised, however, to correspond with my personal friends interested in electrical work to secure, if possible, contributions of importance that would be acceptable under the traditional requisites of matter fitted for our PROCEEDINGS or our *Transactions*. What has been or will be accomplished in this direction remains yet to be seen. Since that time the Society has seen fit to honor with mem-

bership many men of distinction in electrical engineering in its broadest sense. From some of these we may expect contributions.

Inasmuch as the founder of this Society, Dr. Benjamin Franklin, attracted attention as a scientist in the domain of natural philosophy by and through his electrical experiments, I think it advisable to call attention to the limited resources at his command, not only when he announced his belief that electricity and lightning were one and the same thing, but even up to the date of his death. I do so mainly to show the close interdependence between scientific research and the practical application of knowledge to the use of man, and further to show how much of the progress in exact scientific knowledge has been gained from the practical work done in experimental research by those who have not had the technical training or the knowledge of the higher mathematics, whereby they would have been able, to the extent of previously collected data, to formulate conditions leading to results in advance of the experimentation that alone can be depended on to prove the correctness of their deductions. I also desire to show how the growing wants of man have excited research, more particularly when commercial demand calls for the practical application of knowledge to any stated end.

Dr. Franklin was an experimenter. His interest in electricity as one of the then little understood but most interesting branches of natural philosophy was brought about through his ability to generate what he called "electric fire," and to exhibit the effects produced thereby, in conducting the simple experiments possible with the meagre apparatus at his command. It seems that he had received from a friend in London a glass cylinder or rod,[1] with which simple device, held in one hand and excited to produce electricity by being rubbed with a silken cloth, or the fur side of a catskin, he was able to charge Leyden jars or electric condensers, and thus exhibit the more striking effects of static electricity. The electric sparks from the outset may have impressed him as similar to the lightning flash of "thunder-storms."

In the order of chronological sequence, permit me to call attention to our records to connect this Society with his work. We know that Dr. Franklin, on April 5, 1744, eight years before his important electrical discovery, wrote to Mr. Colden explaining his idea of a Society for the Promotion of Useful Knowledge, which

[1] This rod, in its tin case, is in the collection of the Society.

was the beginning of the American Philosophical Society. Some time between 1747 and 1750 Mr. Philip Syng[1] is credited with designing a glass globe electrical machine.[2] One of these electrical machines, in perfect order, said to have been the one Franklin made the most use of, is among the highly prized relics owned by the Franklin Institute in this city. All of us who have used electrical apparatus can appreciate the value of Mr. Syng's invention and the help it afforded to Franklin in his experiments. Franklin was, like Prof. Michael Faraday, an experimenter. Neither of these two great men possessed the mathematical habit of thought that distinguished so many philosophers before and since their time; both based all their knowledge on succcessful experiments.

In 1752 Franklin wrote to his friend in London, Mr. Collinson, expressing his grounds for belief in the identity of electricity and lightning. It matters but little now that this important letter was not deemed worth publishing in the *Transactions* of the Royal Society. Soon after it was received, however, Dr. Fothergill suggested its separate publication. Franklin's discovery thus reached and deeply interested Count de Buffon. It was translated into French, and was read by most learned men of the day. This remarkable and extensive recognition of the discovery induced the Royal Society in 1753, one year later, to make Dr. Franklin a member, without waiting for any formal application in the usual course, and without the payment of any fee or dues as a member. He was also honored the same year with the Copley gold medal for his discovery. Sir Humphrey Davy wrote of Dr. Franklin, in reference to his work, that "a singular facility of induction guided all his researches, and by very simple means he established very great truths. The style and manner of his publications are almost as worthy of admiration as the doctrines they contain. . . . . He has written equally for the uninitiated and for the philosopher."

Franklin's discovery, whether made by means of a kite in Philadelphia or by lightning rods in France, was turned to important use by his suggested protection of buildings from the effects of lightning, from "thunderbolts," or from the so-called electric fire of the clouds.

[1] Mr. Philip S. P. Conner says that Philip Syng in Franklin's time was a goldsmith.

[2] One such globe, mounted on an axle and provided with a driving pulley, was exhibited, belonging to the cabinet of the Society.

This practical application of his discovery, taken in connection with his improvements in fireplaces, his invention, given freely to the world, of the so-called Franklin stove, and other useful inventions, are proofs of his attention to the question of practical and useful results as the outcome of his philosophical studies based on experiments. To more fully understand the limited knowledge possessed in Franklin's day, even up to his departure from life in 1790, it should be borne in mind that not until 1774, when Dr. Joseph Priestley discovered oxygen, was the chemistry of to-day possible. Priestley's discovery took atmospheric air out of the list of simple elements, and was the beginning of the rapid advance in our knowledge of chemistry. Electricity also had no acknowledged connection during Franklin's lifetime with magnetism. Aloisio Galvani had noted an effect of electricity on animals (in fact, what is now known as galvanic action) in 1780, but what is of more importance to bear in mind, in connection with the limited knowledge possessed by physicists in Franklin's time, is the invention of the voltaic pile (which was the beginning of all galvanic batteries since used), was not perfected by Alexander Volta until 1800; therefore, Galvani's and Volta's discoveries had no place in Franklin's studies.

The American Philosophical Society has among its collection some interesting pieces of apparatus of Franklin's time, but, as bearing upon this brief outline of Dr. Franklin's contribution to our knowledge of electricity, a suggestion has been made by Dr. George F. Barker, that the American Philosophical Society shall in the near future examine into the authenticity of all the apparatus held as souvenirs in America by individuals and societies which are claimed to have been used by the founder of this Society. I must also call your attention to the claim that has been made to the effect that to Dr. Franklin and Count Rumford (Benjamin Thompson), both Americans by birth, "we owe the first important step toward a full appreciation of the co-relation of forces and the conservation of energy." The limited acceptance as true of this important fundamental law of nature, based on the assumption that there is only a given amount of energy available in nature for man's use, and that no effort of human intelligence can add to or increase the amount of such energy at our disposal, is shown by the ready credence given even at this late day to the claims of inventors of perpetual-motion machines, or the ready ear lent to charlatans who, by means of verbose pseudo-scientific jargon and fraudulent exhibitions

in support, claim the discovery of some new and heretofore unrecognized power that is to supersede all known forms of energy utilized in the modern means for actuating machinery.

With the first conception of the electric telegraph electricity generated by galvanic batteries was used. The energy of the galvanic battery was transmitted to instruments which produced motion and thus made visible impression upon paper, or later by sound, to convey intelligence through the equivalent of dots and dashes, or by sight noting the vibration of a needle, all of which motions involved the transmission of power, no matter how little might be required for the purpose.

When electricity came to be transmitted for lighting purposes it was not in the form of what was generally accepted as the term power, but it was the transmission of a different form of energy, one only of the many forms that are co-related one to the other. It is in the very last decade of this century that the transmission of power has come to have a meaning of greater importance than was ever dreamed of in Franklin's day, or even when Michael Faraday and others laid the foundation of the mass of valuable knowledge that was ready to be used to advantage when the needs of man called for its practical application.

It is interesting to note that although the actual transmission of power in large amounts by electricity has been carried out chiefly in the last few years, yet what is now being accomplished is the result of knowledge that was obtained quite early in the present century. Faraday's great discoveries began in 1830, and these, with what had been contributed by a host of workers before him, bore fruit before the end of the first half of the nineteenth century.

I will not take up your time with recounting the steps that led up to what forms the substance of our scientific knowledge of electricity, nor to even mention the names of the great men who have contributed to our store of information. With electricity it is very much as in the case of the locomotive, that became an established fact and an important factor in our civilization in 1827, but was anticipated and predicted by those who in a crude way operated steam carriages on common roads before that date; and long before a fairly perfect locomotive was placed upon iron rails the railroad had been demonstrated to be of advantage even with animal traction in mining operations. The iron railroad and the

steam engine on wheels had to be brought together to make a perfect whole.

The beginning of this century saw in our country and by our own people the first great steps taken to make our railroad system of transportation possible through the demonstration of the advantage of using high-pressure steam. This knowledge was necessary even to make the steamboat a commercial success on the inland waters of the United States. On March 2, 1825, at the end of the first quarter of this century, refrigeration by rarefaction of air was being discussed.[1] This fact will be worth remembering when I come to speak briefly of the recent transmissions of energy by other means than electricity. Prof. S. F. B. Morse, as early as 1832, had formed an idea of his electro-magnetic system of electric telegraphing, and in 1835 he constructed his first recording telegraph instrument and used it on short distances, but it was not until 1843 that Congress, after great opposition, voted the sum of $43,000 to construct the line of communication between Washington and Baltimore, which was put in successful operation by 1844, thus giving an illustration of long-distance transmission of power to energize the magnets that gave motion to the instruments required in telegraphy. On December 16, 1848, Prof. Henry, in his second annual report to the Board of Regents of the Smithsonian Institution, proposed that so far as the funds of the Institution would permit, the magnetic telegraph be used in the investigation of atmospheric phenomena, in order that notice of the approach of storms might be given to distant observers. This was just four years after the electric telegraph had been installed.

On March 19, 1853, forty-six years ago, Prof. Henry, in an address at the close of the exhibition of the Metropolitan Mechanics' Institute at Washington, explained the true relation between power and the means at command for transmitting and utilizing power. He pointed out an error in text-books even of that late day, when elementary machines—namely, the lever, the wheel, the axle, the inclined plane, the pulley and the screw, employed separately as instruments for the application of power, or in combination as parts of complex machines—were classed as "mechanical powers," "when every tyro in science," he says, "knows they have no power in themselves; yet, through a wrong name and

[1] See Prof. Jos. Henry's paper on this subject, read before the Albany Institute on the date above mentioned.

a misapplication of the word power, a pernicious error is perpetuated long after the fallacy is understood." He gave a list of what could be classed as the primary powers as used by man. "First, water power; second, wind power; third, tide power; fourth, the power of combustion; fifth, the power of vital action," remarking that "the power of volcanoes and the internal heat of the earth were as yet unused powers." Beyond these few, he says, "science gives no indication of any other." He did not mention the direct heat of the sun as a source of power. He, however, remarked that "Gravitation, electricity, galvanism, magnetism and chemical affinity can never be employed as original sources of power; they are at the surface of the earth forces of equilibrium, the normal condition of which must be disturbed before they can manifest power, and then the work they can do is only (approximately) equal to the power which was communicated to them in disturbing their state of rest."

Electricity is not, he said, in itself a source of power, yet, what is very important from his point of view, "electricity, from its extreme mobility and high elasticity, affords the means of transmitting power with scarcely any loss and almost inconceivable velocity to the greatest distance; a wave of disturbance starting from the impulse given at the battery will traverse the circumference of the earth in less time than I have been occupying in stating the fact." This is interesting, but we are yet far from realizing the consummation of this idea. When Prof. Henry uttered these words the electric telegraph had become a public necessity, energy had been transmitted over great distances and people had ceased to wonder.

"The telegraph," he said, "could not possibly have been invented, the most ingenious synthetical mind could not have contrived the electro-magnetic telegraph, until Galvani and Oersted had made their discoveries." The transmission of power by electricity, however, has been possible, in varying degrees of efficiency, almost since 1832, and yet two years ago, as I said before, I felt that in its highest degree of efficiency I had not the right to say it could be presented, in a satisfactory way, to the American Philosophical Society in a manner worthy of its founder, who of all men of his day thought chiefly of the practical side of such a subject.

When Prof. Joseph Henry spoke of the possibility of transmitting

an electric impulse around the globe, it was the impulse from a *galvanic battery*. No dynamo had been used in place of a battery, although instruments had been constructed to demonstrate the fact that the dynamo could be used. The electro-magnet was well understood, the electric impulse had been made to give motion to machines from electro-magnets and from permanent magnets, and the relation of the various forms of energy, represented by light, heat, magnetism, etc., were each and all known to be what has since been termed "modes of motion."

In the year 1876, marking a century in the age of our Republic, there was given to the world, through the grand Centennial Exhibition in Philadelphia, an object-lesson in the state of the arts and the advance of knowledge. The buildings in Fairmount Park, however, were not lighted by electricity, although the arc light, with clockwork to keep the carbons in proper relation to each other, was used for experimental purposes long before. As to the use of the arc light, on the 8th of December, 1858, the high light at South Foreland was illuminated by an electric current generated by one of Holmes' magneto-electric machines. In 1863 the electric light was applied to the lighthouse at La Hève, France. The chemical action of electricity was known when Carlyle and Nicholson discovered in the year 1800 that water could, by means of electricity, be resolved into its two component gases, oxygen and hydrogen, by means of the voltaic pile. Sir Humphrey Davy by the same means, seven years later, proved true Lavoissier's suspicion that the alkalies potash and sodium were not simple bodies, but compound, by the discovery of five new metals by electrolysis, viz., potassium, sodium, barium, strontian and calcium. I shall refer to one of these metals when I come to speak of the transmission of energy from one common source of power in a condition ready for use, either for turning the wheels of factories, for heating, lighting or repeating Sir Humphrey Davy's process in the production of sodium from an alkali, not as a laboratory experiment, but on a commercial scale at the rate of many tons per day.

In tracing the progress of knowledge bearing upon the transmission of energy by electricity, the United States Patent Office records furnish much information of a historical character useful for determining the chronological sequence of invention, and no more interesting chapter in the history could be obtained than that on the application of the modern dynamo by telegraph companies to

supersede the galvanic batteries that for so many years supplied the electricity needed for their purpose.

There are to be found a number of patents relating to the regulation of the electro-motive force from the dynamo to equalize the pressure on lines of different lengths and different resistances. It was not, however, until lighting by electricity became a necessity in the most recent times that the great demand for electric machinery for lighting purposes, which so alarmed the gas companies, and threatened for a while even to destroy the value of the capital invested in this great branch of industry, namely, illumination by gas, became a commercial necessity. It was then that mechanical engineering talent of a high order was added to the electrical knowledge of the time to increase the efficiency of direct-current dynamos for lighting and for furnishing power in small amounts. Large establishments sprang up in Europe and in America for the manufacture of electrical machinery on an extensive scale, finally leading to the foundation of the present great corporations, whose stock is quoted among the "Industrials" listed on the Stock Exchanges of the country. Ten years ago, in 1889, these companies were doing a thriving business; yet at that time there had been little accomplished in the direction of the actual transmission of *power* by electricity, in contradistinction to the transmission of energy for lighting purposes.

I have preferred to entitle my discourse "The Transmission of Energy" rather than of "power," because the latter term serves rather to suggest kinetic energy, or the energy of matter in motion, while electricity permits the transmission of many sorts of energy. The turbine wheels at Niagara, nominally of 5000 horse power, generate kinetic energy from the water put in motion by gravity. The dynamo driven by the turbine delivers 5000 electric horse power; so efficiently is the change from kinetic to electric energy effected in this case by the dynamo that all the electric and magnetic losses in that part of the machinery amount to less than two and one-half per cent., apart from the losses due mechanical friction and windage, which are light as compared to what has been done by smaller units of power.

In the autumn of 1889 I was asked to submit a report on the transmission of power by electricity by gentlemen who had become interested in what was then known as the Evershed scheme of utilization of power of Niagara Falls, on land above the head of the

American Rapids, and above the entrance to the canal that was constructed more than forty years before to carry water from the Niagara river to factories located on the edge of the cliff, where the fall obtainable for turbines was as much as two hundred feet, though only from ninety to perhaps one hundred and twenty feet fall had been used to drive turbines. Mr. Thomas Evershed, when Chief Engineer of the State of New York, conceived the idea of locating turbines in wheel-pits sunk to a sufficient depth upon the level land above the rapids, where, under a head of sixty to one hundred feet, turbines could be operated by water carried to them through short surface canals, while the discharge from the turbines could be carried away by a tunnel serving as a tail race, this tunnel to proceed in a direct line under the city of Niagara Falls to the gorge below the falls. His scheme had been made the foundation of a charter granted to a company to construct the tunnel and such canals as might be needed for power and sewerage purposes, whereby the land on the river bank above the falls might be utilized as a manufacturing area, as at Lowell, Holyoke and other places where industries have prospered through the enterprise of the companies controlling the water privileges.

To carry out the Evershed plan involved the expenditure of very large sums of money for the tunnel and for surface canals. To effect the purpose, the Niagara Falls Power Company was organized in 1890. The Cataract Construction Company and other allied companies were started at the same time to execute the work, to improve the lands owned or controlled by those interested and to furnish transportation facilities to a large industrial district, where a uniform water power, without fear of low water or freshets, would be obtained. In the first conception of this water-power company, a central station was contemplated from which power might be transmitted to Buffalo and elsewhere, either by electricity or by some of the several modes of transmission of power already used to some advantage in Switzerland and elsewhere, where water power is abundant, coal costly and transmission for a few miles by wire rope or other means had been undertaken with marked success.

In July, 1890, I was suddenly summoned to London to confer with Mr. Edward D. Adams, the President of the Cataract Construction Company, who was alive to the great advantage of long-distance transmission by electricity, his idea being that the central-

ization of power and its transmission by electricity over the whole territory was feasible; hence he ordered work stopped until a careful examination could be made as to the state of the art of electricity in comparison with other modes of transmission.

To obtain reliable information on this important subject, the Niagara Falls International Commission was organized in July, 1890, with Lord Kelvin as Chairman; Prof. Wm. C. Unwin, Dean of the South Kensington Technical School, as Secretary; Prof. E. Mascart, of Paris, as representative of France, the birthplace of the modern turbine water-wheel; Col. T. Turrettini, Mayor of the City of Geneva, an engineer of great note, as representative of Switzerland, and as the engineer of the works at Geneva where power was being transmitted by water under high head; and I was appointed the representative of the United States and of the company for which the information was to be collected. By and through the work of this Commission, the opinion of engineers and engineering companies was obtained as to the best way of developing the power on the land of the company, under conditions laid down by the American company, also the utilization by transmission of the power so developed. A sum of money was paid to each competitor to cover the cost of reports, while premiums were offered to those who should present feasible schemes that could be immediately made use of for either or both of the two parts of the scheme—first, the generation of power, and, second, its transmission.

The information so gained represented the accumulated knowledge of men who could speak knowingly as to the state of the art on both of these subjects at that time. It was well worth its cost, but no perfect scheme, ready for immediate adoption and worthy of the highest premium, was presented. The Westinghouse Electric and Manufacturing Company, of Pittsburg, already interested in utilizing the alternating-current system for lighting and power purposes, having previously spent enormous sums of money to develop the alternating-current motors, generally known as the Tesla system, refused to compete on the ground that what would be offered in 1890 and 1891 could not possibly be what they might be able to submit in 1893; nor could any one suggest what would meet all the conditions which might arise during the development of the hydraulic part of their enterprise on a scale so much larger

than ever before undertaken. This non-competing company, however, a few years after executed much of the work required.

A majority of the Commissioners favored the transmission by direct current, but as they were not asked to express an opinion in that direction, there was no report made as to the character of the electric current if electrical transmission should be decided upon; but a unanimous opinion was given as to the advantage of a unit of 5000 horse power for each turbine in the power house, working under a head of not over 140 feet fall, at a speed of 250 revolutions per minute, which was feasible with turbines that could be made of high efficiency.

The speed recommended was thought to be what would be acceptable to makers of dynamos, whether for alternate or direct current. It is noteworthy, as indicative of the state of the art in 1891, that out of many electrical schemes proposed all but two were based on the generation of the direct current, with the consensus of opinion in favor of the gramme ring as the type of armature.

While waiting for the reports of competing engineers to come in, between July of 1890 and the first of January, 1891, I had time to visit Italy, France, Switzerland and England, where I collected information as to the efficiency of the several modes of transmitting power at that time in vogue. I could find but one example in France of power for factory purposes transmitted by direct current, in which case a turbine was located in a rugged mountainous district, quite inaccessible in winter. The water-wheel, of perhaps 200 horse power, drove a direct-current dynamo, from which the current was conveyed by overhead conductors to a direct-current motor in a paper-mill, in a small town, a distance of five miles. This paper-mill had been operated without profit by steam, but was said to be profitable under the new conditions. The machinery in this case was started and stopped at the turbine by means of telephone communication from the mill to the men in charge at the water power. I visited many interesting plants for the transmission of power by water under pressure and by compressed air, and saw the most important electrical developments for lighting purposes, some by the alternate current, but most by the use of the direct current.

In Paris I made a careful examination of the Popp system of compressed air with great interest, on account of the highly favorable reports that had reached me and the claims as to efficiency

and economy made by the projector. He even went so far as to say that in case of transmitting power from a central station to an outlying electric light plant he would use compressed air for the purpose, using air to drive the engines connected to the dynamos at the lighting stations, instead of transmitting electricity ready for immediate use. Among his various plans of using compressed air, besides operating air motors, elevators and the like, he had published a long list of uses to which it was applicable; he also submitted to the Government his cold storage scheme. In the event of foreign invasion and the investment of Paris, when local industries might be stopped, he stated that by using the compressed air from part of his compressing plant to drive the engines that operated the compressors of the other part, and utilizing the exhaust from these air-driven compressors in the Government storehouses, he could thus lower their temperature to the required degree, on the principle of refrigeration by rarefaction of air after having exerted force, as discussed by Prof. Henry on March 2, 1825, and as afterward toward 1850 used for the artificial production of ice.

The alternate-current lighting plant of Deptford, London, established in 1889, was predicated on the possible generation of electricity in large units of 10,000 volts pressure. I spent much time in watching this experiment, which was in 1891 far from meeting the expectations of its promoters. The 10,000 horse-power engines and direct connected 10,000 horse-power dynamos were never finished.

In Rome I found the most promising scheme under way to utilize the water power at Tivoli to generate a single-phase, alternate current, to be transmitted a distance of twenty-five miles to the gates of Rome by overhead cables, at a pressure of about 5000 volts, with perhaps twelve per cent. loss in transmission. The Roman plant was interesting, as in it the question of rate of alternation per second had been considered, and Ganz & Co., of Budapest, had recommended the lowest periodicity, forty-two full alternations per second, as adapted to arc and incandescent lights on the same feeders. If the rate of alternation per second be less than forty-two full periods arc lights will pulsate, while in the case of incandescent lights by alternating current the rate of alternation may be carried as low as twenty per second, depending upon the thickness of the filament, with no perceptible effect on my eyes. But in common practice seventy-two full periods per second has been

adopted by electric lighting companies, as thereby the local transformers that are used to reduce, from street conductors under a pressure of 2000 volts to 100 volts in houses, are small and inexpensive; much more so than if similar machines were wound for as low a periodicity as forty-two per second. This question of period or rate of alternation per second has since come to be recognized as an important consideration in the transmission of electric energy for power purposes, and bears directly on the question of efficiency, convenience and economy in the conduct of the power-house equipment at Niagara Falls. There is so much of interest that may be said on this subject that I am loath to leave it to speak of what resulted from the study of the problems between 1890 and 1893, when in 1893 the installation of hydraulic machinery was to be begun, and an electric system adopted and put in practice ready for operation. In 1895 but one single tenant, the Niagara Falls Paper Company, now using over 7200 horse power from the surface canal of the company, was and still is the only example we have of a factory controlling its own water power directly connected to its machinery, as at Lowell and elsewhere.

During the year 1893 all idea of extending the tunnel beyond a proposed power house, and all extension of surface canal with branches to supply local factories, was given up in favor of electrical generation and transmission thereof to the users in such form as to be acceptable to the industries established on the land of the company. In the year 1893, while the greatest pressure was being exerted to induce the Cataract Construction Company to adopt the direct-current system, Mr. Edward D. Adams and the other officers of the company had before them a diagrammatic plan showing a central station for the generation of alternate-current electricity, from which conductors were figured as leading to electric furnaces, to apparatus that was capable of converting the alternate current into direct current, either by synchronous motors driving direct-current dynamos or by step-down or step-up transformers and rotary transformers that accomplished the same end. Lighting by arc and incandescent lamps was provided for, and trolley lines were designated as in operation, while an overhead pole line was figured as transmitting the energy to Buffalo or elsewhere, at any required pressure. Nothing could be more convincing than this diagram to show the elasticity of the alternate current, which was confirmed by a practical exhibition offered at Pittsburg by the Westinghouse

Company, and later a similar exhibit was given at Lynn, Mass., by the General Electric Company, the former by bi-phase generation and transmission, the latter by tri-phase.

After a most careful study of the subject from a scientific and commercial point of view, the bi-phase system of twenty-five alternations per second was adopted by the Cataract Construction Company. When such a low rate of alternation was discussed, it was apprehended that the cost of static transformers would be so much increased as to more than counterbalance the efficiency promised by the lowering of the rate of alternation; but, as in many other cases, when a want is felt, the urgency of the want leads to improvements that entirely change the conditions; so in this case, while many predicted that static transformers of this low period would cost from fifteen to twenty or even twenty-five dollars per horse power, still when tenders were to be solicited a guarantee had been exacted that the price should not exceed five dollars per horse power, while in actual practice, in healthy competition, the machinery for the purpose was secured at a very much lower rate.

As to the results reached by the system adopted, I must call your attention to the remarkable character of the industries that clustered about the central station. In 1893 there were no bi-phase motors of high efficiency manufactured, as up to the last few years alternate-current electric lighting plants had not been adapted to the operation of highly efficient motors to take the place of steam engines. There were few if any applicants for power to drive machinery. No cotton mills or other textile industries sought cheap power when it involved the use of machinery that had yet to be perfected. Existing direct-current motors could be had in abundance, but manufacturers had not yet used them. The largest cotton or woolen mills required not over 1000 horse power to drive them, while most are on a smaller scale.

The advantages offered by the elastic electric system at Niagara Falls attracted industries that employed few hands, needed little machinery, but required enormous amounts of power, which, at a lower cost than steam and without an investment in engines and dynamos, could be used profitably.

The Pittsburg Reduction Company, engaged in the extraction of the metal aluminum from its ores, was the first applicant for 1500 to 3000 horse-power electric current from the new power-house. This process, known as the Hall process, required heat energy to

melt the cryolite to form the bath in the electric furnace, and a direct current of low voltage to exercise electrolytic energy in separating the metal from bauxite, which is rich in aluminum. Another enterprise, the Carborundum Company, called for 1000 horse power, in alternate current of one phase only, for a process in which heat energy alone is needed to produce a new mineral next in hardness below the diamond. So with the manufacture of carbide of calcium from coke and lime, great heat alone needed was obtainable by alternate current. The Matheson Alkali Company, making caustic soda from common salt, needed no heat energy, but over 2000 horse power of direct current for electrolytic or electro-chemical energy in a cold process to separate the chlorine gas from the salt water, the gas being delivered into enormous lead-lined chambers, the floor of each chamber being covered with lime, enabled twenty-five tons per day of bleaching powder to be furnished to the market, while the caustic soda liquor, freed from chlorine, is concentrated by boiling in iron kettles to evaporate the water and thus leave caustic soda in solid form when cold. This caustic soda, delivered to still another factory near at hand, is by a direct current, furnishing heat and electrolytic energy, made to yield pure metal sodium, just as Sir Humphrey Davy did when, with the current from a galvanic battery, he produced and gave to the world a few ounces of the new metal. The ingots of sodium, as made by the Chemical Construction Company, at Niagara Falls, are dipped into coal oil and thrown into tin cans, to be closed air-tight, ready for the market, or at once, by a simple process, converted into peroxide of sodium, one of the most powerful oxidizing reagents required in the arts. Factory after factory has been added, for various electro-chemical processes, while the establishments first started have grown in size calling for power in a rapidly increasing ratio.

While these industries were developing, electricity has been furnished to the lighting station to replace steam as the motive power, and a direct current is being delivered to the trolley lines of Niagara Falls and Buffalo. By the time the development was in shape to offer power to Buffalo, and the cost of installation was being worked out there, one great advantage of the tri-phase system over the bi-phase that had been adopted was urged as an important argument against what had been done. This advantage comes from the fact that the bi-phase transmission needs four cables, two

for each phase, while the tri-phase system is worked with three cables only, each of the three cables being no larger than each of the four demanded by the bi-phase system. This advantage had been taken into consideration, but other economies incident to the bi-phase had overbalanced the question of saving in copper in the line. Before the line to Buffalo could be built, however, and as a striking instance of an urgent need of exciting the talent of inventors to supply the want, Mr. C. F. Scott, of the Westinghouse Company, startled the electricians at a meeting in Washington with his scheme of converting the bi-phase current into a tri-phase in the static transformers that are used to raise the electro-motive force of the current from 2200 volts to 11,000 volts or more—this without adding one dollar to the actual cost of the transformers needed, and with the saving of twenty-five per cent. in the copper used, which must be credited to the tri-phase transmission. So that while the low frequency adopted increased the efficiency of the plant, and favored many operations of the power plant, the first cost was not affected by the prophesied high cost of transformers, and all the advantages incident to both systems were obtained not only without an increase of the first cost, but a direct saving in the copper of the line. As the plant grew in size, many of the difficulties that had been expected in handling such an immense volume of electricity as was involved did not occur, and it was evident that the practical electricians attached to the great manufacturing establishments of electrical machinery had brought the appliances needed well up to the requirements of the new conditions. Every machine, every instrument needed, had to be contrived, not only to suit the size of the unit of 5000 horse power, but to meet the unknown effect of coupling so many great machines in parallel and distributing the current to establishments over which the attendants in the power-house have little or no control.

In thus referring to the utilization of power at Niagara Falls, I may seem to depart from the subject of transmission of energy, although the development of the industries described is intended to illustrate the direct results obtained by transmitted energy. The energy developed at the dynamos in the power-house, and existing as potential only while the dynamos are in motion, begins with an electro-magnetic force of 2200 volts, at which 5000 electrical horse power is transmitted by four cables, each $1\frac{1}{4}''$ in diameter, two cables for each phase of each dynamo, to the bus bars from which the

current is distributed at from 2200 to 2000 volts (depending on distance) to points outside of the power-house within a radius of two miles. By means of step-up transformers 10,000 electric horse power of induced current of 11,000 volts can be carried to Buffalo by six cables, each $\frac{5}{8}$″ in diameter, and capable of transmitting 10,000 electric horse power at the said voltage, or double that amount, at 22,000 volts, with a loss, based on Lord Kelvin's law of economy as to size of conductors.[1] You can better realize the idea of the size of the conductors when I tell you that from each turbine exerting over 5000 horse power a steel shaft 11″ in diameter is needed to drive each dynamo delivering 5000 electrical horse power, from which are carried the conductors of the sizes named. Four bus bars receive the current from five dynamos, the heaviest part of each bus bar being 3″ in diameter; *i. e.*, one 11″ steel shaft transmits kinetic energy of 5500 horse power; four $1\frac{1}{4}$″ cables transmit 5000 electric horse power energy of 2200 volts; three $\frac{5}{8}$″ cables transmit 5000 electric horse power to Buffalo.

Besides the development of power at Niagara Falls, to which I have called your attention, numerous successful installations in various parts of our country could be referred to, and even in Europe we find the transmission of power by alternating current in existence, and, in fact, in some instances preceding in actual operation the starting of the plant at Niagara Falls; such installations being on a smaller scale required less time to construct them.

[1] Lord Kelvin proposed, in determining the size of conductors for electricity, that the most economical area of conductor is that for which the annual cost of energy wasted is equal to the interest on that portion of the capital outlay which can be considered to be proportionate to the weight of the metal used; that is to say, the amount of copper and other details of the transmission line, the interest of which should equal that amount of energy at its cost of production that may be wasted. The lower the cost of the power generated the more energy may be wasted to advantage. If too large a conductor is installed for the purpose of decreasing the loss, the capital outlay will be needlessly great. If too small a conductor is adopted the waste of energy will be too great, hence the importance of a law that indicates what the economical loss should be. In applying this law there is more or less divergence of opinion as to what part of the capital outlay should be taken into consideration in determining the amount to be wasted. As, for instance, an underground conduit system may be built to accommodate a great increase of the number of conductors installed, or when a pole line is erected for a given amount of power, additional conductors may be supported on the same poles without any great increase of the cost due to enlarging the capacity of the transmitting line. The law, therefore, bears with most force on the metal if naked or the cable if the conductor is insulated.

The experiments of Mr. Tesla, which were directed toward the utilization of an alternate electric current of high frequency, and which were conducted in the interest of the Westinghouse Company, resulted in the issue of at least twenty-nine patents to cover the multiphase generation of electricity. The first of these patents was issued as early as 1888, and the last in 1891, and yet in 1893, so far as I am aware, there were no examples of the Tesla motors in commercial operation, for the reason that up to that time—and, in fact, not until 1895—the conditions had not been favorable to its development. As soon as there seemed to be a demand for their use, however, the manufacturers placed them on the market with as high an efficiency as the best direct-current motors, with this further advantage that is of the utmost importance: A direct-current motor and a direct-current dynamo are limited in their electro-motive force by the commutator necessary for their operation. The earliest alternating-current motors were what are known as synchronous motors; that is, motors that when started would run in step with the dynamo from which the current proceeded. These motors had no self-starting power, and involved many objectionable features that are not incident to polyphase motors of the induction type—in other words, what we know as the Tesla motor. In the first place, and as of vital importance, a Tesla motor can be wound to suit high voltage. Electricity at 2000 volts can be carried with absolute safety by properly insulated cables into buildings and applied directly to the motor without any live terminals; that is, without any part carrying current being exposed from which a dangerous shock of electricity can be obtained. They are all self-contained. They start with a powerful torque upon completing the circuit; that is, they start when the switch is closed and stop when the switch is open. Here is the possibility of an ideal electric motor, which is perfectly well understood by professional electricians, but about which the public have yet to be more thoroughly informed.

Though I have said that little was known about the alternating current in practice until lately, yet I have before me a copy of a letter written by Mr. L. B. Stillwell, one of our members, the Electrical Director of the Niagara Falls Power Company, when he was on the staff of the Westinghouse Company, dated May 11, 1893, in which he said: "I received yesterday from our engineer in charge of the installation at Pomona, Cal., a report of tests which he had

been making, and I think you will be interested to learn that he has successfully transmitted 130 horse power over eighty-four miles of bare copper wire, supported upon our special insulators; the length of the circuits being eighty-four miles, the conditions are of course such as we should encounter in transmission over forty-two miles. The result was obtained by connecting up in series the respective circuits from the power plant to the town of Pomona and the city of San Bernardino. About 3200 insulators supported the conductor carrying 10,000 volts, and the fact that this was done without the slightest evidence of break-down was noteworthy and important." Since then on some of the Western lines 20,000 volts have been considered moderately low voltage, and 40,000 volts have been used successfully, and this all since the year in which bids were first asked for polyphase alternating-current dynamos under stated conditions by the Cataract Construction Company for the Niagara Falls Power Company at Niagara.

Mr. Edward D. Adams, the president of the Cataract Construction Company, to whom the above letter was addressed, was thoroughly alive to the advantage of the use of the alternating-current system in 1890, but in financiering the great development at Niagara Falls he held his mind open for truth, which he steadily pursued from the beginning, sustained by those interested with him, regardless of his own pecuniary interest and that of his personal friends.

My own interest in electricity began in early boyhood. As soon as I was able I followed the discoveries of Faraday and others experimentally, using instruments made by myself for the purpose. From 1846 to nearly 1849 I was engaged to superintend rolling iron and making the telegraph wire that was used in the first lines established west of the Allegheny Mountains. Keeping in touch with progress of the uses to which electricity has been applied, I have noted how powerfully the growing needs excite the inventive faculty of those engaged in any one branch of science; in general, also, the slow application to actual practice of knowledge given to the world by men seeking truth and laying the foundation of exact scientific methods. Our modern knowledge of thermo-dynamics does not express what was used to perfect the steam engine, as the best results and the greatest advance in the use of steam came before the students of thermo-dynamics gave us the modern text-book on the theory of steam. So it is with the trans-

mission of energy by electricity: beyond the possession of useful knowledge, actual practice and the attempt to accomplish results will yet need many venturesome efforts.

In utilizing the power of Niagara Falls large units of power have been shown to be economical. A single dynamo built to yield 5000 electrical horse power has yielded 5600 electrical horse power without sign of overload. The wonderful efficiency of these machines, which have a loss of less than two and one-half per cent., has established the superiority of electrical transmission of power, and proved it to be more economical than any of the usual methods of transmission by material in motion; that is to say, by shafting, belting or compressed air, etc. All such methods involve great frictional loss. When a steam engine is attached directly to a dynamo, the electrical output of the dynamo, measured by modern instruments of precision, is known to be more reliable as an indication of the power produced by the combustion of a given amount of coal than any ordinary method of indicating the power of a steam engine to determine the horse power per pound of coal burned. Large factories, such as the Baldwin Locomotive Works, have recognized the economy of generating electricity by steam and transmitting it to the various machines or groups of machines in use, to which electric motors are applied, thus dispensing with long lines of shafting. How far electricity can be transmitted from the turbines at Niagara Falls with profit remains yet to be determined. The actual economy obtained by transmission to Buffalo, say a distance of twenty-two miles, is so much beyond what was predicated as possible in 1890, or even 1893, that no one can venture to say what will be forthcoming in the near future. With electricity it is very much as it was with railroads; fifteen miles per hour was thought to be a dangerous speed when locomotives began to supersede the stage coach. Those who travel now hope for an improvement that will lead to a higher rate of speed than we are now accustomed to. So it is with electricity by overhead lines of transmission. One thousand volts is no less dangerous than 11,000 volts on the Buffalo line, or 20,000 or 30,000 on some of the air lines in this country.

The question of underground transmission calls for a high quality of insulating material or method of preventing leakage, and of providing means of dissipating the heat that must result from any loss due to resistance in the conducting material used.

Copper is, of the available materials, the best conductor and the cheapest. The price of aluminum, however, owing to the cheap power used in its manufacture, has fallen from five dollars per pound to twenty-five cents per pound. Pure aluminum, properly alloyed with a metal that will increase its strength without decreasing its conducting quality, renders it possible at the present time for aluminum conductors to be offered at exactly the same price per mile as copper, with the added advantage of allowing the poles supporting the line to be placed much farther apart, thus using fewer insulators and decreasing the cost of the line; also insuring more economy in transmission, as there is less leakage, due to the diminished number of supports, all of which will be weak points in the transmitting system. The increased area required for the lighter metal, resulting in a larger radiating surface, is favorable also to the dissipation of the heat engendered by the resistance in the line, as whatever energy is lost in such transmission assumes the form of heat energy.

What can this or any other learned Society do to help in the promotion of the knowledge of electricity applied to the use of man? It is a matter of great importance to those interested in the work of this Society that they recognize the necessity of exerting themselves to carry out the intent of its founder in promoting useful knowledge. We must try to induce the members and others to make use of the advantages that the Society possesses in disseminating useful knowledge through its publications, and to make this building and these rooms the place for the discussion of subjects of practical as well as theoretical importance in the same direction, on the lines so earnestly followed by its founder, who tried to bring together representative men of varied attainments and to have them submit papers for discussion.

In my efforts to interest members in our work in the direction of the subject of this discourse, and to have them submit papers for discussion, I have been met, first, with the excuse of want of time for the preparation of matter; second, the desire of most specialists to contribute to the societies devoted to their specialties; third, to the fact that there are so many periodicals for each special department of science ready and eager to obtain, even to pay for, copy, and in the case of electricity as applied to the service of man many of the professors of physics in colleges, specialists besides those on the staffs of the great manufacturing companies, are re-

tained in the interest of such companies, and in some cases are even discouraged from making public what for a time can be used to advantage in a commercial way and classed among the trade secrets. I speak knowingly on this subject, for the first question that was asked me in 1889, before I was solicited to report on the subject of transmission of power by electricity, was whether I was retained in the interest of any electric company. The fact that patent litigation has played so important a part in the development of electricity is also to be taken into account when an effort is made to awaken debate on subjects that should be of special interest in the Society founded by the early electrician, Benjamin Franklin. Many men are loath to commit themselves in debate that may in a short time be taken hold of by patent attorneys. The commercial aspect of scientific advance is too important to be ignored; we must therefore, as members of the American Philosophical Society, as far as we can, induce others to assist in the work of the Society by showing a willingness to take an active part in the meetings that are held in this room, and by early publication of matter submitted give precedent in publication to those who lay claims to priority of discovery.

Stated Meeting, April 21, 1899.

Vice-President SELLERS in the Chair.

Present, 17 members.

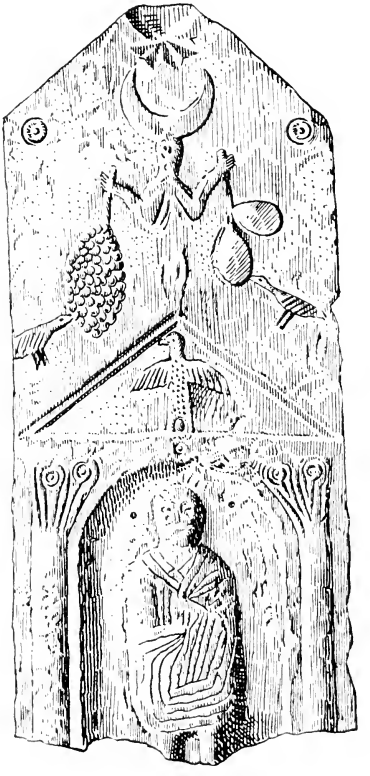
The Curators announced that, in accordance with a resolution of the Society, the Carthaginian tombstone in its possession had been photographed, and exhibited a blue print of same (see accompanying figure, page 72).

The death of Sir Monier-Monier Williams, of London, England, April 11, 1899, who was elected a member December 17, 1886, was announced.

Dr. Stellwagen made a verbal communication to the Society in regard to a tombstone presented by Commodore Stellwagen,

on behalf of Mr. Perry, which was brought from Carthage. He said:

It was in the spring of 1864, if my memory serves me correctly, that, at the urgent request of the Consul-General of the United States, Mr. Amos Perry, the U. S. S. "Constellation," of which I was an officer, paid a visit to the Bey of Tunis, as trouble with the Bedouins had caused alarm among the European residents.



Carthaginian Tombstone.

The Consul requested my father, Captain Henry S. Stellwagen, U. S. Navy, to bring two gravestones or stelæ to this country and send one each to scientific bodies in Philadelphia and New York. The one exhibited here this evening was first given into the care of the Academy of Natural Sciences, but afterwards, at the suggestion of an officer of that body, it was sent to the American Philosophical Society.

At the time of our visit the ruins of Carthage were so completely

hidden by the overlying soil and fine débris that the localities of the famous city were but vaguely known. This stone stela was found in the region of the temple of Astarte, and by many of those who examined it the relief was considered to be a figure of the Goddess Astarte feeding carnivorous, and presumably sacred, animals with the entrails and genitals of the victim of a sacrifice.

I was discouraged at the very meagre results obtained by antiquarians who had studied the locality, and shocked to contemplate how entirely that great city was obliterated. Once she claimed to control the whole western Mediterranean Sea so effectually that "no one could wash his hands in it without her permission." Her fleets and armies, her agriculture and pomology, her stock raising and her temples are only known to us through her enemies, the Romans; but these naturally biased historians freely acknowledged that she excelled the world. At the time of our visit only mounds of earth were to be seen there, covered with very small fragments of different-colored marbles, some fine large pieces of marble steps that evidently had formed portions of a great stairway to the sea gate, and a number of large subterranean reservoirs supposed to have been used for water storage, these being in pretty fair condition, and in strong contrast with the utter and absolute ruin of all else.

Which was followed by a verbal communication by Dr. Morris, as follows:

It has been said that Abdel Kader when brought as a prisoner to Paris was taken to Versailles and asked his opinion as to the celebrated paintings of the battles in Africa, where he had borne such an heroic part. He replied that "if an Arab had portrayed them he would probably have done so very differently." It is well for us to remember that nearly all we know of the Carthaginian empire, people or customs has come to us through Roman sources, and that the "Punica fides" which we have learned of in our childhood might seem very different if heard of from the other side. While I would not be considered as an apologist for the worship of Astarte, which we know of from Syrian and Phœnician as well as from Greek and Roman sources, passing as it does into that of Aphrodite and Nero, of Venus and Juno, or of sexual love, whether normal and pure or abnormal and illicit, it still remains true that

C'est toûjours l'amour, l'amour,
Qui fait le monde â la ronde.

Human nature has been and is the same in all climes, ages, civilizations and religions; and it behooves us in inquiring about them to treat them fairly as we would seek to have done to our own views. It is in this manner I would study this relic, all too rare, as our friend, Dr. Thomas C. Stellwagen has just shown us, of Carthaginian civilization. It is a white sandstone slab, the lower part of which has been broken off and the upper corners sloped nearly but not quite to a point. It is 2 feet 5 inches

long, 1 foot $1\frac{1}{4}$ inches broad, and 5 inches thick. At the top is a ✳, which I take to be intended to represent the sun: on each of the corners of the sloping and straight sides two small concentric circles ⊙, which I take as intended to represent planets (Mars and Jupiter?): and on the upper part of the slab the figure of Astarte with its crescent, holding a pomegranate in the right hand, from which a beast is feasting, and in the left a bunch of dates plucked at by a bird. Under this figure of Astarte, thus emblematic of the love-passion as alike furnishing fertility and prosperity to all living beings, is the entablature of a temple or house with rude Corinthian columns, and an eagle, while beneath is the figure of a man calmly standing, wrapped in a robe. Herodianus (*circa* 150 A.D.) tells us of the custom prevailing at the beatification of an emperor among the Romans. An eagle was bound on the funeral pyre so that when it was lighted and the bonds burned the living bird soared aloft bearing the soul of the deceased to the empyrean, and the Imperator became Divus. May not this well explain this figure standing in the porch of the house or temple ready to pass through the region presided over by Love into the vast beyond where Light and Order still prevail? and how far would such a faith differ from that held by the most of us to-day?

This stone, I believe, formed the doorway of a vault or sarcophagus such as may be not infrequently found on or near the shores of the Mediterranean, and may well aid us in our inquiries into the real beliefs of those who passed so long ago into the Great Beyond.

On each side of the head of the man's figure is a small hole such as would receive a tenon on a bronze plaque, which may have covered this figure, as we see brasses on the graves of Crusaders in old cathedrals. If this were so, this monument, had it contained the man's name, would have, like Horace's, proved "Aere perennius."

The Society was adjourned by the presiding officer.

Stated Meeting, May 5, 1899.

Vice-President SELLERS in the Chair.

Present, 21 members.

Gen. Isaac J. Wistar read an obituary notice of the late Richard A. Tilghman.

The Secretaries announced the death at Philadelphia, on May 2, of Alexander Biddle, aged 80 years.

The following papers were read:

By Mr. R. H. Mathews, of Parramatta, New South Wales, "On Divisions of North Australian Tribes."

By Dr. Rudolph Buti, of Baltimore, "On an Interesting Fragment of the Book of the Dead."

By the Committee on Historical Manuscripts, "A Calendar of the Weedon and of the Richard Henry and Arthur Lee Correspondence in the Library of the Society."

Dr. Samuel G. Dixon was elected a Councillor to fill the unexpired term of Gen. Isaac J. Wistar, made vacant by his election as a Vice-President of the Society.

Mr. Harold Goodwin presented a framed engraving of John Vaughan, who had served the Society as Secretary in 1789 and 1790, as Treasurer from 1791 to 1841, and as Librarian from 1803 to 1842, and on motion the thanks of the Society were returned therefor.

The Society was adjourned by the presiding officer.

DIVISIONS OF NORTH AUSTRALIAN TRIBES.

BY R. H. MATHEWS, L.S.

(Read May 5, 1899.)

The division of a tribe into intermarrying sections or classes, although one of the most interesting of the institutions recognized among the Australian aborigines, has not hitherto received the attention which its importance deserves. In a former number of the PROCEEDINGS of this Society[1] I tabulated the names of eight sections, with the rules of marriage and descent in force over a large extent of country in the Northern Territory. Since then I have reported[2] a similar eight-section system, but with different sectional names, in the northwest corner of Queensland, extending southerly from the Gulf of Carpentaria for a distance of about three hundred miles, including the Wentworth, Nicholson, Gregory and Upper Georgina rivers.

In an article contributed to the Royal Society of New South Wales in June, 1898, I described the eight sections of the Arrinda tribe on the Finke, Todd and other rivers,[3] but, while that paper

[1] PROC. AMER. PHILOS. SOC., xxxvii, 151–154.

[2] *Journ. Roy. Soc. N. S. Wales*, xxxii, 251, 252.

[3] *Ibid.*, xxxii, 72.

was in the press, a correspondent furnished me with additional information which shows the line of descent in a manner that is more readily understood than by the table appended to the article in question. I propose, therefore, to supply a new table, showing how the divisions intermarry, with the sections to which the offspring belong, as follows:

TABLE I.

	Husband	*Wife*	*Offspring*
Group A.....	1. Panungka	Parulla	Pungata
	2. Mbutjana	Pungata	Ngala
	3. Knurraia	Ngala	Bultara
	4. Koomara	Bultara	Parulla
Group B.....	5. Parulla	Panungka	Koomara
	6. Bultara	Koomara	Knurraia
	7. Ngala	Knurraia	Mbutjana
	8. Pungata	Mbutjana	Panungka

It will be observed by the foregoing table that the sons of the women of one group marry the daughters of the women of the other; and, also, that each group has perpetual succession through its females. For example, take the women of Group A in the table, we find that Parulla is the mother of Pungata; Pungata of Ngala; Ngala of Bultara, and Bultara is the mother of Parulla, and this order of succession is continually repeated.[1] Among the women of Group B the line of descent conforms to the same rules. I have traced some of the section names of this organization, namely, Bultara, Koomara, etc., across the country from the Upper Finke river northeasterly to the Georgina river, a distance of more than four hundred miles.

My correspondent also made some further investigations respecting the order of succession in four of the sections of the Warramonga tribe[2] at Tennant's Creek, with the result that it becomes necessary to prepare an amended table of one of the groups. As it might cause confusion to show only one group, I have included both in the subjoined table:

[1] The names of the eight sections of the Upper Finke river tribes were first reported by the Rev. L. Schulze in 1891 (*Trans. Roy. Soc. S. Australia*, xiv, 223, 224.) Their arrangement into two intermarrying gronps was the result of my investigations (*Journ. Roy. Soc. N. S. Wales*, xxxii, 72).

[2] *Journ. Roy. Soc. N. S. Wales*, xxxii, 73.

TABLE II.

		Husband	*Wife*	*Offspring*
GROUP A.....	1.	Aponunga	Tungulli	Apungata
	2.	Ampajona	Apungata	Opalla
	3.	Ungary	Opalla	Kabajee
	4.	Akamarra	Kabajee	Tungulli
GROUP B.....	5.	Tungulli	Aponunga	Akamarra
	6.	Kabajee	Akamarra	Ungary
	7.	Opalla	Ungary	Ampajona
	8.	Apungata	Ampajona	Aponunga

In Group A of the above table, the rotation of the section names is different from that given in my former table, which, necessarily, alters the order of descent among the women and children. Group B is the same as that previously given. If my correspondent is now correct, it can be shown by this table that a brother's son's children intermarry with a sister's son's children, instead of the son of a brother marrying the daughter of a sister, and *vice versa*, as stated in my former paper.[1] In examining the two tables, I and II, it is seen that the names of several sections in the Arrinda tribe are almost identical with some of the section names of the Warramonga.

On the McArthur, Kangaroo and Calvert rivers, in the Northern Territory, reaching thence along the shore of the Gulf of Carpentaria beyond the Queensland boundary, and extending inland about one hundred miles, are several native tribes, among which may be mentioned the Yuckamurri, Yanular, Leanawa, Yookala and Kurrawar. The following synopsis shows the section to which a man belongs—the section into which he can marry—and the designation of the offspring:

TABLE III.

		Husband	*Wife*	*Offspring*
GROUP A.....	1.	Joolanjegoo	Jungalagoo	Bullaranjee
	2.	Jameragoo	Bullaranjee	Jooralagoo
	3.	Jinagoo	Jooralagoo	Bungaranjee
	4.	Yukamurra	Bungaranjee	Jungalagoo
GROUP B.....	5.	Jungalagoo	Joolanjegoo	Yukamurri
	6.	Bungaranjee	Yukamurra	Jinagoo
	7.	Jooralagoo	Jinagoo	Jameragoo
	8.	Bullaranjee	Jameragoo	Joolanjegoo

[1] *Journ. Roy. Soc. N. S. Wales*, xxxii, 74.

Some native tribes on the Victoria river, in the Northern Territory of South Australia are segregated into two intermarrying groups, with the following subdivisions:

TABLE IV.

		Husband	*Wife*	*Offspring*
GROUP A.....	1.	Jamada	Jungalla	Dhalyerree
	2.	Jameram	Dhalyerree	Joolam
	3.	Janna	Joolam	Dhungarree
	4.	Jummiunya	Dhungarree	Jungalla
GROUP B.....	5.	Jungalla	Jamada	Jummiunya
	6.	Dhungarree	Jummiunya	Janna
	7.	Joolam	Janna	Jameram
	8.	Dhalyerree	Jameram	Jamada

If we compare Tables I, II, III and IV with the table of eight sections reported by me in a former article to this Society,[1] it will be observed that the four tables are constructed on the same system, and all contain the same order of succession. In other words, all the tribes dealt with have substantially the same organization, although there are dialectic variations, more or less, in the names of the sections. In the Tables I, II and III, I have omitted the feminine form of the name of each section, which, it is thought, will enable the reader more readily to follow the rules of marriage and descent. The divisional system, or social organization, reported in this article, extends from the Upper Finke river to the embouchure of the McArthur, in the Gulf of Carpentaria, a distance of about six hundred and fifty miles. I am informed by some of my correspondents that the same system, but with different divisional names, reaches westwardly from the Gulf of Carpentaria to the Daly and Victoria rivers, and onwards into West Australia.

The southern portion of the Arrinda and adjoining tribes occupy the Middle Finke and Charlotte waters, reaching as far south as the Macumba river. Among them there are only four sections employed to regulate the intersexual relations, as shown in the following table. These sections comprise four of those enumerated in Table I:

[1] PROC. AMER. PHILOS. SOC., xxxvii, 152.

TABLE V.

		Husband	*Wife*	*Offspring*
GROUP A.....	1.	Panungka	Parulla	Bultara
	2.	Koomara	Bultara	Parulla
GROUP B.....	3.	Parulla	Panungka	Koomara
	4.	Bultara	Koomara	Panungka

It will be seen that the community is segregated into two intermarrying groups, and that the children take the name of the complementary section in the division to which their mother belongs.

In the southern portion of South Australia there are a number of tribes who possess the two primary groups only, like A and B in the foregoing tables, without any subdivisions into sections. As an example of this system, it may be mentioned that in some districts these two divisions, or groups, are called Matturri and Karraroo;[1] in others they are Krokee and Kumite; in other parts they are called Kookoojiba and Koocheebinga, and, again in others, they are known as Koolpirry and Thinewah. In each case the men belonging to one primary division marry the women of the other, and the children take the name of their mother's division. As I am now engaged in the preparation of a comprehensive article dealing with this type of organization, I shall not enter farther upon it at present.

ON AN INTERESTING FRAGMENT OF THE "BOOK OF THE DEAD."

BY RUDOLPH BUTI, PH.D.

(*Read May 5, 1899.*)

In the Egyptian collection of the Woman's College of Baltimore there is an Egyptian hieratic papyrus which, when handed to me for translation, I found to be an interesting fragment of the "Book of the Dead." The fragment written on papyrus is a foot and an inch in length and seven inches in width.

It contains a part of the 149th chapter, which is divided into fourteen paragraphs. The papyrus is also divided into vertical columns of three inches, separated by a double line of nearly one-

[1] *Journ. Roy. Soc. N. S. Wales*, xxxii, 69.

eighth of an inch. The top of each column is occupied for two and one-half inches by colored vignettes, relating to the subject of the paragraph.

The 149th chapter, to which the fragment belongs, is one of the highly mystical chapters, and, with the 148th, was to be recited on the festivals of the first, sixth and fifteenth days of the month, in order to let the deceased pass the mystical regions of Akar (a kind of Purgatory?) and to allow the soul to come out of them.

The entire 149th chapter contained fourteen parts or "abodes" of the Hades. In this papyrus we have the eleventh, twelfth, thirteenth and a portion of the fourteenth or last: but even the first three are not complete.

Almost all the vignettes have demons with swords in their hands. The first vignette (eleventh abode) contains a zigzag path, which is not a staircase as it appears for want of perspective, and two demons. One of them is female and lion-headed, with two swords; the other is male, a Cynocephalus God, also with two swords.

The following vignette (twelfth abode) contains a hippopotamus demon with axe-blade containing four swords.

The thirteenth abode contains the goddess Thaur or Thoueris, a concubine of Typho, the evil genius *Sĕpu*, with the features of hippopotamus and holding a scarabæus.

In the papyrus of Turin there is also a bareheaded god with bow and arrows; in its place are three horse-shoe-shaped abodes.

The last vignette is very much mutilated, but, with the help of the other rituals, we can reconstruct it. We have a crocodile, a hawk and an antropo-sphinx anubis, a Shes or tie God adoring, hawk again, befaced demon with swords, nit and horns.

According to the very regular writing of hieratic text, the colors of vignettes and the differences from other texts, we can say that this fragment belongs to the twenty-first dynasty, like one of those extracts made for religious purposes, preserved in the temples in order to be recited on the festivals of Uka or Thoth, the birthday of Osiris, the manifestations of Khem and the night of the hakr.

The first line of each column, containing the title of the paragraph, is written in red ink, all the others in black.

Although there are seventy-eight fragments of the "Book of the Dead" (of which twenty-five only in England and seventeen in

Paris), the Baltimore fragment is one of the few in America, and it is interesting on account of its fine handwriting and its completeness in the titles of different columns or paragraphs.

Besides that, in our fragment there are some variants worthy of note.

In the beginning of the eleventh abode we find a mention of "Osiris, Lord of Tattou" (Ȧusar neb Tattu . . .), which is never seen in the other texts.

All the phrases which in the Naville complete edition are erased are here clearly legible; even in the beginning of the twelfth abode, when in this fragment is written, "Osiris who opens the doors of heaven" (Ȧusar un āā pet . . .); in all other fragments this phrase is always wanting.

Equally, in the beginning of the last or fourteenth abode, the phrase, "Ammon in Thebes" (Ꞁmen em Ȧptet), is not to be found in any other edition.

CALENDAR OF THE CORRESPONDENCE OF BRIGADIER-GENERAL GEORGE WEEDON, U. S. A., WITH CELEBRATED CHARACTERS OF THE AMERICAN REVOLUTION.

In the Library of the American Philosophical Society.

Prepared under the direction of the Committee on Historical Manuscripts.

(*Read May 5, 1899.*)

LETTERS TO GENERAL WEEDON.

Blair, Archibald:

1780.—*September 6. In Council.*—Proposition from Col. Robert Lawson to raise a body of volunteers to march to the southward, accepted. Detailed enumeration of conditions under which they shall serve. (Copy) No. 40.

1781.—*April 4. In Council.*—Extract from the minutes. Rule of exchange of prisoners to be adhered to as far as possible, calling for such citizens first as have been longest in captivity. If enemy think proper to liberate *absolutely* any number of captive citizens, an equal number of theirs shall be liberated. No. 75.

BLAND, THEODORICK:

1783.—*March 25. Philadelphia.*—Rejoicing over the declaration of peace. Our debt of gratitude to France.

P. S.—Commutation of five years' whole pay in lieu of half pay, allowed by Congress to officers of the army. No. 145.

DAVIS, WILLIAM:

1781.—*June 25. War Office.*—Wishes to know if arms sent arrived at Fredericksburg. Desires his assistance in getting boats for the Marquis, and also in meeting his demand for 600 arms. Dimensions and cost of boats. Congratulates him on the capture of Augusta with 160 British, 200 Tories and about 200 negroes, six pieces of cannon and various stores. On the 8th inst., Gen. Greene's approaches were within 50 yards of the enemy's works at Ninety-six. Offer of capitulation rejected. Reinforcements from Augusta hourly expected to join Gen. Greene. Enemy's only posts, Charlestown, Savannah and Monk's Corner. Georgetown evacuated. Will be in Charlottesville before he can receive an answer. No. 137.

DESBIGUES:

1781.—*June 6. Falmouth (in French).*—Asking for a permit to cross the river. Intends to debark at Leedstown for Cadiz to command the volunteers. No. 109.

ELWELL, JESSE:

1781.—*June 13. Prince William.*—Received orders from Gen. Nelson to send to camp every man of the militia who can be furnished with a rifle, and all horses except those employed in agriculture. Desires advice as to the carrying out of these orders. No. 121.

GRAHAM, RICHARD:

1781.—*June 14. Dumfries.*—Concerning the making of swords or sword hilts. Mr. Caves' offer to make 50 hilts if paid for them in tobacco. Desires his opinion on the intended movements of Cornwallis. No. 122.

GRAYSON, WILLIAM (Col.):

1780.—*October 23. Philadelphia.*—Encloses newspapers. Letter from Mr. Richard Harrison, at Cadiz, mentions destruction of

GRAYSON, WILLIAM (*continued*):

an English fleet of merchantmen. Col. Febiger's zeal in procuring clothes and tents attended with only moderate success. Afraid army will be distressed for woollen clothing and blankets. Will squeeze out about 500 suits for the Virginia line. Blames Virginia for not properly clothing her troops.

N. B.—Gen. Greene to command to the southward. Parsons promoted to rank as Major-General. Heath commands at West Point. No. 45.

1781.—*April 24. War Office.*—Warning him of the reported embarkation of Gen. Clinton for the southward with 3000 men. Believes they meditate immediate descent on Virginia to coöperate with Cornwallis for the conquest of that State and North Carolina. Has private intelligence that French fleet destined for America has not yet sailed. Wayne to set out in a day or two. Scarcity of cash the reason for his delay. Maryland dragoons in want of everything. Dutch have closed with Great Britain as to hostilities. Major Anderson of Virginia and several other officers exchanged by Gen. Moultrie. Cornwallis' threat to send all American officers to Jamaica.

P.S.—In future will not sign his name to any letter, as the British make a point of seizing post-riders and publishing the letters. No. 86.

1781.—*May 29. Philadelphia.*—Detailed account of arms ready to be sent on, and those in preparation. No money in Virginia to buy anything, and no credit. Wayne on his way to Fredericksburg. Six hundred new levies expected from Maryland and Delaware. With Moylan's horse and Steuben's 1200 cannot Cornwallis be faced? Evacuation of New York not so improbable. Conjectures concerning the destination of the last detachments from New York. Advices from Europe most hopeful. No. 95.

1781.—*June 5. Philadelphia.*—Desires more particular intelligence concerning the Marquis' whereabouts, and the number of his (Gen. Weedon's) own force. By July 1, there will be sufficient arms in Virginia for every purpose. Three battalions of militia ordered from Maryland and four from Pennsylvania. Incloses list of arms sent on. Will send by every post further

GRAYSON, WILLIAM (*continued*):

details. Will push hard to get leave to go to Virginia, after arranging matter of arms. No. 106.

1781.—*June 5. Philadelphia.*—Asking that an officer may be sent to Noland's Ferry, who shall remain until July 1, to direct the waggoners where to take the arms. No. 108.

1781.—*June 12. Philadelphia.*—Acknowledging letter of 5th inst. List of arms sent. Upwards of 200 muskets repaired daily. Swords and pistols not so numerous, but promises a certain number. Has informed the Marquis of these matters and has suggested the propriety of collecting and stationing a body of volunteers at Leesburgh. Heard that the Duc de Lauzun's corps were at Lebanon, but uncertain whether their destination is Virginia. Advises skirmishes, but no general action. No. 120.

1781.—*June 18. Philadelphia.*—Acknowledging letter, and glad to hear that matters are not so desperate. Fears the Marquis will risk a battle. Great superiority of the enemy's cavalry. Mentions various reinforcements if only the Marquis will wait for them. Assembly of Pennsylvania doing nothing, still debating the advisability of sending troops to Virginia's aid. Convulsed by faction and ruled by Republican party. President of the State desires the measure, and also the command of the troops, if they march. News of arrival of ships at Boston containing 1200 recruits and military stores for French army at Rhode Island. Also news too good to be true of the arrival in Boston of the Alliance and Lafayette with food and clothing. Difficulty in getting waggoners to carry the arms, several of them having been taken by the enemy. No. 129.

1781.—*June 26. Philadelphia.*—Clothing and 200,000 cartridges despatched to the Marquis, also arms, which were repaired. Moylan will leave Lancaster in two days with 60 dragoons well accoutred. Arrival of Capt. Barry at Boston in the Alliance. Parted, at sea in a gale, with the Lafayette, containing all the arms and clothing. Safety of this vessel of more importance than three victories. Pennsylvania doing well. Reasons for thinking Gen. Weedon ought not to join the Marquis. Desires his opinion of rampart arms. List of arms ordered. No. 140.

GREENE, NATHANAEL (Gen.):

1777.—*February 24. Basking Ridge, N. Y.*—Acknowledging letter of 23d inst. Ignorant who gave Col. Guyger orders to come to his department, but will arm them. Col. Piper's detachment to join Gen. Putnam. Attack made on foraging party of enemy, from Amboy, 4000 strong. Enumerates casualties on both sides. Col. Johnson, with party of Maryland militia, attacked enemy, but, just as they were in his power, his party cowardly deserted him. Will send prisoners, taken by Gen. Warner, to Morristown.

N. B.—Enemy killed two of the inhabitants because they did not assist them to carry off their dead. No. 2.

1782.—*April 22. Headquarters near Dorchester.*—First part of letter personal and amusing. In latter part, speaks of ragged and destitute condition of the army. Complaints of officers and men. Not a good condition in which to face a superior enemy. Not a drop of spirits in camp. No. 142.

1782.—*October 1. Headquarters.*—Congratulations on the approaching peace. Evacuation of Savannah and Charleston, old news. Refugees embarking for St. Augustine—no greater punishment Their situation there deplorable: no shelter, no food. Resentment of people too strong to admit pity. Expects whole British army to be gone by the 12th or 15th. His work being completed, hopes to go North. Took pride in getting rid of enemy without foreign aid. Prospects flattering, but vigilance still needed. Meeting of officers to be held in January to learn their wishes in respect to returning from, or continuing in, service. For himself, desires, above everything, to be a private citizen. Particulars about Col. Washington's and Lt. Col. Lee's marriage. Remembrances to friends. No. 143.

HENDRICKS, JAMES (Col.):

1781.—*May 15.—Alexandria.*—Reporting unnecessary delay in the carrying of a letter from the Marquis to Gen. Wayne. Desires the matter to be looked into and the delinquent punished. No. 93.

1781.—*June 19. Alexandria.*—Acknowledging letter of 17th inst. Capt. Moore, commanding Volunteer Light Horse at

HENDRICKS, JAMES (*continued*):

Georgetown, does not think he is justified in moving without the Governor's instructions. Such punctilios a pity. Hears the Executive of Maryland has never been called on, officially, for her aid; if true, wishes the Marquis would call on them. Can find no shoes in town. Must get County Commissioner's assistance to procure vinegar and spirits. Will do all in his power. No. 133.

HOLMES, JOSEPH:

1781.—*June 5. Winchester.*—Acknowledging letter of 2d inst., concerning the guarding of prisoners. Renders account of the prisoners, their number and rank. No. 105.

JEFFERSON, THOMAS:

No date.—Executive will impress necessary boats. Light boats being built but not to be depended on. No. 30.

1780.—*July 28. Richmond.*—Asks for duplicate certificates, setting forth at what time the regiments were taken on the Continental establishment, whether armed by the State, and how many arms they carried. No. 32.

1780.—*October 22. Richmond.*—Received this day certain information of the arrival of a considerable fleet of the enemy in the bay, and of their intended debarkation. Measures taken to oppose them. His (Gen. Weedon's) presence needed to aid in the command, also Gen. Muhlenberg's, Gen. Nelson's and Gen. Stevan's. No. 43.

1780.—*November 3. Richmond.*—State of magazine renders it essential that not a single arm shall be lost. No militia man who has received a public arm shall be discharged from duty until he has returned it, or given a satisfactory account of it. If he omits to do this, he shall be declared a deserter. No. 52.

1780.—*November 6. In Council.*—Every kind of necessary in future to be impressed according to the directions of the invasion law. One hundred copies of this clause to be printed. The State Quartermaster directed to spare to Mr. Southall two of the three wagons he has. Question as to who has the right of appointing the surgeon and the surgeon's mate. Encloses £125 new money, only kind issued from the treasury, equal to

JEFFERSON, THOMAS (*continued*):

£5000 old money. Offers any aid in their power to promote operations in the laboratory. No. 55.

1780.—*November 7. In Council.*—Encloses Militia Commission to Mr. Triplett, to enable him legally to impress provisions and necessaries. No. 56.

1781.—*March 31. In Council.*—Statement of the number of militia needed to relieve those first called upon. Discusses speediest way of obtaining reinforcements. Master Alexander Frazier Gregory to be permitted to land and proceed to Urbana, on account of services rendered Gen. Woodford by his father. Encloses letters to be delivered to the Flag vessel in James river. No. 64.

1781.—*April 3. In Council.*—Desiring him to see that the militia, ordered to relieve those long in service, proceed to Gen. Muhlenberg's headquarters. Part of Gen. Muhlenberg's forces, having been three months from home, are very impatient. Thinks it wise not to hazard his (Weedon's) detachments more than is necessary. Scouring parties still keep up spirits of the people, protect them from depredation, and, if withdrawn of nights, will, perhaps, be safe. Disposition of vessels containing stores.

P. S.—Very particular attention to be paid to the returning of public arms and ammunition. No. 72.

1781.—*April 4. In Council.*—Acknowledging letters of 1st, 2d, 3d inst. Impossible to send additional arms at present. Any men from the counties destined for the present tour, who cannot be armed, may be sent to Gen. Muhlenberg, whose riflemen will not stay until reliefs arrive. Encloses resolution of Council concerning exchange of prisoners under general rules, the advantage of which will result equally to the lowest and highest citizen. Right of turn an insuperable obstacle to every proposition for the exchange of Col. Curle. Desires Col. Curle's enlargement may be obtained on such a parole as a man of honor could sign. Our kindness to captive English officers should render refusal difficult. Encloses list of prisoners for exchange, soldier for soldier, sailor for sailor, etc. No. 73.

JEFFERSON, THOMAS (*continued*):

1781.—*April 23. Richmond.*—Inclosing letter forwarded by Baron Steuben. Anxious to know if it is an answer to proposition for exchange of prisoners. On 18th enemy came from Portsmouth up James river, force unknown. Landed in two bodies; one at Burwell's Ferry, the other near the mouth of Chickahominy river. Upper party proceeded to shipyard. What injury they did unknown. Stores eight or ten miles higher up. On 22d, enemy left Williamsburg; their future movements doubtful. Enumerates counties from which all men able to bear arms are ordered to assemble at Petersburg. No. 85.

JENIFER, DANIEL, OF ST. THOMAS:

1781.—*June 5. Philadelphia.* — Meeting of foreign powers. Thinks France will procure us favorable terms, if not from justice then from policy. Trusts the Marquis will check Cornwallis. Grayson indefatigable in procuring arms. Four battalions likely to be sent at once to the aid of Maryland or Virginia. Advantage to Pennsylvania if she had delayed a little longer the selling of British property. No. 107.

JONES, JAMES:

1781.—*June 17. Bowling Green.*—Announcing his advance to join the Marquis with a troop of volunteer horse raised in Gloucester county. Ignorance of the enemy's whereabouts and terrible condition of his horse's hoofs determined his march to Fredericksburg. No. 125.

LAFAYETTE, MARQUIS DE:

1781.—*April 27. Bowling Green.*—From information received, thinks enemy has landed, near 3000 strong, and taken Petersburg. Intends leaving for Richmond on the following morning. Small force of horse or men necessary to the Governor's safety and his own in Richmond. Arrival of artillery under Galvan of the utmost importance. Requests him to give Galvan any militia and mounted men he can collect. Must be pushed on night and day. Importance of keeping Richmond. No. 92.

1781.—*May 28. Hanover county.* — Public stores and much private property having been removed from Richmond. A

LaFayette, Marquis de (*continued*):

defeat at present is not worth risking. Road from Hanover Court house to Richmond being unsafe, will remove to Allen's Ford, south of Anne river. Requests that the militia and the expresses shall be ordered to that ford. Also that a strong force may convey thither the horses, arms and particularly clothing coming from Baltimore and Philadelphia. Enclosed to be forwarded to Gen. Wayne. Leslie reported to have gone down James river to garrison Portsmouth. Wants riflemen, cavalry and arms. Thanks him for his past exertions. No. 94.

1781.—*May 29. Gold Mine Creek.*—Enemy's present plan to march to Fredericksburg; hopes to arrive before the main body. Will be at Anderson bridge the following day at noon. Desires everything to be sent there. Desperate need for dragoons. Enclosed to be sent post-haste to Gen. Wayne. All stores to be moved out of harm's way. Every boat and bridge below the falls to be immediately destroyed. The great want of horses and saddles. Desires him to acquaint the General's mother and also Mrs. Washington with this news, also any others who mean to move. No. 96.

1781.—*June 2. Davenport Tavern.*—Enemy's intention to turn his right flank and prevent his junction with Gen. Wayne. Will move towards Orange Court house, at which place militia must rendezvous, and expresses be sent there. Orders concerning supplies on hand and those on the road.

P. S.—Even bet that the enemy will go straight to Fredericksburg. Leslie and Arnold gone down already with body of troops. No. 99.

1781.—*June 2. Mattapony Church.*—(Written by G. A. Washington, aide-de-camp of LaFayette.) Removal of public stores should proceed. Precautions for his (Gen. Weedon's) safety must be taken, as the main body of the enemy are at Chesterfield, and will probably be in Fredericksburg on the following day. Begs him to acquaint Gen. Wayne with the situation, and to write the commissary of prisons, to hold prisoners in Winchester ready at a moment's warning. On arrival of enemy, destruction of boats must be particularly attended to. No. 100.

LaFayette, Marquis de (*continued*):

1781.—*June 3. Corbin's Bridge.*—Orders concerning the sending forward of the militia, the mails and the stores. No. 103.

1781.—*June 16. Deep Creek.*—Mr. Brown is the bearer of this letter. Enemy moving towards Richmond, followed by him (LaFayette), but difference of ground makes reinforcements an immediate necessity. Desires above all things, cavalry. Directions as to their reaching him at once. Wants all armed and unarmed militia, not belonging to counties north of Rappahannock, to be hurried on to him with the greatest despatch. The terrible need of cartridges and shoes, also rum, for the water is bad. Importance of these things! They must travel night and day. No. 123.

Lee, Richard Henry:

1781.—*June 1.*—Acknowledging letter of previous day concerning the raising of militia in the four lower countries. Westmoreland Court house an excellent rendezvous. Certain that Cornwallis will not come north until English fleet appears in the Potomac. Conjectures concerning the slowness of their advance. Terrible want of all things: arms, cavalry, ammunition, etc. Trusts Gen. Wayne will join him (the Marquis) in a day or two, and that together they will make head against the enemy's divided force. No. 97.

1781.—*June 2. 9 o'clock, Saturday.*—Acknowledging letter of previous day. Will submit it to the Lieutenant of Richmond to be forwarded. Will call out militia and armed men to the number of 200 or 250. Enemy's councils now directed by plunder and revenge. No. 98.

1781.—*June 7.*—Detailed account of the drafting of militia. Two hundred well-armed men will join him at Falmouth, under command of Col. John A. Washington. May expect 500 men from the four lower counties. Enemy's designs in the Rappahannock and Potomac. Fears they cannot be prevented from plundering and burning, since so many men and officers have been detached. Will deliver his letter to Col. Warrington. No. 110.

1781.—*June 25. Westmoreland.*—Informing him that one-half of the Westmoreland militia are ordered to march on the following day. Recommends the bearer, Mr. John Munroe, to his

LEE, RICHARD HENRY (*continued*):

kind attention and begs his influence in procuring him a position in the army, more worthy of his past service. No. 139.

1781.—*July 1. Chantilly.*—Acknowledging his last letter. Lookouts vigilant and on the alert for any sign of hostile fleet. Enclosed letter from the Marquis tells condition of affairs three days before. Reported that Mr. Jenifer of Congress has written to his brother of the evacuation of New York by the enemy. If true, either the southern war will be pushed vigorously, or else they intend to quit the states. Wants powder, cartridge paper and a few arms. No. 147.

MCHENRY, JAMES:

1781.—*June 25. Mr. Savage's House.*—Enemy lay at New Kent Courthouse, from 21st to 24th. This morning, Pennsylvanians moved on the route of his lordship. Militia continue on this ground. Marquis begs that a special messenger be despatched to Annapolis to the officer commanding Moylan's corps. No. 138.

1781.—*June 29. Tyree's Plantation, Twenty Miles from Williamsburg.*—Short account of an action on the 26th between American advanced corps under Cols. Butler and Simcoe, within six miles of Williamsburg. American loss: five officers, two sergeants and twenty-six privates killed and wounded. Enemy had sixty killed and one hundred wounded. Lord Cornwallis in Williamsburg; has received reinforcements from Portsmouth; is shipping off his negroes at York. No. 141.

MCWILLIAMS, WILLIAM:

1781.—*June 20. Camp, Dandridge's Farm.*—Glad to place certain men in the important business of making accoutrements for the soldiery. Gen. Greene's success in Carolina. All the enemy's posts taken, except Charlestown, besides 20,000 bushels of corn, sixteen pieces of cannon, and 500 British prisoners. Enemy have crossed James river at Richmond, after destroying tobacco warehouses and some private property. Apologizes for any inaccuracy on the plea of the scarcity of paper. No. 135.

MEALS, JOHN:

1780.—*October 30. Long Island.*—Bearer of this letter is Capt. Willis, who has been exchanged. Speaks of himself as a prisoner with small hope of liberation. Solicits Gen. Weedon's influence with those in power to procure him a parole. Question of certain rents being due. No. 17.

MERCER, JOHN F.:

1783.—*March 24. Philadelphia.*—Negotiations in Europe happily terminated in a general pacification. Triumph, a French frigate, despatched by LaFayette and Comte d' Estaing, brought the news of the cessation of hostilities. Late confusion in the army terminated in a manner which reflects additional honor on that band of patriots. Results of a slight alteration in the southern boundary. No. 144.

MORTIMER, CHARLES:

1780.—*October 30. Fredericksburg.*—Has sent one hundred weight bark, as requested. Urgent need of medicines for his hospital. Keeps the few medicines he has for private practice. Has sent forward seven or eight patients. None shall be kept that can do duty in field or garrison. No. 18.

MUHLENBERG, GENERAL:

1780.—*September 5. Fredericksburg.*—Wishes to know whether it would not be wiser to keep sufficient arms for the levies that rendezvous at Winchester, Alexandria and Fredericksburg. Encloses returns of arms sent forward and those left behind. As soon as he can make up an officer's command with the deserters brought in, will attend to Gen. Weedon's letter of the 29th inst. No. 39.

1780.—*October 8. Richmond.*—Express arrived an hour before from Gen. Gates with an account that Lord Cornwallis had been reinforced with 1000 men, that the enemy were in motion and had taken Charlotte. Begs for four wagons to enable him to send reinforcements to the General. No. 42.

1780.—*October 22. Richmond.*—Sunday night. Amazingly distressed for want of officers. Wishes every officer from Fredericksburg sent on, also Dr. Wallace, as he needs a surgeon. No. 44.

MUHLENBERG, GEN. (*continued*):

1780.—*October 27. Petersburg.*—Glad to hear of his (Weedon's) arrival at Richmond. Advice as to the arrangement of the new levies. Col. Bufort's letter reports that Col. Campbell, in a late action with part of Fulton's corps, killed seventy of them. Making preparations to march for Cabbin Point. Has ordered London Volunteers to join ninety of Gibson's Regiment. No. 47.

1780.—*October 28. Cabbin Point.*—Arrived at Cabbin Point this morning. Nettled to hear that the English had reimbarked and hauled off into the bay without having a shot fired at them. A British cavalryman, captured, swears he left British troops, two nights before, marching towards Smithfield, and that the forces employed in this invasion number 8000. Believes he lies, but will march the next morning and convince himself. What can he do without cavalry or cannon? Has 140 men without camp-kettles; also companies of 100 men with only one officer. No. 49.

1780.—*October 29. Cabbin Point.*—Favor of 27th at hand. Prisoner's assertions of yesterday confirmed. Enemy about eight miles from Smithfield. Would be there, himself, if he could have procured provisions. Money necessary to get military departments in order.

P. S.—Hears that enemy encamped two nights before at Joseph Scott's, seven miles above Suffolk. No. 50.

1780.—*October 31. Baker's Mills, Isle of Wight.*—Militia, 100 in number, assembled at Cabbin Point, only four muskets among them. Must refer them to him (Weedon) for arms. Has sent out 300 men after a plundering party. Hopes to gain from them a few prisoners to furnish him with proper intelligence. Expects Gen. Nelson in the evening. No. 20.

1780.—*October 31. Col. Allen Cockes.*—The bearer of this, Mr. Bush, can give all the intelligence procured thus far. If possible, will form a junction with Col. Parker, before night, who has 250 men. Will endeavor to surprise enemy's outposts. In great need of horse for reconnoitering purposes. No. 22.

1780.—*November 5.*—Encloses letter for the Governor. Reinforcements received, so trifling that he is obliged to stand aloof and not venture further. Difficulties of his position, the enemy

MUHLENBERG, GEN. (*continued*):

having destroyed all boats. Force of enemy too large to permit of his attacking them. Capt. Gaines with small body of horse surprised the advance picket. Officer of the guard, a Hessian, lost his life through speaking English imperfectly. Any chance of getting arms for militia?

P. S.—Twenty-two bushels of oysters just arrived. No. 51.

1780.—*November 5. Stoners Mills.*—Since writing has received enclosed letters from Gen. Gregory and Col. Lamb. Enemy's present manœuvres make reinforcements at this post absolutely necessary. Advises Gen. Weedon if he moves down to take the nearest route to Stoners Mills. Flag just got to Smithfield from Portsmouth, with letter from Mr. Blair on a very frivolous errand. Intends writing to Gen. Leslie to send flag only when there is something worth communicating. [No. 54.

1780.—*November 11. Stoners Mills.*—Just received his favor by express; glad to hear that he is coming on. Enemy lie still from choice, while he does it from necessity. Has a plan to surprise the enemy's post at Dr. Hall's, but will put it off until Gen. Weedon's arrival. Ship-carpenters not needed at his post. Expects Gen. Weedon and Gen. Nelson to supper Monday evening, "hail, rain or snow." No. 58.

1781.—*April 6. Camp near Scott's.*—Acknowledging letter of the 4th. Sent Gen. Phillips's letter, regarding exchange of prisoners, to the Baron. Enemy's designs uncertain. Thinks their main object a junction with Cornwallis, by which route time only will discover. Two deserters from Portsmouth insist that Gen. Phillips has only two regiments. Advantages of his own position; description of the distribution of his forces. No. 77.

1784.—*February 15. Philadelphia.*—Acknowledging favors of 10th and 18th of January. Never received letter enclosing Act of Assembly. Inconvenience of having to set out at once at such short notice for the meeting at Louisville. Instructions concerning personal money matters in case he fails to return from this expedition. Laments the selling of Gen. Weedon's lands and the consequent end of their fishing together. The effect on Mrs. Muhlenberg. Would like to send by post some new books, but it costs too much. Baron Steuben hard at work. No. 150.

MUHLENBERG, GEN. (*continued*):

1786.—*July 18. Philadelphia.*—Delay in getting letter of May 29th. Prize money cannot be drawn unless tickets are presented. Sends bundle of newspapers and the anniversary oration, delivered by Major Jackson before the Society of Cincinnati. The purchase by him and the vice-president of the famous Big Spring tract in Berks Co., Pennsylvania. A description of its advantages. (Note on back of MSS., dated October 12.) Speaks of letter on other side, dated three months before. No time since to write. No. 151.

NELSON, THOMAS.

1777.—*October 28. Williamsburg.*—Wishes to know if report is true that Burgoyne has really surrendered. If true, will not independence be immediately established? Attack on Fort Mifflin, having failed again, their momentary possession of Philadelphia will avail them little. His (Nelson's) sympathy with the army, but his strong wish to raise a body of men, not thought proper at this time. Promises to do it in the future. The Assembly appointed to meet nine days before, has not yet made a House. Terrible remissness at such a critical time. Fears the enemy will hear of it. Nine ships of war in Hampton Roads; their object, perhaps, an attack on Portsmouth. Enemy in want of water. Trusts they will not be able to relieve their distress in Virginia. No. 7.

1777.—*December 19. Williamsburg.*—Acknowledging favor of 27th inst. Letters from York report that Gen. Howe has marched to Chestnut Hill with entire force and an engagement hourly expected. Wishes a general battle could be avoided. Condition of our men compares unfavorably with the enemy's. Also, a defeat on our side might prevent France from declaring war on England. Bill, brought into the House by him, to raise 5000 men to serve six months, thrown out. Might interfere with completing the regular battalions. No. 10.

1780.—*November 3. Williamsburg.*—Acknowledging letters delivered by Captains Prosser and Kirkpatrick. Difficulty of arranging militia when they arrive in such small detachments. One regiment under Col. William Nelson will take their station below York; he needs a Lieut.-Colonel and a Major. Will form light corps for Captain Kirkpatrick as requested.

NELSON, THOMAS (*continued*):

Getting together flat-bottomed boats. In great need of arms, also of men to repair them. Enemy prevented his crossing the river to meet Muhlenberg. No. 29.

1780.—*November 4. Williamsburg.*—Orders just issued to bring boats at the shipyard to Burwell's Ferry. Before receiving his letter of 2d inst., had sent two detachments of horse to Gen. Muhlenberg, and a third will follow. Col. Southall with part of his troops is around Hampton, sent thither as a man of discretion to prevent any intercourse between the enemy and the inhabitants. Thinks he ought to stay there, but, if necessary, will send him to join Gen. Muhlenberg. Medicine needed. No. 53.

1780.—*November 22. Rich Neck.*—Acknowledging letter of the 19th. Does not understand why English fleet remains in Hampton Roads. They have an idea that his (Nelson's) force is 3000 strong. Several negroes have joined the English. Prospect of a glorious ending to the campaign. Detached condition of his brigade. No. 59.

1781.—*June 18. Leeds.*—Informing him that he has sent up six prisoners under guard. Incloses proceedings of a general court-martial held for their trial. Necessity of guarding them closely. Incloses also general return and copy of circular letter to the county-lieutenants of Northumberland and Lancaster, on back of which is a copy of orders to the officers commanding two companies for the defence of Westmoreland and Richmond. His present command the most pleasant in all his military experience. Forming legions of Westmoreland and Richmond, in order to furlough the rest of his command. Question of cavalry. No. 131.

1781.—*June 19. Leeds.*—Concerning the trial of some "vile rascals." Happy effects produced by this tribunal. When it is over will send prisoners under guard to him to be forwarded to their respective destinations with statements of their crimes and the sentence of the court martial. More about the granting of furloughs. Begs permission to go and assist his family who are without food, raiment or lodging. Complains of never receiving a line from any militia officer. Houses burned by enemy. Robberies committed by enemy's privateers since

NELSON, THOMAS (*continued*):

the flag vessel went up to Alexandria; this matter ought to be looked into. No. 132.

1781.—*July 2. Charlottesville.*—Indisposition prevented his answering despatches before. Thanks him for his vigilance and activity in apprehending tories on the borders of the Rappahannock. Desires some intelligence respecting the disaffected. Montague's being tried by a court-martial may bring matters to light. Other measures which might be taken. No. 148.

PAGE, MANN:

1777.—*April 22. Philadelphia.*—Mrs. Page's illness prevented an earlier reply. Best Generals think the enemy's principal attack will be against this place. On Sunday, 13th inst, nine of their men-of-war came into this bay. Camp ordered by Congress to be formed under Gen. Schuyler on west side of Delaware. Enumerates the reasons for it. Gen. Washington approves in part, and ordered camp to be formed at Bristol. Enemy anxious to obstruct trade of Philadelphia. Their army mouldering away with sickness. On 14th Gen. Steven surprised enemy's pickets, killed seven and took sixteen prisoners.

P.S.—Surgeon has gone to Dumfries to inoculate southern troops. No. 4.

PARKER, (Col.):

1777.—*January 24. Springfield.*—Detailed account of a fight on the road leading from Brunswick landing to Woodbridge. Col. Parker's superior officer, Col. Buckner, left on horseback as soon as firing began, and riding four miles to his quarters, announced that all was lost. By this desertion Col. Parker was forced to draw off his troops, none being wounded and only two taken. English loss nearly one hundred killed and wounded. Charges Col. Buckner with cowardice. No. 1.

PRYOR, MAJOR:

1781.—*April 9. Richmond.*—Agreeable to request, has procured a proper vessel as a floating magazine, to be stationed at Sandy Point. Promises shortly to supply a sufficient quantity of ammunition. No. 82.

STEUBEN, BARON:

1780.—*November 23. Richmond.*—His letter of the 19th to Gen. Greene, arriving too late, was delivered to him (Steuben). Desires to see Gen. Weedon and have his advice and assistance in arranging the military department. No. 60.

1781.—*March 21. Suffolk.*—Instructions to march with the troops under his command to York, to cover the battery at that place. Troops at Halfway House to remain there. All boats collected in College Creek to go immediately into Chickahominy river. Vessels to go as high up James river as possible. No. 62.

1781.—*April 1. Chesterfield.*—Rejection of his proposals by the Government. Prospect of accelerating departure of new levies by no means flattering. Gen. Greene very pressing to have cavalry completed; at a loss how it's to be done. Had enemy chosen to disembark all their forces, and make a descent on north side of river, very little resistance could have been made. Believes however that the enemy intend rather to carry most of their force round to the support of Cornwallis. Fears for Gen. Greene, and also for French troops in the fleet. Recommends him to keep up correspondence with Gen. Muhlenberg. Desires immediate information of whatever passes. No. 66.

1781.—*April 11. Richmond.*—Acknowledging letter of 10th inst. Gives his reasons for not ordering back the militia. Gen. Weedon's presence, however, needed there at once. News of the arrival at Fredericksburg of four field pieces and ammunition, conveyed by a detachment of Maryland troops under Col. Stewart. These together with Gen. Weedon's forces should prevent any considerable damage. Desires some word as to his movements and those of the enemy. No. 84.

THORNTON, (Col.):

1781.—*June 3.*—Enemy began their retreat at 4 o'clock this morning from Stells. Left two of their men hanging on a tree and several negroes with the small pox. Desires this intelligence to be sent to the Marquis. Wishes to know where Wayne is. No. 102.

WALKER, JOHN:

1780.—*October 24. Philadelphia.*—Acknowledging favor of the 10th inst. Defeat of Ferguson encouraging. In a few days Col's Meade and Harrison will arrive in Virginia with all the news. Hopes to write him from Fredericksburg about the middle of November. Gen. Greene to take command of southern department.

P.S.—News just received of the capture of about 50 of the British East and West India fleets by the French and Spanish fleets off Cape Finistere. No. 46.

WASHINGTON, GEORGE, (General):

1777.—*March 27. Morristown.*—Acknowledging letter of 10th inst. Question of the promotion of Captains Washington and Thornton. Hopes Thornton will exert himself to the utmost to facilitate the recruiting of Thruston's regiment, as the latter's wound keeps him quiet. No sign of the recovered soldiers of the 3d regiment. Negligence and disobedience of officers must be remedied by strong measures. Indignant at the idea of a leave of absence for himself or his officers at such an important point in the campaign. Cannot consent to Gen. Weedon's being longer from the army than May 10th. Orders all officers of the Virginia troops, with certain exceptions, to join the army at once.

P.S.—Vessels with war stores arrived at Boston from France. Two prizes just taken, in the harbor also. No. 3.

1777.—*May 26. Morristown.*—Obligatory instructions concerning the army. Every soldier, with certain exceptions, to join his corps immediately. Each regiment in his (Weedon's) brigade to be completed to the establishment. Return of the brigade to be rendered every Monday. Find out cause of frequent desertions; call rolls regularly; no furloughs to be granted except in cases of extreme necessity. Careful supervision of the men's accoutrements, food, etc. Accept no resignation of a commissioned officer. What to do in case of a vacancy. Make up and deposit pay rolls in the hands of the Paymaster-General. Avoid heavy baggage on the march. Unless soldiers are sick or lame do not let them throw their arms or packs into wagons. Discourage vice and immorality

WASHINGTON, GENERAL (*continued*):

and gambling. Encourage attendance at Divine worship and amusements. No. 5.

1777.—*October 26. Headquarters.*—Council of war to be shortly called. Desires Gen. Weedon to state his sentiments on the eight questions which follow concerning the plans and welfare of the army. No. 6.

1777.—*December 3. Headquarters.* — Wishes to know by the morning his sentiments on the advisability of a winter's campaign and the practicability of an attack upon Philadelphia with the aid of a considerable body of militia. No. 9.

1783.—*October 24. Rocky Hill.*—Concerning the establishment of the Society of the Cincinnati in each of the southern States. The choice of President-General falling on himself and his duty being to name the place for the general meeting, he must know in which States the Society is established. Desires to know if it has taken place in Gen. Weedon's State. No. 149.

WASHINGTON, JOHN A.:

1781.—*June 9. Major Nelson's, near Price's Ordinary.*—Ship sighted off Blackstone is supposed to be a flag-ship with necessaries for the convention prisoners. Has heard that a considerable fleet of the enemy's ships were at Gwynne's Island; no official account. If able to leave will wait upon him (Weedon) at his headquarters. Number of 1st division short of his expectation. No. 115.

1781.—*June 18. Mont Clear, Westmoreland Co.*—Reasons for his not visiting him (Gen. Weedon). While at Leeds heard that Major Mercer's horse with some infantry had captured some of the enemy's horse, but lost 12 men. Anxious to know the details of the affair, as his son Bushrod was one of the Major's volunteers. Col. Nelson holding a court-martial on several tories; sentence not published when he left Leeds. Believes enemy's vessels to be at mouth of river. Glad militia of certain counties are discharged, as his overseer, who is among them, is sorely needed on his estate.

N.B.—Apologizes for troubling him with enclosures for conveyance. No. 130.

UNKNOWN CORRESPONDENT:

No date.—Giving intelligence of the enemy's forces. Their crossing from Portsmouth to Norfolk 2500 or 3000 strong. Rumored that they are making a push to join Cornwallis.

No. 153.

LETTERS FROM GENERAL WEEDON.

BLACKBURN, (Col.):

1781.—*June 8. Camp, Hunter's Heights.*—Situation of the Marquis LaFayette calls for the aid of every available horse. Lord Cornwallis pointing towards stores in the Southern Communication and the Marquis intending to hang on his rear until reinforced by cavalry and infantry. No. 113.

COMMANDING OFFICER IN BERKLEY:

1780.—*January 21. Falmouth.*—Has been necessary to reinforce the lower counties with 500 of his (Weedon's) best men. Enemy marching in force to Smithfield. Requests him to send two companies of good men by the shortest route.

No. 31.

COOKE, (Major):

1780.—*October 31. Richmond.*—An order to guard small fleet of boats at Hoods, stationed there to transport troops. Utmost care wanted to keep boats in constant readiness. Large smoke on shore, the signal for them to come over. No. 23.

COUNCIL OF VIRGINIA:

1781.—*April 6. Williamsburg.*—Has sent a detachment to cooperate with militia for the protection of Virginia's defenceless counties. Does not wish to draw the farmers and planters into the field in force, but merely to prepare them to act on the shortest notice. Alarm posts and signals to be arranged and arms and ammunition to be ready for immediate service.

No. 76.

DAVENPORT, (Capt.):

1781.—*April 8. Williamsburg.*—Acknowledging letter received that day. Sorry for fate of the Patriot, the result of the disobedience of Capt. Chandler, who was positively forbidden to risk an action. Unless his request to the county-lieutenant

DAVENPORT, CAPT. (*continued*):

for Warwick and Elizabeth City, to detach a body to join Captains Kelly and Davenport, is obeyed, will remove the troops and leave defence of the country to more able officers. Directing him (Davenport) to command the horse and Capt. Kelly the infantry, and both to act in conjunction as his executive officers, regardless of nice punctilios; also, to act on the defensive and keep him fully informed of every transaction.

No. 81.

DAVIS, WILLIAM (Col.):

1780.—*November 23.*—Begging him to forward tents to Gen. Muhlenberg, who is sadly in need of them. Has given militia at Cabbin's Point an order on the Commissary of military stores at Chesterfield for arms. Requesting him (Davis) to send forward such of his militia as are arranged; arms and tents to be given them at Chesterfield, if not provided at Richmond. Hoping to join Gen. Muhlenberg before night. No. 61.

FEBIGER (Col.):

1780.—*August 31. Fredericksburg.*—Orders to him and Capt. Lovely to meet and make a survey of provisions and stores; reporting the quantity fit for use. The report, signed by six gentlemen. No. 38.

GATES (Gen.):

1780.—*September 16. Fredericksburg.*—Will forward shortly the 1000 camp-kettles ordered from Mr. James Hunter. Regrets exceedingly the misfortune near Camden. Second division of the fleet not yet arrived; said to be blocked up at Brest by a British fleet of thirty-two sail. No. 41.

1780.—*November 2.*—Arrangements being made to repel invading foe, who now occupy ground from Portsmouth to Suffolk. Encloses intelligence, gained from a prisoner, respecting enemy's strength, which, though small, cannot be attacked until militia is assembled, officered and armed. Gen. Muhlenberg, with 800 new levies and 80 old soldiers, has passed down James river; hopes he will stop enemy's depredations. Gen. Nelson forming militia at Williamsburg. Three hundred Marylanders to reinforce Gen. Gates' army. Intention of English to cover Lord Cornwallis's operations through North Carolina. No. 26.

GRAHAM, RICHARD :

1781.—*June 17. Fredericksburg.*—Acknowledging letter of 14th inst., and thanking him for procuring the hilts. Marquis in want of vinegar, bacon and shoes; desires his aid in procuring them. British moving toward Richmond. The Marquis at Deep Creek, twenty-three miles above. Lead of any description to be forwarded at once. Begs a quarter-cask of wine for "our good Marquis." No. 126.

GRAYSON, WILLIAM (Col.) :

No date.—*Fredericksburg.*—Begs him to afford the bearer of this letter, Col. Febiger, all possible assistance in obtaining clothing for the new levies; otherwise, operations in Southern department must be exceedingly retarded. No. 14.

1780.—*October 29. Richmond.*—Enemy landed at Hampton and Portsmouth about the 22d; plundered the former place and reimbarked. Every department deranged. Warlike spirit of the Virginians. Using every possible exertion to arrange two armies; one to act on north side of James river, the other on the south. Gen. Muhlenberg has marched down with certain forces. Gen. Nelson at Williamsburg, assembling militia ordered there. Hard work, providing the army with necessaries. News from the South, Cornwallis retreating rapidly. Encloses particulars of Col. Campbell's action with Col. Ferguson; asks to have it published. Unless enemy can be removed from the State before cold weather the troops must suffer terribly from want of all things. In urgent need of tents and other supplies, promised by Col. Febiger from Philadelphia. No. 16.

1781.—*June 8. Camp, Hunter's Heights.*—The Marquis, having waited at Culpepper Church in vain for Gen. Wayne, advanced to Raccoon Ford. Cornwallis expected to strike Southern communication. Tarleton made descent on Charlottesville on the 4th, routed the assembly, and took stores and prisoners. Gives list of ammunition needed by the Marquis. Great and immediate need of clothing and shoes. Earnest appeal for the support and assistance of Congress. No. 111.

HENDRICK (Col.):

1781.—*June 17. Fredericksburg.*—Quotes passage from the Marquis's letter, dated from Deep Creek, speaking of his want of cavalry; also, shoes, vinegar and rum. Begs his (Hendrick's) help in procuring these things. Letter, to the officer commanding Moylan's detachment, must be carried to him with all speed. Steady and close exertions needed to save the country. Best route over which to send brigade of loaded wagons. No. 127.

JEFFERSON, THOMAS:

1780.—*November 3. Richmond.*—Enclosing return of provision stores. Stock on hand very inconsiderable. Sure Mr. Jefferson will obviate the evil.

P. S.—Despatches to Gen. Gates will not require particular express. No. 28.

1781—*April 2. Williamsburg.*—Mr. Armistead will name certain prisoners for exchange, which measure, if approved, will be carried into execution. Asks that marines taken at Warwick, if not yet sent to Richmond, may be detained until answer comes from British general. Has requested a delay of the ships sailing from New York with Col. Curl, uutil his (Jefferson's) pleasure is known concerning the exchange for Col. Allagood. No. 69.

1781.—*April 3. Williamsburg.*—Acknowledging despatches and forwarding those intended for the flag-ship. Incloses trustworthy account, which corroborates Capt. Ross's with respect reinforcements. Believes that the English will endeavor to succour Lord Cornwallis from Portsmouth by penetrating North Carolina. Question of supporting Gen. Greene powerfully and acting solely on the defensive in Virginia. A permanent and proper force of militia needed to prevent enemy from advancing far into the country. Begs for immediate supply of arms.

P. S.—Wishes to be kept advised of the fate of his friend Greene. No. 70.

1781.—*April 25.*—Inclosing copy of Gen. Phillips' letter of 12th inst.; also, papers concerning exchange of prisoners. Gen. Phillips' complaint of an infringement of the sacred rules of

JEFFERSON, THOMAS (*continued*):

flags of truce, as shown in the person of Mr. Armistead. Incloses a copy of Mr. Armistead's credentials. Has sent Gen. Phillips a copy of the flag with the persons' names and the business they went on. Advises the exchange of as many prisoners as the just rules of war authorize, and the choice of a convenient place for exchange. Marquis now crossing the river. Frederick and Barkley men not yet arrived. No. 87.

JONES (Serg't):

1780.—*August 28. Fredericksburg.*—Orders to proceed to the barracks in Albemarle, there take Col. James Wood's orders for recovering some deserters. Let it be known that all deserters may be assured of free pardon if they voluntarily deliver themselves up. No. 36.

KELLEY (Capt.):

No date.—Orders him to go into the lower country and protect the inhabitants, who are themselves to arm and help him. Capt. Davenport's troop of horse to act with him. Bids him contradict a wicked report to the effect that the army intends to evacuate the lower country. No. 13.

LAFAYETTE, MARQUIS DE:

1781.—*June 9. Camp, Hunter's Heights.*—Received the inclosed from Col. Richard Henry Lee, and has sent down an officer to ascertain clearly the truth of the matter. Expresses have been dispatched to Philadelphia for supplies and clothing, as requested. No. 117.

1781.—*June 11. Camp, Hunter's Heights.*—In consequence of the inclosed, has halted troops from below until further advice. Would submit it whether they had better not return to their own counties to defend them against the enemy's depredations. Officer sent down to ascertain truth of Col. Lee's report, not yet returned. No. 118.

1781.—*June 12. Camp, Hunter's Heights.*—Inclosing extract and copy of two letters received from Col. Grayson, respecting arms. Has stationed proper person at Noland's Ferry to forward them, as directed. Militia of King George and Stafford counties have gone home under promise to be ready to take arms at twelve hours' notice. Men from lower counties await his (LaFayette's) orders. No. 119.

LaFayette, Marquis de (*continued*):

1781.—*June 17. Fredericksburg.*—Acknowledging letter of previous day and promising to attend to every part. Wagons to be sent forward. Difficulties in the way of procuring many shoes. Has asked Gen. Morgan to send officer to seize all shoes in factories round about and send them on. Has sent on 750 stand of arms. Difficult to procure cartridges or lead. Has written to a party of horse from Maryland to press forward day and night. No. 128.

1781.—*June 20. Fredericksburg.*—Six wagons starting before night, with 700 gallons of whisky and 300 gallons of vinegar. Rum out of the question. Impossible to get any shoes in this neighborhood; hopes centre in the back counties. Has written about it to the Board of War. Incloses extract from Col. Grayson's letter. Question of equipping a volunteer corps of dragoons at Leesburg. Capt. Dixon's Volunteer Horse from Gloster hope to get off before night and reach camp on Friday. Desires to know the destination of the arms coming from Philadelphia. Number of arms sent forward. No. 134.

1781.—*June 20. Fredericksburg.*—Will cover all the stores that night. Troops under his command on other side of river. In consequence of his (LaFayette's) letter to Major Page, will afford every assistance to Gen. Wayne in his crossing of the two branches of the river. Weather, alarming! Will hold boats in order to recross, unless he receives other instructions. 200 men from King George have joined him.

P. S.—Col. Tupper and Mr. Kingsley on their way to him (LaFayette) with three or four thousand guineas and some despatches. No. 136.

Lewis (Capt.):

1781.—*June 2.* From late intelligence, believes Gen. Wayne's troops will cross Norman's Ford. Orders to impress workmen, tools, rafts or any article which will facilitate their passage over the ford; also, if possible, to send an express to Mr. Bruce, who lives near Raccoon Ford and who owns a saw-mill. No. 101.

Mathews (Col.):

1781.—*March 31. Williamsburg.*—Desiring him to propose an exchange of volunteers taken at Charles City Court house for an equal number of marines taken in Warwick. No. 63.

MUHLENBERG (Gen.):

1780.—*August 28. Fredericksburg.*—Acknowledging letter of 24th inst. Informing him of number of arms sent forward. Regrets extremely misfortune near Camden. Need of provisions and lack of discipline among the militia proved Gates' overthrow. Has opened the general's letters, marked Public Service. No. 146.

1780.—*November 3. Richmond.*—Acknowledging two favors of 30th ult. Arms for troops at Cabbin's Point to be forwarded that day. Col. Southall's troop of horse has crossed to reinforce him (Muhlenberg), as requested. Engaged in getting a strong brigade together; would like any directions respecting the route and the most eligible position to take. If enemy's depredations are confined to Portsmouth and Princess Anne, will it be necessary to assemble such a large body in one place? Enemy's advantage on the water must be attended to. No. 27.

1781.—*April 4. Williamsburg.*—Gained information of Gen. Muhlenberg's situation through opening his letters to Baron Steuben. Enemy will repent making an attack on his side of river unless they come in force. Advantage the English have on the water. Baron Steuben, before leaving, ordered all the boats to Sandy Point; has sent a guard of forty men to protect them. Discusses his own plans and the enemy's. Positions of the two look-out boats. Any hopes of French fleet and troops landing at Cape Fear? Baron Steuben uneasy on their account. Begs to be kept fully advised of every movement. No. 74.

NELSON, THOMAS (Gen.):

1780.—*October 29. Richmond.*—Sends list of officers who the Executive Board have called upon to furnish their militia with field officers; also incloses an order of Council as a guide by which to arrange the troops. Will send Capt. Kirkpatrick to him in a day or two. Intended coming himself, but military matters too urgent. No. 15.

1780.—*October 30. Richmond.*—Introducing Capt. Kirkpatrick, whom he recommends to the command of a volunteer corps; praises his military experience and firmness. Leaves choice of station on James river to Gen. Nelson's superior knowl-

NELSON, THOMAS (*continued*):

edge of country. Will establish another fleet to be stationed at Sandy Point or Hoods. No. 19.

1780.—*November 2. Richmond.*—Acknowledging his favor of 21st ult. Evident that his despatches of 29th and 30th not yet received. Inclosed in them authority to establish a communication between his (Nelson's) troops and the advance body under Muhlenberg. This to be done with the utmost despatch. Wishes Col. Southall's forty horse to be sent to join Gen. Muhlenberg, who is in great need of them. No. 25.

1781.—*June 9. Camp, Hunter's Heights.*—In consequence of the report that the enemy is in the Rappahannock and Potomac rivers, has directed the colonels in the four lower counties to remain at home until further notice. Orders him (Nelson) to take command of troops from counties of Westmoreland, Richmond, Lancaster and Northumberland, to rendezvous at a convenient place and to consolidate, arrange and train the troops. Further minute directions concerning his movements, in case of the enemy's landing at certain points. No. 114.

1780.—*June 10. Camp, Hunter's Heights.*—Marquis de LaFayette desires a reinforcement of horse immediately. Enemy's superiority of horse subjects him to many evils. His position yesterday was near the borders of Orange county, pointing southward. No. 116.

PAYNE (*Gen.*):

1777.—*June 3. Camp, Hunter's Heights.*—Suggesting a change of route to Norman's Ford. Waiting for express returns from the Marquis to determine his own route. Has sent to the ford to make rafts in case the river rises. Evacuated Fredericksburg the night before and has four hundred militia with him. No. 104.

PRESIDENT OF CONGRESS:

1777.—*December 26. Camp, Valley Forge.*—A protest against the injustice of a resolve passed by Congress, which could affect his honor and his rank in the army. No. 11.

RUDE (Capt.):

1781.—*April 27. Fredericksburg.*—Desiring him to send at once all the cavalry fit for duty to join the Marquis, who is on his way to Richmond. No. 90.

RUSSELL, THOMAS:

1780.—*October 31. Richmond.*—Order to collect a fleet of flat-bottomed boats not to exceed twenty, and to station them at Hoods, on James river. No. 21.

SPOTSWOOD (Gen.):

1781.—*April 27. Fredericksburg.*—The Marquis anxious for a few horse to protect him till his reinforcements arrive. He is on his way to Richmond where there is not a man in arms. Enemy supposed to be in Petersburg. Richmond probably their next object. Need for cavalry. No. 91.

STEUBEN, BARON:

1781.—*April 1. Williamsburg.*—Letter of 28th ult. communicated change of position of troops. From information received, expected an attack, therefore drew (our) extended line together. Gen. Muhlenberg's orders were to keep near the enemy's lines, but before he knew their designs, they embarked. 700 of them crossed over to Newport-News with intention of beating up troops at the Half-way House. Finding them withdrawn, they secretly and silently returned. Only nine small and shattered vessels of the enemy got up to Portsmouth with reinforcements. Incloses examination of some deserters. Murmuring of the people consequent on the withdrawal of his troops; has sent detachments there to pacify them. Arms badly needed. Disposition of vessels and boats. No. 67.

1781.—*April 1.* Acknowledging letter of 29th ult. Incloses a letter to him from Gen. Muhlenberg, with an apology for having opened it. Will see by it that the withdrawal of troops from below was exceedingly judicious, the enemy intending to attack some part of the dispersed line. Notwithstanding the necessity of the measure, the people below murmur and threaten to make terms with the enemy. Thinks of sending a light corps there with a prudent officer. Exceedingly distressed for arms. Would like 200 sent on immediately. Disposition of boats. Marquis' barge made prize of a vessel on James river, fitted out on a pirate plan, which had done much mischief to the shores of Maryland and Virginia. Mr. Lane sent the rascals to the Governor to meet their just rewards. No. 65.

STEUBEN, BARON (*continued*):

1781.—*April 3. Williamsburg.*—Apologizing for having opened a letter from Gen. Muhlenberg to him (Steuben). Account of Muhlenberg's confidential agent corroborates that of Capt. Ross. Always his own opinion that the English would try hard to succour Cornwallis by penetrating North Carolina, at the same time, holding a strong post in Virginia to keep them diverted. Fatal consequences should they prove superior in the South. Propriety of supporting Greene. Asks for directions concerning a considerable number of public horses, of no use to his post. Distressed for arms. No. 71.

1781.—*April 8. Williamsburg.*—Inclosing copies of his correspondence with Gen. Phillips, concerning exchange of prisoners. Careful in his letters not to show favoritism. Object of enemy's preparations probably a junction with Cornwallis, but uncertain by which route. French fleet arrived safely at Rhode Island. Sends British account of the engagement of the 16th. No. 80.

1781.—*April 25. Williamsburg.*—Acknowledging letter of 11th inst. from Richmond. Announcing his intended departure for Fredericksburg. Will report on his arrival. Incloses copies of his correspondence with Gen. Phillips. Hopes he has not incurred Baron Steuben's censure by what he has said. Exceedingly desirous of cultivating the liberal idea held out by Gen. Phillips, as it will result in reciprocal advantages. Has directed Col. Innes to take command until Gen. Nelson arrives. Incloses general return of the troops. No. 88.

1781.—*April 26. Fredericksburg.*—Concerning his correspondence with Gen. Phillips about the exchange of prisoners. Advises him to liberate all American prisoners taken in arms. Good results accruing from this. Many prisoners at large in Winchester, some of whom make their escape. Advantage of exchanging these very men for Americans on board prison-ships. Frederick and Barkley riflemen on their march. Unless directed otherwise, will come down with them. No. 89.

WASHINGTON, GEORGE (Gen.):

1777.—*December 29. Valley Forge.*—A detailed account of a permanent system to be adopted in future promotions, regula-

WASHINGTON, GENERAL (*continued*):

tions and arrangements in the army. One-half of the present staff belonging to the army, idle and pleasure-loving; mere sinecures, of no benefit to the public. Reforms needed.

No. 12.

1780.—*August 24. Fredericksburg.*—Present military law for raising 3000 new levies exempts those who apprehend and deliver over deserters. Danger of impositions under this rule. Suggests slight changes in the law. Also proposes that Gen. Washington should offer free pardon to all deserters who deliver themselves up by a certain day. All who escaped from Bluford's rout brought in as deserters; this, of course, wrong. No. 33.

1781.—*April 8. Williamsburg.*—Acknowledging letter, directing the disposal of militia. Incloses general return of counties making his defences on his side of James river. In writing British General at Portsmouth about exchange of prisoners, the list for exchange left entirely to the Executive. Dangers of favoritism; therefore merely hinted at the justness of such a favor, leaving Mr. Armistead to mention Col. Curle as the object of the hint. Desire of Gen. Phillips, as well as himself, to encourage liberal exchanges, therefore begs to be authorized to assure the British General that on his sending out the whole number of prisoners taken in arms, an equal number shall be sent back. Enemy's preparations for a move; nearly all their ships gone out. No. 79.

1781.—*April 11. Williamsburg.*—Has received a report from a Mr. Turberville that a small fleet of the enemy's vessels is in the Potomac. Fears they will visit Hunter's works and the gun factory in Fredericksburg, both important points, totally undefended. Proposes marching some of the troops back for their defense. Names troops whose tour of duty will soon expire, as suitable for that purpose. Thinks Mr. Beal's offer of 1000 weight of lead ought to be accepted. No. 83.

WASHINGTON, JOHN A. (Col.):

1781.—*June 8. Camp, Hunter's Heights.*—Requesting troops to halt, as it appears the enemy are at Guynn's Island in the Potomac. Would like officer sent to get information and to report at once. Gives him leave to impress horses for this service, being careful to return them to their owners. No. 112.

WOOD, JAMES (Capt.):

1780.—*August 28. Fredericksburg.*—Has information of the whereabouts of four deserters. Desires him to send Sergeant Jones to apprehend them. Every one's duty to recover as many deserters as possible rather than allow rascals, after long concealing them, to give them up in order to get excused from service themselves. Gen. Gates defeated at Camden; has retreated to Hillsborough. Particulars not yet at hand. No. 34.

MISCELLANEOUS LETTERS AND PAPERS.

BRADFORD, SAMUEL K., Aid-de-Camp to WILLIAM PRICE, Wagon-Master:

1780.—*August 28. Fredericksburg.* — Orders to proceed with brigade of wagons to Richmond, and to suffer no delay en route. On arriving to apply to Brig.-Gen. Muhlenberg for orders, or in his absence to the officer in command, before unloading. Nature of service requiring utmost expedition and attention. This by order of Gen. Weedon. No. 35.

BRADFORD, SAMUEL K., to WILLIAM WOODSIDES:

1781.—*August 31. Fredericksburg.*—Orders to proceed with utmost despatch to Richmond with brigade of wagons, and to report to Gen. Muhlenberg, or in his absence, to the officer in command, before unloading. No. 37.

JEFFERSON, THOMAS, to MAJOR P. COOKE:

1780.—*November 2. In Council.*—Unless armed elsewhere, the fifty Marylanders passing to the southward can be armed at Richmond. Will countermand all the militia called from the proprietary counties. With this deduction, militia will number 4150, which, with the new levies, will be sufficient. No. 24.

JEFFERSON, THOMAS, to GEN. MUHLENBERG:

1780.—*October 28. Richmond.*—Incloses latest intelligence from north side of river, also advice of Council for regimenting the militia. Leaves it to the General to overcome certain difficulties which must arise between the militia and the regular Captains and subalterns. Incloses names of many resigned and supernumerary officers and dates of their original appointments, also letters to be directed to such as can be got. No. 48.

NELSON, WILLIAM (Col. Commandant), orders from :

1781.—*June 20. Leeds.*—Orders for Capt. —— to take command of a company, to march them to —— county and use utmost exertion to prevent depredations of the enemy; also, to change ground frequently, to keep order and discipline among the men, to attend to the shores of rivers, etc., and to prevent escape of slaves and disaffected persons. No. 124.

PAGE, JOHN, to GEN. WASHINGTON (?) :

1777.—*October 30. Williamsburg.*—Received his two letters, one announcing Burgoyne's surrender. Joy of the troops! Now past ten P.M., and the victory still being celebrated in the streets. Britain's wilful abuse of power. Heaven on "our" side. Confident of ultimate victory. Letter just received from Baltimore says Howe is retreating to his ships and Washington is in possession of Philadelphia. If true, congratulations! George III must see he paid dear for the taking of Philadelphia. Very late and has been obliged to go into the streets to prevent a riot. No. 8.

PHILLIPS, WILLIAM, to GEN. MUHLENBERG :

1781.—*April 7. Portsmouth.*—Protest against allowing individuals to enter within the outposts of the King's forces under his command, unless proceeding directly from an American general officer. Such requests as those respecting negroes may be sent in writing. As regards subject of negroes, refers him to the explanation given by Brigadier-General Arnold. No. 78.

STEUBEN, BARON, general orders of :

1781.—*April 1. Chesterfield.*—Every wagon, horse, etc., impressed since 1st day of January to be collected and returned to Quartermaster at Williamsburg or Suffolk without delay. Inattention to this order an injustice to the public, and shall be treated as such. No. 68.

WEEDON, GEN., general orders from :

1781.—*June 16. Leeds.*—Orders to allow the men of their county furloughs to go home, but to be ready at a moment's warning to repel the enemy, should they attempt to land in force. Humane reasons for the above indulgence of furloughs. Place to have a legion of horse and foot formed in the lower counties to be composed of single men. No. 124.

WEEDON'S (Gen.), handwriting:

1780.—*November 2. Richmond.*—Examination of a deserter, by name Peter Christian (Sergeant). Suggests the countermanding of some of the militia called into service, in consequence of the information gathered from this deserter, a reliable man. No. 57.

No date.—No name. Note relating to the landing of the British at the capes of Virginia. Detailed account of their number and movements. No. 152.

CALENDAR OF THE CORRESPONDENCE OF RICHARD HENRY LEE AND ARTHUR LEE.

IN THE LIBRARY OF THE AMERICAN PHILOSOPHICAL SOCIETY.[1]

Prepared under the direction of the Committee on Historical Manuscripts.

(*Read May 5, 1899.*)

LETTERS TO RICHARD HENRY LEE.

ADAMS, JOHN:

1780.—*March 15, Paris, Rue de Richelieu, Hotel de Valois.* See R. H. Lee's "Life of Richard Henry Lee," Philadelphia, 1825, Vol. ii, p. 137. Vol. ii, p. 199, No. 55.

1785.—*April 29, Auteuil.* See "Life of Richard Henry Lee," Vol. ii, p. 140. Vol. ii, p. 290, No. 78.

1785.—*July 15, Westminster, Grosvenor Square.* See "Life of Richard Henry Lee," Vol. ii, p. 141. Vol. ii, p. 299, No. 80.

1785.—*September 6, Westminster, Grosvenor Square.* See "Life of Richard Henry Lee," Vol. ii, p. 143. Vol. ii, p. 311, No. 83.

ADAMS, SAMUEL:

1773.—*April 10, Boston.* See "Life of Richard Henry Lee," Vol. i, p. 87. Vol. i, p. 71, No. 23.

[1] These manuscript letters are contained in two volumes.

ADAMS, SAMUEL (*continued*):

1774.—*July 15, Boston.* See "Life of Richard Henry Lee," Vol. i, p. 99. Vol. i, p. 61, No. 21.

1775.—*March 21, Boston.* Unfinished letter. See "Life of Richard Henry Lee," Vol. ii, p. 118. Vol. i, p. 133, No. 39.

1776.—*July 15, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 182. Vol. i, p. 215, No. 62.

1777.—*June 26, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 120. Vol. i, p. 325, No. 93.

1778.—*April 20, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 124. Vol. ii, p. 55, No. 17.

1784.—*December 9, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 127. Vol. ii, p. 250, No. 70.

1784.—*December 23, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 128. Vol. ii, p. 258, No. 70.

1787.—*December 3, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 130. Vol. ii, p. 319, No. 85.

1789.—*April 22, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 132. Vol. ii, p. 335, No. 89.

1789.—*July 14, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 133. Vol. ii, p. 339, No. 90.

1789.—*August 24, Boston.* See "Life of Richard Henry Lee," Vol ii, p. 134. Vol. ii, p. 347, No. 92.

1789.—*August 29, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 135. Vol. ii, p. 351, No. 93.

CARMICHAEL, WILLIAM:

1777.—*March 17, Paris.* Slightly abbreviated in "Life of Richard Henry Lee," Vol. i, p. 197. Vol. i, p. 289, No. 84.

CONWAY, THOMAS:

1778.—*May 23, Fishkill.* See "Life of Richard Henry Lee," Vol. i, p. 294. Vol. ii, p. 59, No. 18.

CHASE, SAMUEL:

1776.—*July 30, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 180. Vol. i, p. 219, No. 63.

CHASE, SAMUEL (*continued*):

1777.—*November 28, Annapolis.* See "Life of Richard Henry Lee," Vol. ii, p. 182. Vol. ii, p. 27, No. 9.

1789.—*July 2, Baltimore* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 183. Vol. ii, p. 323, No. 86.

BARON DE KALB:

1777.—*September 16, Bristol.* See "Life of Richard Henry Lee," Vol. i, p. 296. Vol. i, p. 339, No. 99.

1778.—*August 17, Camp at White Plains.* See "Life of Richard Henry Lee," Vol. i, p. 295. Vol. ii, p. 91, No. 27.

DICKINSON, JOHN:

1768.—*August 10, Philadelphia.* Fragment. Merely the ending of a letter. Vol. i, p. 37, No. 15.

1769.—*January 16, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 68. Vol. i, pp. 33, 32, No. 12.

1769.—*June 22, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 76. Vol. i, pp. 31, 30, No. 11.

1773.—*May 30, Fairhill.* See "Life of Richard Henry Lee," Vol. i, p. 91. Vol. i, pp. 36, 35, No. 14.

FLORIDA BLANCA, COUNT DE:

1784.—*October 8, St. Lorenzo.* A letter of introduction for Don Diego de Gardoque, appointed by the King of Spain Minister Plenipotentiary to the United States. Vol. ii, p. 246, No. 67.

GATES, HORATIO:

1778.—*September 23, Danbury.* See "Life of Richard Henry Lee," Vol. ii, p. 227. Vol. ii, p. 102, No. 29.

GERRY, ELBRIDGE:

1789.—*February 9, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 144. Vol. ii, p. 327, No. 87.

GRASSE, COUNT DE:

1781.—*January 8, Paris.* French letter and translation. See "Life of Richard Henry Lee," Vol. i, p. 298. Vol. ii, p. 209, No. 57.

HENRY, PATRICK:

1778.—*June 18, Williamsburg.* See "Life of Richard Henry Lee," Vol. i, p. 195. Vol. ii, p. 63, No. 19.

HOLKER (*French Consul*):

1779.—*April 5.* See "Life of Richard Henry Lee," Vol. i, p. 199. Vol. ii, p. 150, No. 41.

1779.—*April 22, Philadelphia.* Offering to the United States a loan of a million dollars, on behalf of several persons in France. Vol. ii, p. 146, No. 40.

JAY, JOHN:

1823.—*February 12, Bedford, Westchester county, N. Y.* See "Life of Richard Henry Lee," Vol. i, p. 270. Vol. ii, p. 359, No. 95.

JEFFERSON, THOMAS:

1779.—*June 17, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 189. Vol. ii, p. 164, No. 45.

1781.—*March 10.* In council. See "Life of Richard Henry Lee," Vol. ii, p. 190. Vol. ii, p. 212, No. 58.

JENINGS, EDMUND:

1771.—*August 17, London.* Letter slightly abbreviated. See "Life of Richard Henry Lee," Vol. i, p. 50. Vol. i, p. 87, No. 27.

1771.—*December 29, London.* See "Life of Richard Henry Lee," Vol. i, p. 50. Vol. i, p. 111, No. 33.

LAFAYETTE, MARQUIS DE:

1778.—*July 2, Camp at Brunswick.* See "Life of Richard Henry Lee," Vol. ii, p. 105. Vol. ii, p. 73, No. 22.

1779.—*January 7, on board the "Alliance."* See "Life of Richard Henry Lee," Vol. ii, p. 107. Vol. ii, p. 130, No. 36.

1779.—*June 13.* Bidding him good-by on the eve of his departure for Versailles. Compliments him on his son. Desires Arthur Lee's further acquaintance. Vol. ii, p. 156, No. 43.

1779.—*October 7, Havre.* See "Life of Richard Henry Lee," Vol. ii, p. 108. Vol. ii, p. 134, No. 37.

LaFayette, Marquis de (*continued*):

1780.—*December 17, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 109. Vol. ii, p. 192, No. 53.

1785.—*March 16, Paris* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 109.
Vol. ii, p. 282, No. 76.

Laurens, Henry:

1779.—*June 22, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 233. Vol. ii, p. 160, No. 44.

1779.—*August 31, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 234. Vol. ii, p. 176, No. 49.

1779.—*September 28, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 236. Vol. ii, p. 184, No. 51.

1779.—*October 12, Philadelphia.* No further news of Count d'Estaing. Letters from France to Col. F. L. Lee and R. H. Lee; they are to be printed if possible. Two letters to be read in Congress. Salaries of Ministers Plenipotentiary. Refuses vote to Carmichael; his reason for this.
Vol. ii, p. 188, No. 52.

Lee, Arthur:

1768.—*December 27, London.* See "Life of Richard Henry Lee," Vol. i, p. 59. Vol. i, p. 39, No. 16.

1768 or 1769.—*October 9* (probably to R. H. Lee). See "Life of Arthur Lee," Boston, 1829. Vol. i, p. 200; see "Life of Richard Henry Lee," Vol. i, p. 260. Paragraph omitted in printed copy, in which he begs his brother to send to Dr. Fothergill and Dr. Cullen some American wine.
Vol. i, p. 53, No. 19.

1769.—*August 15, Bath.* See "Life of Arthur Lee," Vol. i, p. 194; see "Life of Richard Henry Lee," Vol. i, p. 255.
Vol. i, p. 43, No. 17.

1769.—*September 18, Ipswich.* See "Life of Arthur Lee," Vol. i, p. 190; see "Life of Richard Henry Lee," Vol. i, p. 72.
Vol. i, p. 19, No. 7.

1769.—*November 19, Bath.* See "Life of Arthur Lee," Vol. i, p. 193; see "Life of Richard Henry Lee," Vol. i, p. 81.
Vol. i, p. 17, No. 6.

LEE, ARTHUR (*continued*):

1769.—*November 15, Bath.* See "Life of Arthur Lee," Vol. i, p. 197; see "Life of Richard Henry Lee," Vol. i, p. 258. Vol. i, p. 51, No. 18.

1769.—*December 3, Bow Wood.* See "Life of Richard Henry Lee," Vol. i, p. 75. Vol. i, p. 57, No. 20.

1770.—*May 20, London.* See "Life of Arthur Lee," Vol. i, p. 205; see "Life of Richard Henry Lee," Vol. i, p. 82. Latter part of letter was published, in which he speaks of his five years' law course. Some business about land grants. Vol. i, p. 65, No. 22.

1770.—*October 20, London.* Concerning the slight chance of procuring his brother Richard a secretaryship. Vol. i, p. 121, No. 36.

1772.—*August 17, London.* Much abbreviated in "Life of Richard Henry Lee," Vol. i, p. 83; much abbreviated in "Life of Arthur Lee," Vol. i, p. 206. Part omitted speaks of personal money matters. Death of Mr. Horrocks; character of his successor. Question of school for his nephews. Dr. Franklin's continued stay gives him small chance of the Boston Agency. Influence requisite to obtain for his brother a diplomatic position. Vol. i, p. 91, No. 28.

1774.—*March 18, London.* See "Life of Arthur Lee," Vol. i, p. 207; see "Life of Richard Henry Lee," Vol. i, p. 93. Vol. i, pp. 78, 77, 76, 75, No. 24.

1774.—*December 22, 24, 26, London.* See "Life of Arthur Lee," Vol. i, p. 211; see "Life of Richard Henry Lee," Vol. i, p. 134. Vol. i, p. 107, No. 32.

LEE, CHARLES:

1775.—*September 2, Camp on Winter Hill.* See "Life of Richard Henry Lee," Vol. i, p. 157. Vol. i, p. 151, No. 45.

1775.—*December 12, Camp.* See "Life of Richard Henry Lee," Vol. ii, p. 214. Vol. i, p. 163, No. 48.

1776.—*May 10, Williamsburg.* See "Life of Richard Henry Lee," Vol. i, p. 166. Postscript omitted in published copy. Urges Congress to take *Niagara* and *Detroit.* Too much money and attention paid to fleet. Vol. i, p. 203, No. 59.

LEE, CHARLES (*continued*):

1776.—*April 5, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 215. His private opinion of Pendleton and Bland omitted in the published letter.
Vol. i, p. 195, No. 57.

1776.—*April 12, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 216. Vol. i, p. 199, No. 58.

1777.—*While in Captivity.* See "Life of Richard Henry Lee," Vol. i, p. 180. Vol. ii, p. 42, No. 13.
For answer, see MS. Vol. i, p. 187.

LEE, WILLIAM:

1777.—*December 3, Paris.* Deals with the refusal of the King of Prussia to allow troops in the service of Great Britain to pass through his dominions, *en route* for America. Lord Chatham's speech in the House of Lords.
Vol. ii, p. 31, No. 10.

1778.—*September 21, Paris.* See "Life of Richard Henry Lee," Vol. ii, p. 212. Vol. ii, p. 97, No. 28.

1778.—*October 17, Frankfort, Germany.* See "Life of Richard Henry Lee," Vol. ii, p. 228. Paragraph omitted in published copy, concerning grants of land. Vol. ii, p. 116, No. 32.

LOVELL, JAMES:

1777.—*December 28* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 150.
Vol. ii, p. 37, No. 12.

1778.—*December 18.* Enclosing letter from Arthur Lee to Samuel Adams, dated Paris, July 31. See "Life of Richard Henry Lee," Vol. ii, p. 148. Vol. ii, p. 126, No. 35.

1779.—*August 17.* See "Life of Richard Henry Lee," Vol. ii, p. 146. Vol. ii, p. 168, No. 47.

1780.—*August 31.* See "Life of Richard Henry Lee," Vol. i, p. 231. Vol. i, p. 15, No. 5.

M'KEAN, THOMAS:

1780.—*March 25, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 176. Vol. ii, p. 138, No. 38.

MIFFLIN, THOMAS (Gen.):

1777.—*November 5, Reading.* See "Life of Richard Henry Lee," Vol. ii, p. 173. Vol. ii, p. 13, No. 5.

1777.—*November 12, Reading.* See "Life of Richard Henry Lee," Vol. ii, p. 174. Vol. ii, p. 23, No. 8.

MONROE, JAMES:

1783.—*April 4, King George.* See "Life of Richard Henry Lee," Vol. ii, p. 225. Vol. ii, p. 236, No. 64.

1786.—*May 24, New York* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 224. Vol. ii, p. 315, No. 84.

MORRIS, GOUVERNEUR:

1775.—*Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 154. Vol. i, p. 167, No. 49.
For answer see MS. Vol. i, p. 141.

PAGE, JOHN:

1776.—*February 20, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 199. Vol. i, p. 179, No. 53.

1778.—*July 10, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 200. Vol. ii, p. 75, No. 23.

1778.—*October 15, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 201. Vol. ii, p. 112, No. 31.

PAGE, MANN:

1777.—*September 23, Mansfield.* See "Life of Richard Henry Lee," Vol. ii, p. 203. Vol. i, p. 343, No. 100.

1777.—*October 27, Mansfield.* See "Life of Richard Henry Lee," Vol. ii, p. 203. Vol. ii, p. 9, No. 4.

1778.—*June 23, Mansfield.* See "Life of Richard Henry Lee," Vol. ii, p. 204. Vol. ii, p. 67, No. 20.

PAINE, THOMAS:

1777.—*July 1, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 156. Vol. i, p. 333, No. 96.

PEABODY, NATHANIEL:

1780.—*October 27, Morristown, N. J.* See "Life of Richard Henry Lee," Vol. ii, p. 157. Vol. ii, p. 195, No. 54.

PENDLETON, EDMUND:

1776.—*April 8, Caroline.* See "Life of Richard Henry Lee," Vol. ii, p. 192. Vol. i, p. 223, No. 64.

1777.—*September 3, Caroline.* See "Life of Richard Henry Lee," Vol. ii, p. 193. Vol. i, p. 337, No. 98.

1777.—*October 11, Caroline.* See "Life of Richard Henry Lee," Vol. ii, p. 193. Vol. i, p. 347, No. 101.

1785.—*February 28, Edmundsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 195. Vol. ii, p. 270, No. 73.

1785.—*March 7, Edmundsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 196. Vol. ii, p. 274, No. 74.

1785.—*April 18, Edmundsburg, Va.* See "Life of Richard Henry Lee," Vol. ii, p. 197. Vol. ii, p. 286, No. 77.

"PHILOPATRIA:"

1775.—*June 1, Eastown.* See "Life of Richard Henry Lee," Vol. i, p. 155. Vol. i, p. 143, No. 43.

PULASKI, COUNT:

1778.—*August 13, Wilmington.* See "Life of Richard Henry Lee," Vol. i, p. 296. Vol. ii, p. 87, No. 26.

REED, JOSEPH:

1780.—*April 15, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 175. Vol. ii, p. 142, No. 39.

RUSH, BENJAMIN:

1776.—*December 20, Philadelphia.* See "Life Richard Henry Lee," Vol. ii, p. 159. Paragraph about Mr. Dickinson omitted in published letter. Vol. i, p. 230, No. 67.

1776.—*December 21, near Bristol.* See "Life of Richard Henry Lee," Vol. ii, p. 160. Advice about recruiting the army omitted in published letter. Vol. i, p. 237, No. 68.

1776.—*December 30, Crossides.* See "Life of Richard Henry Lee," Vol. ii, p. 161. Vol. i, p. 243, No. 70.

1776.—*January 6, Bordentown.* See "Life of Richard Henry Lee," Vol. ii, p. 163. Vol. i, pp. 178, 177, No. 52.

1777.—*January 7, Princeton.* See "Life of Richard Henry Lee," Vol. ii, p. 163. Vol. i, p. 265, No. 77.

RUSH, BENJAMIN (*continued*):

1777.—*January 14, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 165. Vol. i, p. 273, No. 79.

1777.—*January 14, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 166. Vol. i, p. 277, No. 80.

SCHUYLER, PHILIP:

1775.—*October 19, Ticonderoga.* See "Life of Richard Henry Lee," Vol. ii, p. 155. Vol. i, p. 159, No. 47.

SHIPPEN, WILLIAM, JR.:

1776.—*December 17, Bethlehem.* See "Life of Richard Henry Lee," Vol. ii, p. 167. Vol. i, p. 229, No. 66.

1776.—*December 20, Bethlehem.* See "Life of Richard Henry Lee," Vol. ii, p. 168. Vol. i, p. 247, No. 71.

1777.—*January 17, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 169. Vol. i, pp. 281, 282, No. 81.

STEPHEN, ADAM:

1774.—*August 27, Berkeley Courthouse.* See "Life of Richard Henry Lee," Vol. ii, p. 207. Vol. i, p. 95, No. 29.

1775.—*February 1.* See "Life of Richard Henry Lee," Vol. ii, p. 208. Vol. i, p. 125, No. 37.

1775.—*February 17.* See "Life of Richard Henry Lee," Vol. ii, p. 210. Vol. i, p. 129, No. 38.

1775.—*September 23, Pittsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 211. Vol. i, p. 155, No. 46.

1777.—*April 22, Chatham.* See "Life of Richard Henry Lee," Vol. ii, p. 211. Vol. i, p. 297, No. 86.

SULLIVAN, JAMES:

1789.—*April 11, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 152. Vol. ii, p. 331, No. 88.

WASHINGTON, GEORGE:

1774.—*August 9, Fredericksburg.* See "Life of Richard Henry Lee," Vol. i, p. 105. Vol. i, p. 83, No. 26.

1775.—*July 10, Camp at Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 1. No postscript in original MS. Vol. i, p. 147, No. 44.

WASHINGTON, GEORGE (*continued*):

1775.—*October 29, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 6. Vol. i, p. 99, No. 30.

1775.—*November 27, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 7. Vol. i, p. 103, No. 31.

1775.—*December 26, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 8. Vol. i, p. 183, No. 54.

1776.—*April 4, Cambridge.* See "Life of Richard Henry Lee," Vol. ii, p. 10. Unpublished P. S. Speaks of the need of a hospital. Vol. i, p. 189, No. 56.

1776.—*May 11, New York.* See "Life of Richard Henry Lee," Vol. ii, p. 11. Vol. i, p. 207, No. 60.

1777.—*January 10, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 11. Vol. i, p. 269, No. 78.

1777.—*March 6, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 12. Vol. i, p. 285, No. 83.

1777.—*April 24, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 12. Vol. i, p. 301, No. 87.

1777.—*May 10, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 15. Vol. i, p. 305, No. 88.

1777.—*May 17, Morristown.* See "Life of Richard Henry Lee," Vol. ii, p. 15. Vol. i, p. 309, No. 89.

1777.—*June 1, Camp at Middlebrook.* See "Life of Richard Henry Lee," Vol. ii, p. 18. Vol. i, p. 315, No. 91.

1778.—*February 15, Valley Forge.* See "Life of Richard Henry Lee," Vol. ii, p. 20. Vol. ii, p. 47, No. 15.

1778.—*August 10, White Plains* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 22. Vol. ii, p. 83, No. 25.

1778.—*September 23, Fredericksburg, N. Y.* See "Life of Richard Henry Lee," Vol. ii, p. 23. Vol. ii, p. 108, No. 30.

1779.—*May 5, Headquarters Middle Brook* (not only to R. H. Lee but to Henry Lawrence and Thomas Burke). See "Life of Richard Henry Lee," Vol. ii, p. 24. Vol. ii, p. 152, No. 42.

WASHINGTON, GEORGE (*continued*):

1784.—*June 12, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 25. Vol. ii, p. 242, No. 66.

1784.—*December 14, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 6. Vol. ii, p. 258, No. 71.

1785.—*February 8, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 28. Vol. ii, p. 262, No. 72.

1785.—*March 15, Mount Vernon.* See "Life of Richard Henry Lee," Vol. ii, p. 32. Vol. ii, p. 272, No. 75.

1785.—*June 22, Mount Vernon* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol ii, p. 31. Vol. ii, p. 295, No. 79.

1785.—*August 22, Mount Vernon* (probably to R. H. Lee). See "Life of Richard Henry Lee," Vol. ii, p. 33. Vol. ii, p. 307, No. 82.

1789.—*August 2, New York.* See "Life of Richard Henry Lee," Vol. ii, p. 36. Vol. ii, p. 343, No. 91.

WEEDON, GEORGE:

1781.—*June 15, Fredericksburg.* See "Life of Richard Henry Lee," Vol. ii, p. 205. Vol. ii, p. 216, No. 59.

1781.—*August 2, Fredericksburg.* See "Life of Richard Henry Lee," Vol. ii, p. 206. Vol. ii, p. 220, No. 60.

1781.—*September 20, Camp, Gloucester Courthouse.* See "Life of Richard Henry Lee," Vol. ii, p. 206. Vol. ii, p. 228, No. 62.

WHIPPLE, WILLIAM:

1778.—*November 8, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 216. Vol. i, p. 120, No. 33.

1779.—*August 23, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 111. Vol. ii, p. 172, No. 48.

1779.—*September 18, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 112. Vol. ii, p. 180, No. 50.

1783.—*April 17, Portsmouth, N. H.* See "Life of Richard Henry Lee," Vol. i, p. 238. Vol. ii, p. 240, No. 65.

WHIPPLE, WILLIAM (*continued*):

1783.—*September 15, Portsmouth.* See "Life of Richard Henry Lee," Vol. ii, p. 113. Vol. ii, p. 232, No. 63.

WYTHE, GEORGE:

1777.—*August 24, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 185. Vol. ii, pp. 336, 335, No. 97.

1777.—*October 18, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 186. Vol. ii, p. 1, No. 1.

1777.—*November 6, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 187. Vol. ii, p. 17, No. 6.

1778.—*August 1, Williamsburg.* See "Life of Richard Henry Lee," Vol. ii, p. 187. Vol. ii, p. 79, No. 24.

LETTERS TO ARTHUR LEE.

ADAMSON, DR. (in Latin):

1766.—*February 22.* Enclosing a leaf (since lost) of some recently discovered plant. Expresses a hope that Mr. Lee will become the botanist of America. Vol. i, p. 1, No. 1.

BARRÉ (Col.):

1771.—*January 31, London.* See "Life of Richard Henry Lee," Vol. i, p. 265. Vol. i, pp. 82, 83, No. 25.

CARDROSS, LORD (afterwards Earl Buchan):

1767.—*October 31, Walcot near Bath.* See "Life of Richard Henry Lee," Vol. i, p. 263; see "Life of Arthur Lee," Vol. ii, p. 345. Vol. i, p. 21, No. 8.

JONES, SIR WILLIAM:

1790.—*October 14, Bengal, Chrisna Nagar.* A letter concerning the legal affairs of Mr. Stepdoe. Postscript dated Calcutta, November 7, 1790. Vol. ii, p. 355, No. 94.

LEE, WILLIAM:

1780.—*August 15.* See "Life of Richard Henry Lee," Vol. ii, p. 231. Vol. ii, p. 166, No. 46.

M'KEAN, THOMAS:

1781.—*September 4, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 178. Vol. ii, p. 224, No. 61.

WILKES, JOHN:

1777.—*November 9, Prince's Court.* See "Life of Richard Henry Lee," Vol. i, p. 264. Vol. ii, p. 19, No. 7.

WYNDHAM, WILLIAM:

1778.—*March 12, Dunkirk.* See "Life of Richard Henry Lee," Vol. i, p. 266. Vol. ii, p. 51, No. 16.

LETTERS FROM RICHARD HENRY LEE.

DICKINSON, JOHN:

1768.—*November 26, Chantilly, Va.* See "Life of Richard Henry Lee," Vol. i, p. 66. Vol. i, pp. 37, 38, 34, No. 13.

1773.—*April 4, Chantilly, Va.* See "Life of Richard Henry Lee," Vol. i, p. 90. For answer see "Life of R. H. Lee," Vol. i, p. 91. Vol. i, p. 29, 36, No. 10.

FLORIDA BLANCA, COUNT DE:

1785.—*October 6, New York.* Impaired health necessitates his retirement from Congress. Assures him that Don Diego de Gardoque has been received with due honor. Desires above all things friendly and commercial relations with Spain. Vol. ii, p. 247, No. 68.

HENRY, PATRICK:

1777.—*May —.* Speaks of accusations made against him by his enemies. Gives hopeful account of the army. Gen. Tryon's wound mortal. Vol. i, p. 211, No. 61.

JOHNSON (GOV.):

1777.—*December 13, Stafford Co.* About the Marylanders trading with the English ships of war. Advises means to prevent its continuance. Vol. ii, p. 35, No. 11.

LEE, CHARLES:

1777.—*February 11, Philadelphia.* See "Life of Richard Henry Lee," Vol. i, p. 181. Vol. i, p. 187, No. 55.

MORRIS, GOUVERNEUR:

1775.—*May 28.* See "Life of Richard Henry Lee," Vol. ii, p. 155. Vol. i, p. 141, No. 42.

PAINE, THOMAS:

1777.—*July 13, Chantilly, Va.* Concerning the importance of France and Spain as allies. Advises their being at once informed of American achievements so far.
Vol. i, p. 331, No. 95.

WASHINGTON, GEORGE:

1777.—*May 22, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 17. Vol. i, p. 313, No. 90.

1778.—*January 2, Chantilly, Va.* See "Life of Richard Henry Lee," Vol. ii, p. 19. Vol. ii, p. 45, No. 14.

1778.—*June 24, York.* See "Life of Richard Henry Lee," Vol. ii, p. 2. Vol. ii, p. 71, No. 21.

WYTHE, GEORGE:

1777.—*October 19, York, in Pennsylvania.* Burgoyne's defeat. Gen. Howe in danger. Speaks of slanders he has been subjected to, in regard to payment of rents. Begs Mr. Wythe to place the matter in clear light before the House.
Vol. ii, p. 3, No. 2.

MISCELLANEOUS LETTERS.

ADAMS, SAMUEL, to DENNYS DEBIRDT, Esq.:

1768.—*May 14, Boston.* See "Life of Richard Henry Lee," Vol. ii, p. 115. Vol. i, p. 25, No. 9.

ADAMS, SAMUEL, to person unknown:

1781.—*January 15, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 126. Paragraph concerning an unpaid debt of $500, omitted in published letter.
Vol. ii, p. 204, No. 56.

EXTRACTS OF LETTERS PROBABLY FROM SAMUEL CHASE:

1777.—*July 1, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 181. Vol. i, p. 327, No. 94.

LEE, ARTHUR, to GENERAL WASHINGTON:

1777.—*June 15, Berlin.* See "Life of Arthur Lee," Vol. i, p. 87.
Vol. i, pp. 321, 322, 320, No. 92.

LOVELL, J., to ——:

1778.—*December 10.* See "Life of Richard Henry Lee," Vol. ii, p. 145. Vol. ii, p. 124, No. 34.

LEE, CHARLES, to LORD PIERCY (a copy):

1775.—See "Life of Richard Henry Lee," Vol. i, p. 281. Vol. i, p. 171, No. 50.

LEE, R. H. (?), to GEORGE PYNCHEON and JOHN BRADFORD:

1777.—*October 16, York, Pa.* Arranging for transport of soldiers. Note in different handwriting. Speaks of Mr. Lee's financial straits. Vol. i, p. 351, No. 102.

SHIPPEN, WILLIAM, to HIS BROTHERS:

1776.—See "Life of Richard Henry Lee," Vol. ii, p. 170. Paragraph relating to family matters, omitted in published letters. Vol. i, p. 251, No. 72.

WASHINGTON, GEORGE, to a GENTLEMAN of VIRGINIA:

1787.—*July 19, Philadelphia.* See "Life of Richard Henry Lee," Vol. ii, p. 35. Vol. ii, p. 303, No. 81.

PAPERS OF RICHARD HENRY LEE.

1766.—*July 25, Westmoreland.*—To the Editor of the *Virginia Gazette.* See "Life of Richard Henry Lee," Vol. i, p. 40. Vol. i, p. 11, No. 4.

1766.—R. H. Lee's opinion concerning the authority of the Committee for King George's county. Vol. i, p. 5, No. 2.

1774.—*October 3.* A resolution moved by R. H. Lee concerning the appointing of a militia. See "Life of Richard Henry Lee," Vol. i, p. 112. Vol. i, p. 116, No. 34.

1775.—*May* – . Letter written by R. H. Lee on behalf of the Delegates of the City of London to the Lord Mayor. See "Life of Richard Henry Lee," Vol. i, p. 153. Vol. i, p. 139, No. 41.

PROC. AMER. PHILOS. SOC. XXXVIII. 159. I. PRINTED JULY 18, 1899.

LEE, RICHARD HENRY (*continued*):

1776.—*October.* Proposed addition to the instructions given the Commissioners going to France, in R. H. Lee's handwriting. See "Life of Richard Henry Lee," Vol. i, p. 188.
Vol. i, p. 227, No. 65.

1776.—Address to the people of Virginia by Richard Henry Lee. See "Life of Richard Henry Lee," Vol. i, p. 37.
Vol. i, p. 257, No. 74.

1776.—A subscription paper drawn up by R. H. Lee, in testimony to Mr. Sear's patriotism. Signed by nine prominent men. Vol. i, p. 255, No. 73.

1777.—*October 24, Yorktown, in Pennsylvania.* Copy of letter by R. H. Lee for the Committee of Congress to Fort Pitt. Concerning the charges against Col. George Morgan.
Vol. ii, p. 7, No. 3.

OFFICIAL PAPERS.

1766.—*February 27.* Draught by R. H. Lee of the articles of the association by the citizens of Westmoreland. See "Life of Richard Henry Lee," Vol. i, p. 34.
Vol. i, p. 9, No. 3.

1776.—*December 29.* Circular letter to the States, draughted by R. H. Lee. See "Life of Richard Henry Lee," Vol i, p. 187. Extract from *Journal of Congress* on back of manuscript. Vol. i, p. 241, No. 69.

1776.—*December 21, Baltimore.* Letter to the Commissioners. See "Life of Richard Henry Lee," Vol. i, p. 285.
Vol. i, pp. 264, 263, 260, 261, 262, No. 76.

1776.—*December 30, Baltimore.* Letter to the Commissioners. See "Life of Richard Henry Lee," Vol. i, p. 290.
Vol. i, p. 259, No. 75.

1777.—*February 19, Baltimore. Letters to Commissioners in France.* See "Life of Richard Henry Lee," Vol. i, p. 291.
Vol. i, p. 283, No. 82.

OFFICIAL PAPERS (*continued*):

1777.—*April 10, Philadelphia. Letter from a Committee of Congress to General Washington.* See "Life of Richard Henry Lee," Vol. i, p. 284. Vol. i, p. 293, No. 85.

1778.—*Copy of a letter from Congress to the King's Commissioners.* Rejects peace as proffered by Great Britain. Vol. ii, p. 123, No. 36.

PETITIONS.

1774.—*March 26.* Petition to the House of Lords, protesting against the Massachusetts Acts. Signed by Sheriffs of London, Franklin, Izard, William Middleton, Arthur Lee and many others. See "Life of Richard Henry Lee," Vol. i, p. 268. Vol. i, p. 117, No. 35.

1775.—*April 5. Fragments of Petition to the King* (drawn up probably by Arthur Lee), beseeching him to dismiss certain ministers and advisors. Vol. i, p. 137, No. 40.

1775.—*Petition addressed to the King by the Lord Mayor, Aldermen and Commons of the City of London.* See "Life of Richard Henry Lee," Vol. i, p. 273. Vol. i, p. 175, No. 51. (Not quite finished in the MS.)

Stated Meeting, May 19, 1899.

Present, 27 members.

Vice-President WISTAR in the Chair.

Correspondence was submitted as follows:

A letter from Dr. Samuel G. Dixon, accepting election as a member of the Council.

A letter was also read from Mr. Dunbar D. Scott, asking for information concerning Messrs. Draper and Rittenhouse, former members of the Society.

Mr. W. V. McKean, on behalf of the Phillips Prize Essay Fund Committee, presented a report and submitted a list of names from which judges for the competition were to be selected.

A communication was read from the Special Committee appointed to pass upon Dr. R. Buti's paper "On an Interesting Fragment of the Book of the Dead," recommending the paper for publication in the PROCEEDINGS of the Society.

The death of Edward Goodfellow, of Washington, D. C., was announced.

On motion, the President was requested to appoint a suitable person to prepare an obituary notice of Alexander Biddle, a lately deceased member.

The proceedings of Officers and Council were then submitted.

Pending nominations for membership having been read, the Society proceeded to an election.

The Tellers then reported that, after a scrutiny of the ballots, the following candidates had been duly elected members of the Society:

Arthur V. Meigs, M.D., Philadelphia.
Samuel M. Vauclain, Philadelphia.
Prof. William Ramsay, Ph.D., London, Eng.
Israel W. Morris, Philadelphia.
John Cadwalader, Philadelphia.
Charles E. Dana, Philadelphia.
Prof. Francis C. Phillips, Allegheny, Pa.
Prof. Arthur S. MacKenzie, Ph.D., Bryn Mawr, Pa.
Prof. Joseph P. Remington, Philadelphia.
Prof. William C. Day, Ph.D., Swarthmore, Del. Co., Pa.
William Brooke Rawle, Philadelphia.
Prof. Marion D. Learned, Philadelphia.
Stuart Wood, Philadelphia.
Harrison S. Morris, Philadelphia.
Waldron Shapleigh, Ph.D., Philadelphia.
Prof. William A. Lamberton, Litt.Dr., Philadelphia.
Milton J. Greenman, M.D., Philadelphia.
Rt. Hon. Sir George O. Trevelyan, London.
Henry S. Pritchett, Washington, D. C.
Henri Poincaré, Paris.
James E. Keeler, Sc.D., Mt. Hamilton, Cal.

The Society was then adjourned by the presiding officer.

MAGELLANIC PREMIUM.

FOUNDED IN 1786, BY
JOHN HYACINTH DE MAGELLAN,
OF LONDON.

1899.

THE AMERICAN PHILOSOPHICAL SOCIETY,

Held at Philadelphia, for Promoting Useful Knowledge

ANNOUNCES THAT IN

DECEMBER, 1899,

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to the author of the best discovery, or most useful invention, relating to Navigation, Astronomy, or Natural Philosophy (mere natural history only excepted) under the following conditions:

1. The candidate shall, on or before November 1, 1899 deliver, free of postage or other charges, his discovery, invention or improvement, addressed to the President of the American Philosophical Society, No. 104 South Fifth Street, Philadelphia, U. S. A., and shall distinguish his performance by some motto, device, or other signature. With his discovery, invention, or improvement, he shall also send a sealed letter containing the same motto, device, or signature, and subscribed with the real name and place of residence of the author.

2. Persons of any nation, sect or denomination whatever, shall be admitted as candidates for this premium.

3. No discovery, invention or improvement shall be entitled to this premium, which hath been already published, or for which the author hath been publicly rewarded elsewhere.

4. The candidate shall communicate his discovery, invention or improvement, either in the English, French, German, or Latin language.

5. A full account of the crowned subject shall be published by the Society, as soon as may be after the adjudication, either in a separate publication, or in the next succeeding volume of their Transactions, or in both.

6. The premium shall consist of an oval plate of solid standard gold of the value of ten guineas, suitably inscribed, with the seal of the Society annexed to the medal by a ribbon.

All correspondence in relation hereto should be addressed

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PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVIII. DECEMBER, 1899. NO. 160.

CONTENTS.

PHILADELPHIA:

THE AMERICAN PHILOSOPHICAL SOCIETY,

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1899.

It is requested that all correspondence be addressed

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Philadelphia, U. S. A.

Members will please communicate to the Secretaries any inaccuracy in name or address as given on the wrapper of this number.

It is requested that the receipt of this number of the Proceedings be acknowledged to the Secretaries.

Members who have not as yet sent their photographs to the Society will confer a favor by so doing; cabinet size preferred.

PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XXXVIII. OCTOBER, 1899. NO. 160.

Stated Meeting, October 6, 1899.

Dr. J. CHESTON MORRIS in the Chair.

Present, 8 members.

Correspondence was submitted as follows:

Letters accepting membership were read from Messrs. Arthur V. Meigs, M.D., Henri Poincaré, Charles E. Dana, William Ramsay, Francis C. Phillips, Sir George Otto Trevelyan, Israel W. Morris, A. Stanley Mackenzie, W. A. Lamberton, Waldron Shapleigh, Milton J. Greenman, William C. Day, Samuel M. Vauclain, Harrison S. Morris, Marion D. Learned, Stuart Wood, Henry S. Pritchett, Joseph P. Remington and William Brooke Rawle, and a letter from James E. Keeler declining membership.

A letter from the Connecticut Academy of Arts and Sciences, inviting the appointment of delegates to the commemorative exercises of the one hundredth anniversary of its foundation. The President was authorized to appoint a delegate.

An invitation from the Mayor of Chalon-sur-Saône to send a delegate to the fêtes accompanying the unveiling of the statue of the Egyptologue, François Chabas. On motion the Secretaries were directed to inform the Mayor of Chalon-sur-Saône that the Society had received the invitation too late for its acceptance.

An invitation, also, to the President, from the Committee on the Unveiling of the Monument to Prof. Guiseppe Meneghini, to be present at the ceremony.

A communication from the French Ministry of Commerce,

inviting the attendance of the Society during the Exposition of 1900 at a Congress for the Study of Popular Traditions, and enclosing the proposed programme of proceedings. On motion it was resolved that the President be requested to appoint a delegate to represent the Society in the Congress.

A letter from Mr. A. Radcliffe Grote, in regard to a fossil butterfly described by Dr. H. Rebel, of Vienna, which confirms Mr. Grote's theories as to the Papilionides, and stating that in consequence of Mr. Grote's papers published in the *Proceedings* of this Society, Dr. Rebel, in the edition of Dr. Standinger's European catalogue, will retain the Papilionides at the head of the system.

The deaths of the following members of the Society were announced:

Daniel Garrison Brinton, M.D., of Media, Pa., at Atlantic City, N. J., on July 31, 1899.

Mr. Frank Thomson, of Philadelphia, on June 6, 1899.

Sir William Henry Flower, K.C.B., F.R.S., of London, England, aged 68 years, on July 1, 1899.

Mr. William P. Tatham, of Philadelphia, aged 79 years, at Atlantic City, N. J., on August 5, 1899.

Prof. Robert Wilhelm Eberhard Bunsen, of Heidelberg, Germany, aged 89 years, on August 16, 1899.

Hon. Charles P. Daly, of New York, aged 83 years, on September 19, 1899.

W. G. A. Bonwill, D.D.S., of Philadelphia, on September 24, 1899.

On motion of Mr. Prime, it was

Resolved, That the President be requested to appoint gentlemen to prepare memoirs of Messrs. Daniel G. Brinton, M.D., Frank Thomson, William P. Tatham and W. G. A. Bonwill, D.D.S.

The following papers were read:

"Results Secured at Aransas Pass, Tex., by the Reaction Breakwater," by Prof. Lewis M. Haupt.

"Genealogical Trees of Butterflies," by A. Radcliffe Grote.

"Gold in the Glacial Drift of the Adirondacks," by Mr. Frederick Prime.

HISTORICAL RÉSUMÉ OF THE EFFORTS MADE TO DEMONSTRATE THE PRACTICABILITY OF THE REACTION BREAKWATER AT ARANSAS PASS, TEX., WITH RESULTS TO FEBRUARY, 1899.

(Plates VI-VIII.)

BY LEWIS M. HAUPT.

(*Read October 6, 1899.*)

NECESSITY FOR IMPROVED METHODS.—Inasmuch as this Society has already set its seal of commendation upon a new method proposed nearly thirteen years ago for the alleviation of ocean bars, it becomes a pleasure to complete the record to date by a brief recital of subsequent events. For some years prior to the filing of the theses, for investigation, in the spring of 1887, I was impressed with the serious obstructions and dangers to commerce due to the prevalence of sand bars on alluvial coasts and the unsatisfactory as well as expensive methods in vogue for their improvement.

In fact, the only harbors of importance on our Atlantic and Gulf seaboard which admitted vessels of over seventeen feet draught at M. L. W., south of New York, were Philadelphia, Baltimore, Norfolk, Port Royal, Pensacola and New Orleans, only six in a coast line covering about 3200 miles. The ruling depths on the bars in many of the other inlets was limited to from eight to twelve feet.

The methods of improvement in general use by maritime engineers to-day are the building of two parallel or convergent jetties for the purpose of concentrating the ebb currents upon that portion of the bar included between them and dredging a channel through this protected area, involving large expenditures for construction and maintenance.

HISTORY.—To remove these barriers from our doors a critical examination was made of a large number of special cases both at home and abroad and by comparative studies of local effects, combined with the operation of the general laws of tides and currents, certain deductions were reached as to the causes operating to produce them. These deductions were formulated in the paper entitled "The Physical Phenomena of Harbor Entrances," submitted to the Society in April, and for which there was awarded the highly esteemed Magellanic premium on December 16, 1887.

Encouraged by this substantial recognition of the merits of the invention, I had the honor to submit the plans to the Board of United

States Engineers having general jurisdiction over river and harbor improvements, in January of the following year (1888), with the view to their introduction by the only parties who could use them. The Board, however, made a report on the 16th of March following, concluding in these words: "The views are purely theoretical, are unconfirmed by experience and contain nothing not already well known, which has a useful application in the improvement of our harbors," thus making a direct issue with the conclusions reached by this Society.

On learning of this report, accidentally, some time later and being anxious to confirm "the views" by establishing a precedent, applications were made to several Chiefs of Engineers in succession, on June 30, July 30 and September 14, of 1888, requesting an opportunity to make a demonstration, but without eliciting any response whatever.

This report of the Board was so directly at variance with the conclusions reached by this distinguished Society, and apparently so erroneous as to the observed movement of littoral drift, that a discussion thereof was carefully prepared and read before this Society on January 18, 1889, under the title, "Discussion on the Dynamic Action of the Ocean in Building Bars."[1]

A copy of this paper was likewise mailed to the members of the Board of Engineers, but elicited no reply. On February 24, 1888, the subject was also presented to the Committee on River and Harbor Improvements of the House of Representatives, attracting much interest and close attention, but no action. Thus the efforts to create additional commercial facilities and to demonstrate the truth of a physical law appeared to be thwarted and there remained nothing to do but to await an opportunity.

This did not occur until 1895, or six years later, when the Government decided to concentrate all the appropriations for the West Gulf coast upon the great problem of creating at least one deep-water entrance at Galveston and abandoned the remaining ports to private enterprise.

Then it happened that Mr. George W. Fulton, President of the Coleman-Fulton Pasture Company, and thoroughly familiar with the conditions at Aransas Pass, Tex., from a residence of over fifty years, and Mr. Brewster Cameron, of Tucson, Ariz., succeeded in persuading the Aransas Pass Harbor Company, holding a franchise

[1] See PROCEEDINGS of March, 1889.

from Congress, to undertake the construction of a breakwater on this plan, after all previous attempts had failed to secure increased depth.

ARANSAS PASS.—It may be well to state just here that this inlet opens into Corpus Christi, Aransas, Copanio and Nueces bays, covering in all about 350 square miles of tidal waters; that the mean range of the tide of the Gulf is but fourteen inches, and that for many years the pass has been drifting southwestwardly at the average rate of 260 feet per year. It is now about 175 miles west of Galveston; is the point farthest west on the Gulf coast of the United States where it is possible to create an inner harbor, without great cost and has consequently a larger extent of tributary territory than any other Atlantic port, with the important collateral of giving the shortest transcontinental haul. Its position is therefore strategic, and but for the lack of sufficient water on the bar it should long since have become the great metropolis of the Gulf. The controlling natural depths were from six to eight feet on the site of the recent bar, while at Galveston they were twelve and one-half feet, which gave the latter place the precedence and caused the termini of the transportation routes to be located at that point.

GOVERNMENT EFFORTS.—The superiority of the more western location, however, led the Government to make several vain attempts to secure a navigable channel at Aransas Pass, and as early as January 13, 1853, Lieut. George B. McClellan reported on the pass which was then some two miles east of its present position, and when, in consequence of its steeper slope and more direct discharge, "the depths were about nine feet, but that the channel was constantly shifting." That was a very different pass from the present one and not comparable with it. Fifteen years later (1869) the citizens of Rockport constructed a short wooden spur dike 600 feet long from the shore of St. Joseph's Island on the north side of the pass, which increased the depth two feet, but which disappeared with the destruction of the dike in a few years by storms.

Surveys were renewed by the Government in 1870–71, but no recommendation to improve was made because of the great expense of building a jetty sufficiently strong to withstand the storms of the Gulf because of the alleged existence of quicksands. This it was said was an "insuperable objection to any such experiment." Nevertheless, after eight years more, or in 1879, it was estimated that a channel twelve feet deep might be secured over the bar by

two jetties at a cost of $759,185, and work was actually commenced on this project by the partial construction of the westerly jetty in 1880. The head of Mustang Island was revetted, sand fences built and other work done during the following decade until operations were suspended in May, 1889, after an expenditure of $550,416, with a resulting depth of seven and one-half feet over the bar. In 1887 it was reported to be eight and one-half feet. In the meantime it should be stated that the project was revised in 1887 so as to secure a probable twenty-foot depth. "The original estimated cost of this work as here revised is $2,052,543.72."[1] Work on the Government jetty, which was of mattresses covered with rock, practically ceased about 1885, when it extended seaward including the shore end 5400 feet, and a few years later it was officially reported to have "disappeared," thus confirming the previous opinion as to the difficulties of maintaining such work at that location.

The condition of the bar at the close of the Government work is shown on Plate VI.

PRIVATE EFFORTS.—The years from 1890 to 1895 were spent in experiments by the Harbor Company which was chartered on the 22d day of March, 1890, by the State of Texas, and which secured the passage of an act of Congress, May 12 of the same year, authorizing it to create a twenty-foot channel at Aransas Pass from its own resources. The tribulations of this company and the failure to secure results during the financial depression of those intervening years need not be recorded. Suffice it to say that a contract was made by Mr. Cameron, acting for the Harbor Company, and Charles Clarke & Co., of Galveston, contractors, on the 3d day of July, 1895, to construct only a part of the breakwater on the plans under consideration. The work of placing the foundation mattresses was promptly commenced during the month and vigorously prosecuted. It proceeded so rapidly and was accompanied by such pronounced results that by the end of October it was stated that there were thirteen feet entirely across the bar (see *Report of Board of U. S. Engineers*, Nov. 22, 1897). This without dredging and at an unfavorable season of the year.

UNEXPECTED OBSTRUCTIONS.—It then transpired that the remains of the old Government jetty, which was reported to have "disappeared," were still in place covered with rock, crossing the bed of

[1] *Report of Chief Engineer*, 1887, Part ii, p. 1432.

the channel and intersecting that portion of the curved reaction breakwater then in place about its middle point (see Fig. 2). It thus acted as a submerged mat or retaining wall to prevent further scour, and as the breakwater subsequently rose, by the deposition of rock, to a plane three feet above the surface a perfect *cul de sac* was formed for the accumulation of sand. The Harbor Company was strenuously urged to remove the obstructing jetty, the existence of which was not suspected, as soon as discovered, but as it had made no provision for this unexpected work either financially or in the contract it was not removed. In consequence a shoal formed reaching to within six and one-half feet of the surface.

THE GOODYEAR CONTRACT AND SUSPENSION OF WORK, MAY, 1897.—This so discouraged the Harbor Company that it was willing to enter into a contract, dated September 12, 1896, with Col. C. P. Goodyear, of Georgia, to complete the entire work and furnish the capital as per an amended agreement dated March 11, 1897. Under these contracts Col. Goodyear exploded 23,350 pounds of dynamite on the old Government jetty and channel between December 18, 1896, and May, 1897, by which he blasted out about 500 feet of the old jetty, thus opening a small breach through which the currents could partially escape seaward, but, being unable to secure the payments, which he had every reason to expect, for work done elsewhere, from the Government, he was obliged to surrender this contract, and since that date, May, 1897, absolutely nothing has been done to create a channel. In fact, so discouraged were the residents of southwestern Texas, as well as the company, that it was decided to request the Government to appoint a Board of Engineers to appraise the work done with a view to its reconveyance to its jurisdiction. Such a Board was appointed by the Honorable Secretary of War June 22, 1897, and submitted its report November 22 of the same year, or only about six months after the work of blasting was suspended, yet it reveals some interesting features to which attention is briefly directed.

REPORT OF THE BOARD U. S. ENGINEERS OF 1897.—It states that between October 30 and November 18 there was "only part of one day that satisfactory soundings could be taken on account of the roughness of the water,"[1] and that this examination gave a depth of eight and one-half feet. The map accompanying this report,

[1] *Vide*, p. 3, Doc. 137, H. R., 55th Cong., 2d Session.

however, shows a channel having a least depth of nine and one-quarter to nine and one-half feet across the bar, which is believed to be a greater depth than had ever existed on the bar in this its most unfavorable position. The *Report*, moreover, states:

"The works built and partially built for the purpose of deepening the channel across this bar have produced no greater depths than were found before these works were constructed."[1]

And again:

"There does not seem any probability that the jetty (meaning breakwater), as now constructed, will of itself secure and maintain any considerable increase of depth in a navigable channel of proper width."[2]

It may seem phenomenal, therefore, that where the eight and one-half feet depth was shown in the chart of November, 1897, there were over twenty-two feet in January, 1899, or an increase of thirteen and one-half feet in a period of as many months, a result which is unprecedented in the annals of harbor improvements, and this without dredging or other assistance, save that derived from the half-completed breakwater reacting upon the partially controlled currents escaping through the breach in the old jetty.

On the other hand, the *Report* states (page 14):

"Since the building of the jetty the position of the channel seems to have become more constant, and, as shown in the following table, the width across the bar to have lessened."

The table referred to shows that between February, 1895, or prior to the beginning of the breakwater, and November, 1897, after work was suspended, the bar had been reduced in width as follows: At the twelve-foot contours the distance across from inside to outside was reduced 550 feet, at the fifteen-foot contours 900 feet, and at the twenty-foot contours by 1600 feet. It is added that "the outside slope has changed but little; . . . . the change has been in the advance of the inner contours." Thus showing that the bar had not advanced seaward, but was eroded on its inner scarp, which is a great desideratum in this class of work. Now, the twelve-foot contours are cut through and but a few hundred feet separate the fifteen-foot contours, if indeed they have not disappeared altogether since the last survey, while there were depths on the bar, under the control of the breakwater,

[1] *Vide*, p. 16, *supra*.

[2] *Vide*, p. 15, *supra*.

reaching to twenty-three feet in January last, and which are probably greater to-day.

The *Report* also states that the Harbor Company has expended on the breakwater about $250,000, which, with the cost of previous work and other expenses, amounted to about $525,000; and the President of the Harbor Company, Mr. Thomas H. Franklin, of San Antonio, in his report to the Board, dated as early as September 7, 1896, says, *inter alia*,[1] in summing up:

"Fifth. Sufficient work has already been done at the pass by the company to demonstrate the entire feasibility of obtaining the necessary depth of water by the expenditure of a practically small additional amount, and the Government has therefore had the problem of deep water solved for it at this port."

That this view seems to be accepted in part by the Board of Engineers would appear from its closing remarks, to wit:

"The Aransas Pass Harbor Company, instead of carrying out the Government plan, adopted one entirely in conflict with it." * * * *

And further:

"This Board believes that with a careful study of the problem a plan of improvement can be devised that will give for a reasonable cost quite a good entrance in which a channel of navigable width with twenty-foot depth at mean low water can be maintained by the aid of inexpensive dredging. Such a plan would doubtless remove a small part of the curved breakwater and utilize the balance. It would cost less than the approved (?) Government plan, but it would not be so good."

And the *Report* closes with these words:

"In consideration of all these facts, the Board is of the opinion that the value to the Government of the works of the Aransas Pass Harbor Company for the improvement of Aransas Pass, Texas, is nothing."

THE ARANSAS PASS HARBOR COMPANY SURRENDERS ITS PROPERTY.—In view of this finding of the Board and the urgent desire of the citizens of southwestern Texas to have the work proceed, the Harbor Company generously concluded to transfer all the work on the breakwater to the Government, as a condition precedent to the early prosecution of the work. This was accordingly done on the 27th day of March of this year.

ESTIMATE OF BOARD OF 1898 AND ACTION OF CONGRESS THEREON.—In the meantime, however, the subject was referred back to a Board

[1] *Vide*, p. 26.

of Engineers by resolution of the Fifty-fifth Congress, third session, which passed the Senate, May 28, 1898, requesting "the Secretary of War to prepare and submit plans, specifications and estimates for the improvement of the harbor at Aransas Pass, Texas."

Two members of the former Board composed the one appointed under this resolution. They reported on December 17, 1898, but the report and estimate were not submitted until the hour of the hearing before the River and Harbor Committee, and then was not read in full. It states that the Board is of the opinion that to secure a 20 foot channel of a width of 150 feet at bottom "it will be advisable to build two parallel jetties and to have recourse to dredging." . . . . Also that "a portion of the old Government jetty and the outer 1000 feet of foundation of the Aransas Pass Harbor Company's jetty must be removed in any case." (See Fig. 1.)

The estimate accompanying this carefully matured plan places the cost of the works at $1,525,000, without provision for maintenance.

Had this plan been adopted it would have destroyed the efficacy of the reaction breakwater almost entirely and would have involved the Government in useless annual expense for maintenance. It was therefore met on the spot by a counter-proposition to complete the existing work as designed, guarantee a twenty-foot channel within two years and secure the Government from loss by filing a large bond of indemnity, conditioned on the payment by the United States of a sum less than one-half the above estimate of the Government's engineers, on the completion of the work. The proposition also included the use of the invention at this place gratis. The committee held it under advisement to be put in legal form, which was subsequently done, but before acting upon it the Government engineers offered to dredge a channel (without guarantees, however, of any kind) for the sum of $100,000. The committee therefore requested my presence when in executive session, and after a brief discussion as to the probable cost of the several parts of the work and the results to be expected therefrom it decided to insert the following item in its bill:

"Improving Aransas Pass, Texas: For *dredging and other* improvement of Aransas Pass Harbor, sixty thousand dollars: *Provided*, That the Secretary of War is hereby authorized to contract for the removal of that portion of the old Government jetty in said harbor from the end nearest the curved jetty constructed by the Aransas Pass Harbor Company to the wreck 'Mary,' in such manner as *to in no wise interfere with*

the curved jetty now located in said harbor: And provided further, That said contract shall not be let by the Secretary of War, nor said work done, until the said Aransas Pass Harbor Company shall have

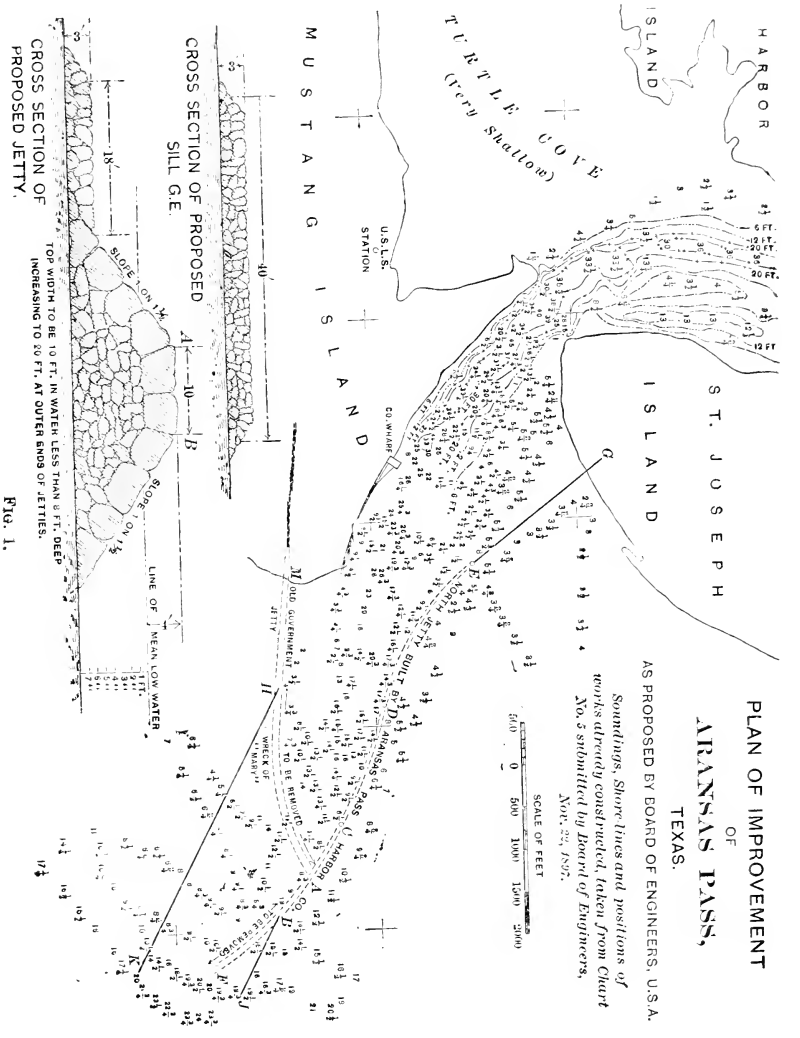


FIG. 1.

properly released and surrendered all rights and privileges heretofore granted to it in said harbor by Congress, also the jetty constructed in said harbor."

THE PLAN SAVED FROM DESTRUCTION.—Thus the integrity of the invention was preserved for the time being from emasculation, and the Government was saved over $1,000,000 by securing the work done by the Harbor Company, without consideration and by avoiding the unnecessary additional work proposed, the effect of which would have been to obstruct the tidal influx and destroy the natural scour. It should be added that during the consideration of this important subject by both Boards, the Consulting Engineers were given no opportunity to be heard, and did not receive a copy of the reports for months after their presentation to the department.

RESULTS OFFICIALLY REPORTED BY THE COAST SURVEY.—Whilst these matters were pending in Congress last winter the Superintendent of the United States Coast and Geodetic Survey, Dr. Henry S. Pritchett, detailed the survey steamer, "Bache," during January and February to make a detailed hydrographic survey of the bar, but the report thereof showing the remarkable results was not available until the end of June, too late to be of service before Congress.

In this report the assistant in charge of the "Bache," Capt. Welker, stated that the weather was so bad as to prevent work on the bar for more than about one day out of each week and also that

"In 1895 the Aransas Pass Harbor Company constructed a jetty in the shape of the letter 'S,' on the north side of the entrance, which is still in existence, and ever since its construction there has been a marked increase in the depth of water on the bar. The present channel crossed the Mansfield jetty, portions of which are still in existence. An attempt was made to remove this by explosion of dynamite, with the result that the rocks scattered over considerable area and without doubt they prevented the current from scouring the bottom to its full capacity." . . . . "It is my opinion that by the completion of the present jetty and the clearing away of the rock in the entrance that a channel of at least twenty feet in depth would soon be secured."

This rapid and progressive deepening of the channel was known in the neighborhood by report of pilots and by the draft of vessels entering the Pass, but does not seem to have merited the attention of the Board in the preparation of its recent plans and estimates. In fact the deepening was so remarkable that many persons were very skeptical as to the facts, and it was therefore necessary to have the official confirmation of the Coast Survey as stated above to verify them.

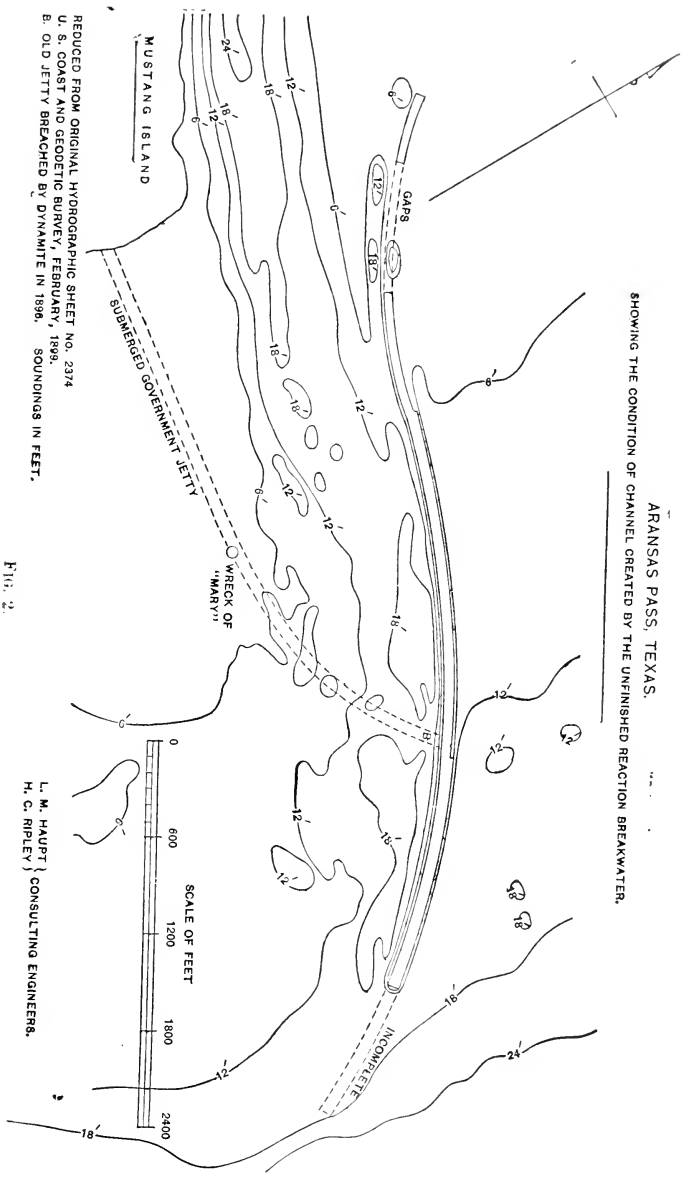


Fig. 2.

THE WORK OF REMOVAL OF THE OBSTRUCTING GOVERNMENT JETTY FINALLY APPROVED AND BIDS INVITED.—The last chapter in

this record is brief, for as yet nothing has been done on the work of removing the obstructing jetty. The act was passed at the close of the last session of Congress, March 4, and after careful and intelligent consideration the Government Engineer of the district, Col. C. S. Riché, son of Prof. George I. Riché, late member of this Society, recommended the letting of the work under the appropriation and provisions as made by Congress. It was authorized July 11, and advertised on September 25 for thirty days, when the bids are to be opened, which brings the chronology of events up to the 30th inst. Additional time will be consumed before the preliminaries are complied with. If there be no bidders, the work must be readvertised. In such case no contractor can transfer a plant to the site much before the winter storms begin which involve serious loss of time and increased cost for the Government, or loss to the contractor. Even after the removal of the old jetty time will be required for the currents to adjust themselves to the new regimen and demonstrate their ability to enlarge the channel. These delays therefore will doubtless retard greatly the development of the channel at this important entrance on the West Gulf coast.

THE PROGRESSIVE DEEPENING PRODUCED BY THE BREAKWATER WITHOUT DREDGING OR OTHER AID.—In conclusion it remains only to state that this half completed, single breakwater has so far controlled the ebb currents as to have removed from the channel by their own energy some 400,000 cubic yards of compact, sandy material, and to have produced a progressive improvement of depths, as follows:

	FEET.
August 28, 1896. After suspension of work on breakwater by company	6.0
December 10, 1896. Before old jetty was breached the depth was	6.5
February 2, 1897. During use of dynamite	8.0
June 8, 1897. After work was suspended	8.75
November 5, 1897. Without further aid from any source	9.25
February 5, 1898. An examination with lead line gave	10.0
June 15, 1898. Pilots reported	11.0
August 29, 1898. Pilots reported and added, "The S. E. wind this summer did not fill it up as it usually does."	12.0

	FEET.
January 4, 1899. Telegram announced (on pilot's range)	13.3
February 11, 1899. Capt. Welker wired the Coast Survey office	15.0

ECONOMY AND DEPTHS UNPRECEDENTED.—So that in two years there was a gain of eight feet produced by a half-finished structure in the face of serious obstructions at a cost of less than $30,000 per foot depth as compared with from $200,000 to nearly $900,000 at other places by the usual twin jetty system. It may therefore be safely stated, even without awaiting the completion of the breakwater and the removal of the obstructing jetty, that as our respected Vice-President, Mr. Coleman Sellers, remarked only last evening in referring to the progress of the Mechanic Arts: "Two blades of grass have been made to grow where one grew before." In fact the adage may be carried further, since in this case the half of a blade (jetty) has done what two complete blades (jetties) have never done before in the same time, without dredging, and the American Philosophical Society has evidently not made a mistake of judgment in awarding its highly prized Magellanic premium and medal for this "invention and discovery."

GENEALOGICAL TREES OF BUTTERFLIES.

BY A. RADCLIFFE GROTE, A.M.

(*Read October 6, 1899.*)

Previous to 1897 the butterflies were generally regarded as monophyletic, springing from a single stem, the family branches being variously arranged by different authors. In classification they were kept together as "Rhopalocera;" and the only exception to this course was the more recently attempted exclusion of the Skippers, the family Hesperiadæ, under an analogous title, equally derived from the Greek, and having reference to the structure of the horns or antennæ. It must be admitted that the reasons given for this were inconclusive, where they were not wholly absent.

From studies of the neuration I was able to announce (February,

1897) the diphyletism of the diurnals, separating for the first time the Papilionides as a distinct phyletic line from the rest of the butterflies, and keeping these latter together under the title of Hesperiades. It is the Hesperiades alone whose ancestry can be sought for in the Noctuid branch of Dyar's Bombycides (Agrotides), since to this presumptive lineage the Papilionides are apparently alien. For the general pattern of the veining of the Lycæni-Hesperiadæ is repeated in the Agaristid branch of the Bombycides, equally without any indication of affinity with the Papilionid type. With regard to classification and linear succession, it may be said that in the main points I follow Fabricius, in 1787, but it must be said that I give adequate reasons for so doing which were previously wanting.

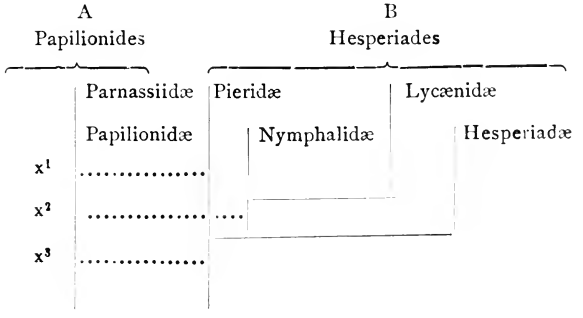
At the risk of appearing self-assertive, I endeavor to give clearly the original points brought forward by myself in various papers, and to the above statements there must be added, that I have tried to prove that the Blues and the Skippers are directly related, however distant the time may be assumed at which the divergence took place. The interpolation, therefore, between these two groups, of the group of the Swallowtails, by Scudder, Comstock and other observers, would be wholly inadmissible. I show that the points of similarity in structure between the Swallowtails and Skippers, brought forward by Mr. Scudder in 1877, are due to convergence, to that parallelism in development, announced by Milne-Edwards, of which Mr. Scudder appears to take no note, and for which he makes no allowance. Through studies of the Charaxinæ it becomes clear that the hesperid wing, with separated veins, underlies the wings of the group, while a normal evolutionary change in the specialization of the Radius develops in succession the wing of the Blues out of that of the Skippers.

The family Hesperiadæ are then a survival of an ancestral stage in the evolution of the other groups of the Hesperiades, *i. e.*, the Pieridæ, or Whites, the Nymphalids, or brush-footed butterflies, the Lycænids, or Blues. I show, from the fact that a diminution of the internal veins of the hind wings accompanies specialization in other groups of the Lepidoptera (*i. e.*, Saturniades, Tineides), that the Papilionides, or Swallowtails, cannot represent an ancestral phase of any of the other families of the diurnals, because in this respect they are the more advanced group. The assumed generalization of the Papilionides, which has led to the view that they are

lower than the other butterflies, would be a mistaken assumption. The opposite view, that the Hesperiades represent ancestral forms of the Papilionides, would be the more tenable, were it not contradicted by the fact that the Papilionides possess an exclusive character in the short, downwardly curved anal vein of the fore wings. The diphyletism of the two groups becomes thus apparent and prevents further comparison. The Papilionides and Hesperiades are parallel developments and neither represents an ancestral stage of the other.

In a review of the genealogical trees of the butterflies hitherto published, it will again make the subject clearer if we commence with the diphyletic tree, first published by me in 1897. I choose here the elementary first sketch, already printed in the PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY for January, 1899, giving dotted lines to show the different points at which it has been presumed that the Papilionid line may have intersected with the Hesperid. In the trees published by me in the *Butterflies of Hildesheim* and in *Natural Science*, I endeavored to intercalate the minor divisions upon this basis. The three culminating family groups, the Parnassiidæ, Pieridæ and Lycænidæ, have, in certain forms, the Radius of the fore wings specialized by the reduction of the branches to four, and sometimes even three in number. In the three lower groups the Radius always remains in a generalized, five-branched condition. Most of the six family groups of butterflies retained have been elsewhere subdivided into families; but, for the sake of simplicity, the names are here used in their older collective sense.

FIG. 1. *Diphyletic genealogical tree of the Butterflies, Grote, 1897.*



Explanation.

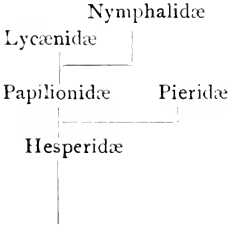
x^1. Dotted line of connection proposed in consequence of analogies of the Papilionides with the brush-footed butterflies. This line is apparently favored by Chapman, 1895, Packard and Quail.

x^2. Dotted line of interconnection indicating that the Papilionides represent an ancestral form of the other butterflies, excluding the Skippers. This line is favored by Scudder, Comstock and others, who place the Papilionides between the Lycænidæ and Hesperiadæ, just above the latter.

x^3. Dotted line of interconnection indicating that the Papilionides represent an ancestral form of *all* the diurnals and that these latter would be monophyletic. I reject *all* the dotted lines, considering the butterflies as diphyletic. The two separated stems, and the arrangement of the collective groups, represent the conclusions to which I have arrived.

I shall now briefly discuss the monophyletic trees published by authors and reproduce two of them. The monophyletic designs published by Scudder (1877) and Reuter (1896) do not differ in principle. In both the brush-footed butterflies are placed "at the head," and the view is expressed that the Papilionides are degraded forms. In addition, Reuter conceives that the Papilionides embrace also the Pieridæ, an old opinion based mainly on coincidence of color between the Parnassians and the Whites and a similarity in pupal suspension. I have endeavored in my writings to expose its fallacy. All methods of pupal suspension in the butterflies are paralleled in other Lepidoptera. The drawings published by Scudder and Reuter are too fanciful or complex to allow of reproduction here.

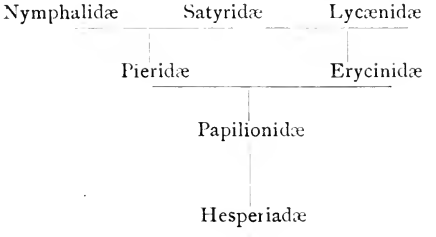
Fig. 2. *Monophyletic tree of the Butterflies, Packard, 1895.*



In this genealogical tree the collective family groups are reduced to five, the Parnassiidæ being fused with the Papilionidæ. A comparison of this tree with Fig. 1 will show that the entire butterflies are intercalated between the Lycænids and Skippers. The ancestors of the Skippers are first imagined to have thrown off the

Pieridæ, these the Swallowtails, these the Nymphalids and again the Blues. The dislocation of the Blues and Skippers is entire and the positions are so reversed that a criticism here would take up too much space. This criticism will, moreover, become apparent upon a comparison with what I have written in these pages and elsewhere. It will be better to pass on to the latest tree published of which I have any knowledge.

FIG. 3. *Monophyletic tree of the Butterflies, Hampson, 1898.*



It is to be presumed that Mr. Meyrick agrees with this classification. There is no entire tree of the butterflies in the *Handbook*, 1895, but the classification agrees with the above, while there are a number of diagrams of the generic branchlets. A study of these show that Mr. Meyrick has not read the meaning of the changes in position of the veins as made out by Comstock and myself. It is characteristic of the genealogies of Meyrick and Hampson, that no reasons for the position of the groups are given in the accompanying text. They cannot thus be subjected to a proper scrutiny, and are, to a great extent, enigmatical. In the above tree the Hesperiadæ, with two internal veins on the hind wings, are placed at the base of the series, in the position of ancestors of the Papilionides, which have only one. This, of itself, would not be incredible. But we are further asked to believe that the Papilionides, with one internal vein, have then given birth to a variety of divergent forms having again two internal veins on the hind wings. This is quite incredible. It may be said that analogous contradictions occur in such of Mr. Meyrick's genealogies as I have carefully examined. It is understood that Mr. Meyrick has paid great attention to the veining of the wings, but in his resultant systems the character is apparently not regarded as crucial.

The object of this communication is attained by this brief review of the genealogical trees of the butterflies in literature The anomalous position of the Papilionides, assigned to them by Bates, Scudder and the Scandinavian school of writers, has been the principal cause of confusion. In addition, the methods of general zoölogy have been neglected, and this neglect has led to a system of false reasoning, by which the misplacement of the Papilionides has been propped up. To all this has often been added a lack of any serious study of the neuration. The fact that no monophyletic tree of the butterflies will work satisfactorily and stand criticism may be thus explained.

The termination of Superfamily names in *ides* was proposed by F. J. Buckell and adopted by myself in 1895. The names Hesperi[a]des and Papilionides are used by Dr. Chapman as early as April, 1895, but the former name is used for a group containing only the Skippers, while under the latter title all the rest of the diurnals are included. Thus Dr. Chapman's Hesperides equal the Grypocera of continental writers, and his Papilionides their Rhopalocera. This is also the same as the classification by Prof. Comstock in 1893, who gives the English names of Skippers and Butterflies to the two groups, and ventures to say that "if we remove the Hesperidæ (Comstock's Skippers) from the division of the order, as indicated above, the Butterflies form a well-defined group." The classification, however, proposed in my writings is here opposed to both that of Dr. Chapman and of Prof. Comstock, as well as to that of all other authors known to me. The diphyletism of the diurnals is mooted by no other writer and the idea is original with myself.

The Papilionides appear to form a closed group. The Hesperiades appear to be an open group, open to the moths. The Nymphalids, or brush-footed butterflies, form several subparallel converging minor groups and seem properly regarded as an offshoot (monophyletic) from the main stem of the six-footed Hesperiades, which latter culminates in the Pieridæ. The parallelism between Leucophasia and Heliconius supports this view. The Whites show a specialization of the Radius, which the Nymphalids do not, while retaining a more generalized stage of suspension of the chrysalis. The fastening of the latter by the tail alone is copied exceptionally in other groups of the Lepidoptera. Here we again have an inequality of specialization in the secondary (generic) characters of the different stages, an observation made by me originally in 1876,

and the correctness of which receives constantly fresh proof as the results of closer studies are published.

When Comstock uses the word "butterfly," he means all the diurnals except the Skippers, the family *Hesperiadæ*. Thus he connects the Papilionides with the other diurnals, including the Blues, and merely regards them as thrown off at an early period. The Papilionides are thus placed at the base of his "butterfly" system, and the Lycænids and Hesperids are divorced, as in Mr. Scudder's arrangement. My course is the very opposite of this. I unite the Skippers with the Blues and connect both with the Nymphalids and Whites (the affinity of which two groups is pointed out by Chapman) under the name *Hesperiades*, and I show that this distinct stem of the Lepidoptera is open to the moths. I then separate the Papilionides as a closed group, having great analogy but no affinity with the rest of the diurnals. The Skippers (*Hesperiadæ*) are really what they appear to be on the surface, an intermediate type between the Lycænids and the moths, assisting in keeping the phylogenetic line open in that direction. But they represent an old and now specialized type, and their proper characters have been made of undue importance by anxious classificators, who have then called them by hard and peculiar names. I try to show that the Skippers are an offshoot of the same main stem which gives us the brush-footed butterflies and the Pierids, from which groups they are not excluded by any character of primary value.

The reversal of the generic arrangement *within* the group of Papilionides is based on neurational features, which prove to me that the Parnassians are more specialized and younger forms. A mere general survey of the group seems to show that this view is reasonable. It must be admitted that *Ornithoptera* is an unusual and original-looking type, compared with the bulk of the diurnals, and one still rich in species in the Australian area. It seems incredible that such a local type should be the offshoot of widely disseminated and more specialized forms of Papilio, to say nothing of the Parnassians. On the other hand, it appears not unreasonable to assume that Ornithoptera-like butterflies should have thrown off the forms of Papilio, many of which retain ornithopteran traits, and to believe that, through dispersal, the suffering of geographic and geologic (climatic) change, the Parnassian types should at length appear. So like the Pierids do the associating Parnassians become, that Mr. Reuter welds them with a nomenclatorial clamp, and Dr. Spuler

draws us a radiating figure, from which they equally project (*Zur Stammgeschichte der Papilioniden*, p. 492). Such progeny, so dissimilar in essentials, cannot have had a common womb. But when we examine the pale Parnassian from northern meadows, and the black and gold Ornithopteron from openings in the tropical forest, then the short anal vein on their fore wings reveals in both cases the blood of the Papilionides, the proof of common descent and of a separate origin from the Pierids and the rest of the butterflies. It is Dr. Spuler (*l. c.*) who derives *Ornithoptera* from Papiliolike forms, so that I am totally at variance with this author in my views as to the classification and phylogeny of the Papilionides. While Dr. Spuler regards *Ornithoptera* as an end form, terminating a Papilionid branchlet, I consider it to represent an initial type coming nearer to the primitive form of the diurnal Papilionides.

I have been thus explicit in order to give clearly the radical points of distinction between the classification of the diurnals by any other author and my own.

Stated Meeting, October 20, 1899.

Vice-President SELLERS in the Chair.

Present, 22 members.

Newly elected members, Mr. Stuart Wood, Dr. Arthur V. Meigs and Prof. Remington, were presented to the Chair and took their seats in the Society.

The decease of the following members was announced:

Prof. Edward Orton, of Columbus, O., October 17, 1899, and Prof. Don Mariano Barcena, of the City of Mexico.

Mr. Henry Carey Baird read an obituary notice of the late Col. Alexander Biddle.

Proceedings of Officers and Council were submitted.

Pending nominations for membership having been read, the Society proceeded to an election.

The Curators presented the completed bound volumes of the Curators' Record of Donations, with Index; also, the bound volume of the Curators' Catalogue of Portraits and Busts.

The Tellers reported the election of the following gentlemen as members of the Society:

Prof. William Morris Davis, of Cambridge, Mass.

Russell W. Davenport, of South Bethlehem, Pa.

Mr. Frank Miles Day, of Philadelphia.

The Society was then adjourned by the presiding officer.

Stated Meeting, November 3, 1899.

Vice-President SELLERS in the Chair.

Present, 13 members.

Prof. William A. Lamberton, Mr. Charles E. Dana, and Prof. Marion D. Learned, newly elected members, were presented to the Chair, and took their seats in the Society.

Letters were read from Mr. Frank Miles Day, Prof. William Morris Davis and Mr. John Cadwalader, accepting membership.

From the President, announcing the appointment of Prof. Albert H. Smyth to prepare an obituary notice of the late Dr. Daniel G. Brinton, and from Prof. Smyth, accepting the appointment.

On motion of Dr. Morris, it was ordered that a Committee be appointed to arrange for a meeting in memory of the late Dr. Daniel G. Brinton, and that invitations be authorized to be extended to the learned societies to which Dr. Brinton belonged to participate in the same. The Chair subsequently appointed as the Committee Dr. Morris, Prof. Smyth, Mr. Culin, Mr. Burk and Dr. W. H. Greene.

The list of donations to the Library was laid upon the table, and thanks were ordered therefor.

The decease of the following members was announced:

Prof. Heinrich Kiepert, of Berlin, on April 21, 1899.

Prof. George Rawlinson, Canon of Canterbury.

Prof. George F. Barker presented a report as the delegate of the Society to the Stokes Jubilee at Cambridge, Eng.

Dr. Cleemann moved that translations of papers that have been published already in another language are not eligible for the *Transactions* or *Proceedings*. Adopted.

The Society was then adjourned by the presiding officer.

Stated Meeting, November 17, 1899.

Vice-President SELLERS, in the Chair.

Present, 16 members.

Mr. L. B. Stillwell, a newly elected member, was presented to the Chair and took his seat in the Society.

A letter was read from Vice-President Sellers, naming as the Brinton Memorial Committee, Messrs. J. C. Morris, A. H. Smyth, S. Culin, J. Y. Burk and W. H. Greene.

The Librarian presented a list of the donations to the Library.

The deaths of Sir Augustus Wollaston Franks, K.C.B., and Dr. Walter J. Hoffman, members of the Society, were announced.

Dr. C. N. Peirce read an obituary notice of Dr. W. G. A. Bonwill.

A communication from J. Dyneley Prince, Ph.D., entitled, "Some Passamaquoddy Witchcraft Tales," was presented.

Also a communication by John Van Denburgh, of Baltimore, Md., entitled "Notes on Some Birds of Santa Clara County, California."

The Society was then adjourned by the presiding officer.

NOTES ON SOME BIRDS OF SANTA CLARA COUNTY, CALIFORNIA.

BY JOHN VAN DENBURGH.

(*Read November 17, 1899.*)

This paper has been prepared in response to several requests for such notes as I might have on the land birds of Santa Clara county. It is based upon more or less casual observations extending over a period of fourteen years, and makes no pretense to completeness in any way.

Santa Clara county is slightly greater in extent than Rhode Island. Roughly, it may be described as a great valley lying between two mountain ranges. The eastern range rises, in Mount Hamilton, to a height of nearly 4450 feet. The western range is considerably lower. The floor of the valley is made up of the southern marshes of San Francisco bay, parklike expanses of open oak groves, orchards, vineyards and great grain fields. The western mountains, where not already under cultivation, are clothed in chaparral throughout their lower levels, while a fringe of redwoods stands in outline against the sky.

It is at two points in this western range—Los Gatos and Palo Alto—that nearly all my observations have been made. Doubtless many additional species occur in the valley and in the eastern mountains, and it is my hope that other observers will soon complete the list.

Lophortyx californicus. California Quail.

Quail are resident in all parts of the county. During March and early April their calls may be heard almost incessantly, for this is the season of courtship, and even the most bashful of the *debutantes* does not hesitate to reply to the amorous notes of her lovers. At such times the males seem almost devoid of fear, and, if a female be caged, will strut boldly up to her prison door, even though an observer be openly stationed a few feet away. Rival suitors often engage in fierce conflicts, for what is to the female the tenderest of love calls is to another male the sharpest of challenges.

A few coveys often remain as such through the year, but the middle of April finds most of the quail roaming in pairs. Even at this

date some of the more enterprising have selected their homes, and, in a few instances, begun to lay (April 19, 1888). The majority, however, wait until nearly a month later.

After the nest has been finished and laying begun, one egg is deposited each morning, with an occasional intermission, until the set is complete. The number of eggs laid varies greatly. I have found incubated sets of from ten to nineteen eggs, and reports of nests containing twenty-five have reached me from reliable farmers. Two pairs kept in captivity during the summer of 1888 laid sixty-six eggs (twenty-five and forty-one).

Single eggs are often found on the ground in places where least expected. This, I believe, is due to indecision on the part of the female, for caged birds deposited several eggs at random before choosing a definite nest. It is not unlikely that nests sometimes receive eggs from more than one female. This certainly is true of caged quail. I have found two nests of *Pipilo maculatus oregonus* which contained, besides the usual four eggs of the towhee, one and three quail's eggs respectively.

Sometimes both birds are flushed from the nest, but the duties of incubation usually fall to the lot of the female. A hint of the tragedies that sometimes occur at this time is given in the following items from my notebook:

On May 18, 1898, while clearing away some vines, a quail's nest was discovered in the corner of a chicken-yard. When first shown me this nest contained six eggs and was partially hidden by some dead vines which had been placed over it. May 26: Female sitting on nine eggs. May 27: Female incubating. May 28: The eggs were cold and quail feathers were scattered all about. Evidently the female had been caught and eaten during the night. May 29: The male has taken the female's place on the nest. I fear he will share her fate. May 30: The male's feathers are mingled with those of his mate.

Often, while the female is incubating or has gone on the nest to lay, her mate mounts upon some post or tree nearby and gives vent to his feelings in a metallic call that may be represented by the monosyllable "kayrk." This note, which is repeated drawlingly at frequent intervals, is heard only at this season.

The period of incubation is, to judge from caged birds, twenty-one days. The young often leave the nest before their down has dried, and are from the first gifted with great ability to hide. It is

probable that two broods sometimes are reared in a season, for I have found nests containing fresh eggs as late as June 26 (1889).

The very young birds feed, to a great extent, on the seeds of a small grass, which ripen in May and June. Later in the summer various seeds and grains are eaten, and during the autumn and early winter grapes, and then the berries of the California holly form a large part of their diet. In the early spring, after the seeds have sprouted, the quail live almost entirely on the tender leaves of the young weeds which cover the ground. They are very fond of the inner portions of various small bulbs turned up by the plow. A pair made daily visits to a cherry tree during the season of that fruit.

Many of the oaks near Los Gatos contain nests made of twigs by a species of wood-rat. The quail often resort to these when hunted and it is very difficult to get one to leave when once it is thus hidden. On the 16th of May, 1886, I flushed a pair of quail from such a nest, built about eight feet from the ground, and upon climbing to it found it to contain five eggs. Two days later this nest was empty.

Columba fasciata. Band-tailed Pigeon.

This pigeon is a rather common migrant and winter resident, occurring from October 6 (1889) to May 9 (1890). It feeds on the red fruit of the Christmas berry, acorns, oak buds and grain, but rarely descends to the ground. The largest flock, containing between seven hundred and a thousand birds, was observed near Los Gatos in November, 1887. Usually the flocks are composed of from two to three dozen individuals. At Palo Alto they may be found throughout the winter and well on into May.

Zenaidura macroura. Mourning Dove.

A common spring and summer resident, arriving about the end of March. I have found fresh eggs from the first week in May until the last in June. The doves eat large quantities of the shiny black seeds of a sort of "cockscomb" which grows very abundantly in parts of the valley.

Pseudogryphus californianus. California Vulture.

Two vultures seen near Los Gatos are my only records of this species in Santa Clara county.

Cathartes aura. Turkey Buzzard.

Buzzards may be seen at any season of the year, sometimes in

large companies. They formerly nested near Los Gatos, and still do so among the redwoods near Boulder creek, Santa Cruz county.

Elanus leucurus. White-tailed Kite.

I have never seen this beautiful hawk near Los Gatos. In the vicinity of San José and Palo Alto, however, it is a common resident, and its nests are not infrequently found. It hunts in pairs throughout the year.

Accipiter velox. Sharp-shinned Hawk.

Sharp-shinned hawks are very abundant in winter, both at Los Gatos and Palo Alto, where they wage ceaseless war on the Juncos and Zonotrichias. One was shot while trying to get at some quail in a trap. I have never observed them in summer.

Accipiter cooperi. Cooper's Hawk.

I have seen but two specimens of this hawk, both at Los Gatos in autumn.

Buteo borealis calurus. Western Red-tail.

This fine hawk is a very common resident in all parts of the county. Measurements of a young bird, which was taken from a nest near Palo Alto, April 30, 1893, and fed upon raw beef, show great rapidity of growth:

May	1,	length	5.86	inches,	extent	7.00	inches,	weight	145	grammes.
"	2,	"	5.90	"	"	7.05	"	"	170	"
"	4,	"	6.50	"	"	7.50	"	"	190	"
"	6,	"	6.75	"	"	8.00	"	"	219	"
"	8,	"	7.25	"	"	8.50	"	"	250	"

This bird was covered with soft down, pure white, except on the top of the head, the scapular and interscapular areas, the dorsal surfaces of the wings, and two bands running forward from each eye to the cere, where the down was slightly tinged with slaty gray. Pinfeathers were just beginning to appear along the sides of the body.

Buteo swainsoni. Swainson's Hawk.

I have never seen this species at Los Gatos. It is not common at Palo Alto, but specimens are occasionally killed.

Aquila chrysætos. Golden Eagle.

In the eastern parts of the valley and in the mountains near Mount Hamilton, this eagle breeds abundantly, but it seems to avoid the western portions of the county, where I have seen it but once, at Los Gatos, in winter.

Falco sparvarius deserticola. Desert Sparrow Hawk.

This is the commonest of our hawks. It is resident in all parts of the valley, and breeds abundantly in the cavities of the white oaks in April and May.

Strix pratincola. Barn Owl.

Barn Owls are very common at Palo Alto and near San José, but are rarely seen at Los Gatos. A nest in a hollow oak near Palo Alto, visited May 13, 1894, contained one egg, three young owls and five gophers. The gophers were arranged in a row at one side of the cavity, their headless necks all directed away from its centre, where the egg and young owls lay.

Asio wilsonianus. Long-eared Owl.

I have seen this owl but once, on Black Mountain, February 18, 1893.

Asio accipitrinus. Short-eared Owl.

A single specimen was killed near Los Gatos in the fall of 1891.

Megascops asio bendirei. California Screech Owl.

This is a resident species, which breeds abundantly in all parts of the county, usually in May.

Bubo virginianus pacificus. Pacific Horned Owl.

This large owl may often be seen toward five or six o'clock in the afternoon of warm, clear days in April and May soaring in pairs or skimming over the fields in search of food. Near Palo Alto the species is quite common and nests in the large oaks which abound in that district. The nest examined May 14, 1892, contained two half-grown young. The following year this pair constructed a nest in a white oak about two hundred yards from that which contained their nest of 1892. This new nest was made of coarse twigs and was partially lined with moss. Its construction occupied the owls about two weeks. When deprived of the two eggs which they laid in this nest the birds returned to the nest of 1892 and laid two

there. The extreme rarity of this owl at Los Gatos is doubtless due to the absence of large trees.

Speotyto cunicularia hypogæa. Burrowing Owl.

This a common resident in many parts of the county. A pair have nested near the same spot on the campus of Leland Stanford Junior University three successive years. In winter one bird may always be seen near this nest burrow (of *Spermophilus*), but I have never seen two there at that season. In this burrow I have found at various times remnants of gophers, meadowlarks and toads.

Glaucidium gnoma californicum. California Pygmy Owl.

Twice, in May, 1898, a Pygmy Owl came at about six in the morning and dashed itself against the wire netting of my bird cage.

Geococcyx californianus. Road-runner.

Road-runners are not very common. I have seen them either at Los Gatos or Palo Alto in every month of the year except January, and have taken their eggs in May. A nest found in a white oak near Los Gatos, May 31, 1888, held four eggs, two of which contained large embryos. This nest was made of oak twigs, lined with weeds and grasses, fifteen feet from the ground. Diameter, twelve inches; height, eight inches; cavity diameter, seven inches; cavity depth, three inches. Another nest, in a cypress near Palo Alto, contained four highly incubated eggs, May 14, 1892.

Ceryle alcyon. Belted Kingfisher.

Kingfishers are sometimes found along the larger streams of the county, where they occasionally breed.

Dryobates pubescens gairdnerii. Gairdner's Woodpecker.

This active little bird is nowhere very common, although seemingly more abundant at Palo Alto than at Los Gatos. A nest in a maple near Los Gatos contained five fresh eggs, May 5, 1890.

Dryobates nuttallii. Nuttall's Woodpecker.

I have seen this bird only on Mount Hamilton, where it is said to breed.

Sphyrapicus varius nuchalis. Red-naped Sapsucker.

A bird which I shot at Palo Alto, February 17, 1893, is, while not typical of this form, much nearer *S. varius nuchalis* than *S. ruber.* It was busy in a small grove of pepper trees when found.

Sphyrapicus ruber. Red-breasted Sapsucker.

My first bird of this species was seen and shot at Los Gatos, November 6, 1892. It was an adult male in high plumage. I saw another at Palo Alto on December 8 of the same year. Two were killed by others during that winter. I have seen none since.

Melanerpes formicivorus bairdi. California Woodpecker.

At Palo Alto this bird is the commonest of its tribe, and numbers of its storage trees may be seen. One large oak at Stanford University contained fully five thousand acorns. All that I examined had been placed, apex inward, in holes which had been drilled just through the bark to the hard wood. Usually but one acorn was placed in a hole, but in some instances several were wedged in together. The holes made by the birds are often very close together. This particular tree has been studded from within about six inches of the ground to about thirty-five feet above it. It has been suggested, perhaps not seriously, that the birds store the acorns in order to procure the larvæ which develop in them. October 2, 1892, I gathered twelve acorns from the lower part of the trunk. Three contained grubs, while the others were sound. November 13, I examined one hundred and fifty acorns. Of fifty taken between the ground and five feet above it, twenty-three were sound, twenty-three contained one grub each, one contained two grubs and three each sheltered three grubs. Of the second fifty, taken between five and ten feet from the ground, forty were sound and ten held grubs. Of the third fifty, taken between ten and fifteen feet from the ground, twenty-two contained grubs. Sixty more were examined on December 11; only twenty-five were sound. Mr. J. M. Stowell examined numbers of the stomachs of these birds at Stanford University and informed me that they contained nothing but bits of acorn.

The birds are very gregarious and noisy. They may be seen in flocks of from six to a dozen or more even during the breeding season.

Melanerpes torquatus. Lewis' Woodpecker.

I have never seen this woodpecker at Los Gatos. It is rare in the oak groves lower in the valley, and is not often seen at Palo Alto.

Colaptes cafer. Red-shafted Flicker.

Flickers are common at all seasons of the year, but are much more abundant in winter than in summer, there seeming to be a considerable immigration of northern birds at this season without a corresponding exodus. With these northern (?) individuals of *C. cafer* come numerous birds showing more or less *auratus* blood. Some of these are almost true *cafer*, others almost typical *auratus*. One, now in the collection of Leland Stanford Junior University, has the rectrices of one side yellow and shorter than those of the other side, which are red.

These birds nest late in May, and lay usually five, sometimes four or six eggs.

Colaptes auratus luteus. Northern Flicker.

I add this name only on the strength of some of the birds mentioned above. All show traces of *cafer* blood.

Phalænoptilus nuttalli californicus. California Poorwill.

This curious bird may often be seen toward dusk squatted in the dust of the old and less frequented roads of the hill region. Here they may often be followed for a quarter of a mile or more, rising when approached, but alighting again farther on. In August they feed on a gray moth, and when disturbed utter a few quick, short notes very different from their plaintive love call.

Chætura vauxii. Vaux's Swift.

No rule can be given for the coming and going of these birds, whose movements seem to be regulated, if regulated at all, by the abundance of insect food. I have seen them very many times, but find only two dates in my notebooks—Palo Alto, April 27, 1893, and Los Gatos, August 24, 1893. They are usually seen in company with *Tachycineta thalassina*, and I have reason to believe that both breed among the redwoods of Santa Cruz county.

Calypte anna. Anna's Hummingbird.

Anna's hummingbirds are resident throughout the year, though they probably are fewer in winter than at other seasons. One unusually cold winter day I found a male of this species perched on a rafter in a barn and unable to move until warmed in the house, when he flew about seemingly none the worse for his torpor. They sometimes begin to nest in January, and I have found nests con-

taining young birds as late as July 4 (1890). It is probable, therefore, that they raise more than one brood each year. The nests are beautiful structures, often so covered with lichens as to be very well disguised. This is especially apt to be the case when the nests are built in deciduous oaks. Other trees commonly used by these birds for nesting purposes are the live oak, Monterey cypress, pines, bay and eucalyptus. Late in the season they seem to prefer trees growing near or even overhanging running water. I have never seen the males take any part in nest building or in rearing the young. Indeed, they are almost never to be seen near the nests, seeming to prefer to spend their time perched upon an exposed twig in some lonely situation, or in making war upon their fellows. When attacking other birds they usually rise to a considerable height and then drop straight down as if to strike the enemy. When a few inches above the victim, however, they suddenly turn and rise again to the original position, giving vent, at the moment of turning, to a sharp rasping squeak, which has much the same effect on the enemy as the sudden click of a gunlock. In this way they vanquish even the jays.

I once saw two males of this species performing a curious sort of dance. They perched upon dead twigs, perhaps thirty feet apart and about half this distance from the ground, as if about to attack each other. Instead of doing so, however, they continually exchanged places, passing one another without any show of hostility, and meanwhile uttering their peculiar rasping song. This performance was continued during about fifteen minutes.

While feeding from flowers they frequently steady themselves in the air by holding with one or both feet to some twig or leaf. In feeding from certain plants, as the hibiscus, where the tube of the flower is too long to allow of their reaching its base in the ordinary way, these humming birds habitually plunge their bills through the under surface of the corolla near its base. They eat multitudes of small flies, either catching them in the air or, at times, picking them off the bark of trees where they have been attracted by exuding sap.

They are very fond of bathing, and for this purpose usually select a stream so small and shallow that they can stand in the water. Standing thus they dip first one side of the face and then the other in the stream in an indescribably graceful and dainty manner. Having thoroughly soaked themselves they dart to some

leafless twig to dry and carefully arrange their feathers. I have never observed them bathing in the spray of fountains.

Selasphorus rufus. Rufous Hummingbird.

This hummingbird seems to be most abundant in February and March when the wild currants are covered with their pink blossoms. It can then almost always be found where these bushes grow. The shriller whir of its wings enables one to distinguish it readily from Anna's hummingbird which is found in the same situations. It is even more pugnacious than the latter species and its nesting season probably is shorter. I have found its nests only in March and April. It usually builds in cypresses, pines, or eucalypti, and its nests are often very beautiful structures, especially when the highly colored stamens of the eucalyptus blossoms are used in their construction.

Tyrannus verticalis. Western Kingbird.

This beautiful flycatcher is abundant in many localities in the valley, but I never have observed it in the foothills west of Los Gatos.

Myiarchus cinerascens. Ash-throated Flycatcher.

I believe that these birds usually arrive at Los Gatos in April, although I observed one February 26, 1889. They begin to nest late in May (May 16, 1890; May 21, 1889; May 24, 1888), and eggs may sometimes be found after the middle of June (June 18, 1889). The number of eggs laid is ordinarily either four or five. The nests are usually built in cavities in oak trees, but a bird-box which I placed in a tree in a barnyard has been used by these flycatchers for the last ten years (1890–1899).

On May 21, 1889, I found a pair of these birds building in a common tin watering-pot hanging in a vine-covered arbor. The nest had just been begun. The first egg was laid May 25, and others were added on each of the next four days. This nest was made chiefly of hair from cows and rabbits, and was so soft that none of the five eggs could be seen in it even when one looked directly down.

Sayornis saya. Say's Phœbe.

Say's Phœbe appears usually in October or November and is not uncommon through the winter.

Sayornis nigricans. Black Phœbe.

This phœbe is common in all parts of the county and, even in the foothills where snow sometimes lies on the ground a few days in winter, is resident throughout the year. It begins to nest early in April, but fresh eggs may sometimes be found in June.

Contopus richardsonii. Western Wood Pewee.

The Western wood pewee is a common summer resident, arriving usually in April and leaving in September, or even late in August. It begins to nest early in June (June 4, 1892).

Empidonax difficilis. Western Flycatcher.

This flycatcher is a very common summer resident and breeds abundantly from May to July (May 4, 1891, to July 4, 1890). Its nests are built in all sorts of situations. One was made of grasses and green moss in some ferns which hung over the bank of a road. Others are made almost entirely of spider-web and placed on beams in low sheds such as cow-stables and hen-houses. The eggs are usually either three or four. The love-call of the male is fée-iss fée-iss, repeated over and over again.

Otocoris alpestris chrysolæma. Mexican Horned Lark.

I have never seen the horned lark at Los Gatos, though it is not rare only a few miles away in the valley.

Pica nuttalli. Yellow-billed Magpie.

This magpie breeds abundantly in the eastern and southern portions of the county, but I have never seen it in the western foothills.

Cyanocitta stelleri frontalis. Blue-fronted Jay.

At Los Gatos these jays are numerous throughout most of the year, but during the breeding season are almost never seen. Probably a few remain to breed in the deeper cañons, while the majority retire to the redwoods of Santa Cruz county. They are able mimics, and imitate perfectly the calls of the red-tailed hawk, quail and several other birds. One, which I kept in a cage with a number of small birds, killed and ate a golden-crowned sparrow.

Aphelocoma californica. California Jay.

These jays are very common and are very destructive to fruit. Their eggs may be found from the middle of March to the middle

of May (March 17, 1892, to May 16, 1889). Like the blue-fronted species this jay eats a great many bay-nuts, acorns and almonds. These it carries to some suitable situation, such as a fence rail or the limb of a tree, and, holding them with one foot, deftly cracks them with its bill. I have known it to eat the eggs of Anna's hummingbird, the house finch, the green-backed goldfinch and the brown towhee.

Corvus americanus. American Crow.

I have never seen the crow in this county, but Mr. J. M. Hyde tells me that he has found it near Gilroy, where it probably breeds.

Xanthocephalus xanthocephalus. Yellow-headed Blackbird.

This handsome bird breeds in considerable numbers in the marshes south of San José.

Sternella magna neglecta. Western Meadow Lark.

This was formerly a very common resident in all parts of the valley, but of late years the converting of grain fields into orchards has resulted in a great restriction of its territory. As a songster it is with us probably without an equal, unless the black-headed grosbeak or the California thrasher share its honors. The number of its eggs ranges from four to six. I have found fresh eggs from April 3 (1889) to May 31 (1890). Once in the breeding season, I shot one of these larks which had several wasps in its bill.

Icterus bullocki. Bullock's Oriole.

Bullock's oriole is a common summer resident which breeds abundantly in the valley, but rarely if ever in the foothills west of Los Gatos. It arrives about the middle of April (April 18, 1889; April 16, 1892; April 8, 1893) and begins to nest a week or two later (April 20, 1893). It is seen occasionally after the middle of August (August 17, 1892).

Scolecophagus cyanocephalus. Brewer's Blackbird.

In many parts of the valley these noisy birds breed abundantly in April and May. Most of the nests that I have seen were in live-oak or cypress trees, usually close to water. The usual number of eggs is five, though sometimes only four are found. I believe that only one brood is reared each year. Small flocks remain through the winter.

Carpodacus purpureus californicus. California Purple Finch.

This purple finch is at no time common. Individuals or little companies, however, occur all through the year. I regard them as stragglers from the redwoods near the coast, though some may, perhaps, breed in localities where conifers have been planted.

Carpodacus mexicanus frontalis. House Finch.

The linnet or redhead is probably our most abundant bird in spring and summer, but in winter is outnumbered by certain migratory species, such as the robin and the Zonotrichias. It does great damage to fruit, being especially fond of cherries, peaches and figs. It begins to lay about the middle of April, though eggs may sometimes be found a little earlier (April 9, 1888), and lays one egg each day until the set is complete. The number of eggs varies from three to six, but usually is four or five. I have known three broods to be raised in one nest in one year. Nests of the previous year not infrequently are relined and used, as are also those of other species, such as the brown towhee. The labor of nest building falls entirely on the female, but the male accompanies her on all her trips for material and sings almost constantly with great power and fervor. He, however, takes no part in incubation, and little or none in feeding the young, at least while they remain in the nest.

The following notes show, among other things, the period of incubation :

April 14, 1887. Found a nearly completed nest of the house finch.

April 15, 16. Female continued work on nest.

April 17. One egg.

April 18. Two eggs.

April 19. Three eggs.

April 20. Four eggs.

April 21. Five eggs.

May 3. Four young birds and one egg.

May 4. Five young.

July 14, 1899. House finches began a nest in a vine.

July 15. Nest building was continued.

July 16. Female carrying lining materials. Male always accompanies her, but carries nothing.

July 17. One egg. Female sitting at night.

July 18. Two eggs. Female sitting off and on, it being a very warm day.

July 19. Three eggs. Female sitting intermittently.

July 20. Four eggs.

July 21, 22, 23. Four eggs. Three young birds, probably of an earlier brood, roost at night in the vine with the male.

August 1. Noon: Four eggs. Evening: One egg has hatched.

August 2, 8 A.M. Two eggs and two young. Noon: Same. 6 P.M.: One egg and three young.

August 3. Four young.

August 18. Noon: One young bird on edge of nest, three in nest. Later: Four young in nest. 5 P.M.: One young bird in vine a foot from nest. 6 P.M.: Two young in vine, then back in nest. 7 P.M.: Three of the young have flown to neighboring trees; one is still in vine. Later: All are gone.

On May 4, 1893, I found a nest containing four eggs and a female that evidently had died while sitting. All were cold.

In the spring of 1898 I transferred three young linnets from the nest where they had just hatched to the nest of a pair of domestic canaries whose young were of about the same size. The canaries showed no objection to this sudden addition to their family, and reared all successfully. Late in the summer two of the young linnets began to sing in low tones. To my surprise, their song was entirely copied from that of their foster parent, though of only about half its extent. Early in the summer of 1899, these birds were liberated. Their song then consisted of about one-half of the song of the house finch, followed by several trills from the song of the canary and for several months after this they could be distinguished by it. What finally became of them, I do not know. Birds which have been reared in a cage have the usual red of the plumage replaced with yellow. Caged adults also become yellow after moulting.

Astragalinus tristis salicamans. Willow Goldfinch.

I have not seen this bird at Los Gatos in summer, although it occurs there in considerable numbers in winter. It is not rare at Palo Alto at any season.

Astragalinus psaltria. Green-backed Goldfinch.

This beautiful goldfinch breeds very abundantly in all parts of

the valley which I have visited. That it is also very abundant in winter and early spring may be seen from the following item from my notebook :

"March 21, 1888. Counted seventy-two goldfinches in a large white oak. Probably there were a hundred and fifty in all, mostly *S psaltria*, and the males were in full song, forming a charming chorus for all their lack of leadership."

Nest building begins early in April (March 30, 1889), and fresh eggs may be found as late as the 1st of August (July 31, 1888). The number of eggs laid varies from three to five, but usually is four. Rarely, sets of pure white eggs are found. I found one set of four eggs, of the usual bluish tint, of which one was finely dotted with reddish brown. The nests are built in all sorts of trees and bushes (blackberry, raspberry, grape, maple, orange, apple, peach, oak, fig, bay, greasewood, bamboo, etc.), at heights varying from two to thirty feet.

Astragalinus lawrencei. Lawrence's Goldfinch.

This species is not nearly so common as the green-backed goldfinch, but is by no means rare. It nests in May and June and usually lays five eggs.

Spinus pinus. Pine Siskin.

The siskin usually is a very common bird in winter, though sometimes few are seen. I have not observed it in summer, but Mr. James M. Hyde tells me that a pair nested in Santa Clara several years ago.

Ammodramus sandwichensis bryanti. Bryant's Marsh Sparrow.

I never have noted this bird at Los Gatos, though it is common at Palo Alto, especially in winter.

Chondestes grammacus strigatus. Western Lark Sparrow.

The lark sparrow breeds commonly, throughout the county, in April, May and June. I saw one carrying nesting materials March 22, 1889. The nests are built either on the ground or in trees or bushes. The species does not occur at Los Gatos in winter (arriving in March), but probably is to some extent resident in the lower parts of the valley.

Zonotrichia leucophrys intermedia. Intermediate Sparrow.

This form occurs in some numbers in winter, but is never so

abundant as Gambel's sparrow. I believe that a few individuals of the true *leucophrys* occur, but of this I am not positive.

Zonotrichia leucophrys gambeli. Gambel's Sparrow.

Gambel's sparrow usually appears at Los Gatos in September (September 22, 1891) and remains until the end of March (April 1, 1890). It is more abundant at Palo Alto and San José than at Los Gatos.

Zonotrichia coronata. Golden-crowned Sparrow.

Probably the most abundant winter bird at Los Gatos is this handsome sparrow. It usually arrives in September (October 1, 1887; September 22, 1888; September 16, 1889; September 23, 1891; August 31, 1892), and leaves in April (April 3, 1889; April 11, 1892; April 20, 1893). It is common at Palo Alto, but probably less so than the white-crowned varieties.

Spizella socialis arizonæ. Western Chipping Sparrow.

The chipping sparrow is a fairly common resident, breeding usually in May. I saw none in 1892.

Junco hyemalis oregonus. Oregon Junco.

Junco hyemalis thurberi. Thurber's Junco.

Junco hyemalis pinosus. Point Pinos Junco.

A few juncos nest in the chaparral belt near Alma. They appear indistinguishable from the juncos which breed throughout the redwood region of Santa Cruz county, and which I have no hesitation in calling *J. h. pinosus*. This same pale-headed, pink-sided variety occurs during the winter. At this season one finds also dark-headed, pink-sided birds, which I call *J. h. oregonus*, and dark-headed birds, with comparatively little pink, which I refer to *J. h. thurberi*. The juncos usually arrive at Los Gatos in October (October 21, 1887; September 16, 1889), and a few remain until late in April. The October and April birds seem to be mostly *J. h. pinosus*.

Amphispiza belli. Bell's Sparrow.

This bird appears to be of very local distribution in Santa Clara county. I have found it only on a small tract near the summit of the mountains west of Los Gatos. Here a considerable colony

breeds every year, but their nests are so well hidden that I have found only one. This was built in a small bush and held three slightly incubated eggs, May 9, 1898. The old birds were feeding their young a kind of yellow spider, June 23, 1892.

Melospiza fasciata samuelis. Samuel's Song Sparrow.

Samuel's song sparrow is a very common resident. It nests in bushes, usually within a foot or two of the ground, though sometimes at a height of more than ten feet. Its three or four eggs may be found from the first week in April (April 4, 1889) to the last of June (June 29, 1889). Very frequently one of the eggs fails to hatch. Discarded snake skins are sometimes used in constructing their nests. This song sparrow daringly enters all sorts of holes and dark corners about woodpiles and under boxes, where no other bird except a wren would think of going.

Melospiza lincolni. Lincoln's Sparrow.

My experience would lead me to believe that Lincoln's sparrow is a rather rare winter visitant, though it may, perhaps, prove to be fairly common in the low-lying portions of the valley. One was shot February 21, 1891.

Passerella iliaca unalaschcensis. Townsend's Sparrow.

This is a common winter resident in the foothills. It usually arrives in October and stays late in March.

Pipilo maculatus oregonus. Oregon Towhee.

To this name I refer the common "black-headed" towhee resident in the foothills west of Los Gatos. It is not typical *oregonus*, but approaches that form far more closely than it does *P. m. megalonyx*. Probably in winter some nearly typical *P. m. oregonus* can be found. What the bird of the eastern side of the valley is I do not know, but I shall not be surprised if it prove much closer *P. m. megalonyx*.

This bird almost invariably builds on the ground, though in a few instances I have found its nest in bushes. Its eggs are usually four, sometimes three, in number, and may be found from late in April (April 24, 1889) until the middle of July (July 11, 1888). April 30, 1888, I found a nest of this bird containing four eggs of the towhee and one of the California quail. Wishing to learn whether the towhee objected to bringing up other people's children, I took

her four eggs, leaving only the quail's egg in the nest. The next day the towhee was still sitting, though it cannot be supposed that she was unable to detect the great difference in size, color and shape between this egg and her own. The next year (May 17, 1889) I found a nest of this species containing the usual four towhee's eggs and two quail's eggs, in addition to which there was a third quail's egg on the ground about six inches from the nest. The towhee was sitting.

Pipilo fuscus crissalis. California Towhee.

This is a very common resident. The birds apparently remain paired through the year. Nesting begins about the middle of April (April 16, 1889), and young birds may sometimes be found still in the nest in September (September 3, 1899). The number of eggs usually is three or four, and one is laid each day until the set is complete. The period of incubation is fourteen days.

Oreospiza chlorura. Green-tailed Towhee.

One was shot in a river bottom near San José during the winter of 1889 or 1890.

Zamelodia melanocephala. Black-headed Grosbeak.

This grosbeak must be ranked among the very finest of our songsters. The song begins with a series of loud, clear notes, delivered, at considerable intervals, in a more or less declamatory style. These are followed at length by runs and trills fully as tender and liquid as the notes of a thrush, and quite as well executed as those of a well-trained canary. This song is repeated over and over again, almost without a pause. One that I timed sang nearly twelve minutes, with never a pause of more than ten seconds. This grosbeak arrives about the middle of April (April 16, 1890; April 15, 1892), and comparatively few remain until September. Nest building usually begins early in May, but the last of the young sometimes remain in the nest until the middle of July (July 12, 1888). The males assist in the duties of incubation.

Cyanospiza amœna. Lazuli Bunting.

This species arrives about the middle of April—the males always, I believe, coming a day or two before the females—and begins to build about the end of that month. I have found fresh eggs from May 1 to June 23 (1888). Occasionally the eggs are dotted with

brown. The number laid is ordinarily either three or four. A caged male often sang until nine or ten o'clock at night during the breeding season, though in the dark.

Piranga ludoviciana. Louisiana Tanager.

This beautiful bird occurs only as a migrant—during April and May and again in August and September. At these times it is fairly common. Last seen in spring, May 29 and 30, 1898.

Progne subis hesperia. Western Martin.

The martin breeds in some numbers on the Mount Hamilton range. I have not noted it on the west side of the county.

Petrochelidon lunifrons. Cliff Swallow.

This is a very common summer resident, appearing at Palo Alto about the middle of March (March 14, 1892), though it usually does not reach Los Gatos much before April. It breeds in June.

Hirundo erythrogaster. Barn Swallow.

For some years a colony nested at Alma.

Tachycineta bicolor. Tree Swallow.

Along the western side of the county this swallow breeds quite abundantly in holes in white oaks.

Tachycineta thalassina. Violet-green Swallow.

This gorgeous bird is an irregular summer visitant, probably from the redwood region nearer the coast. I have no knowledge of its breeding in Santa Clara county.

Stelgidopteryx serripennis. Rough-winged Swallow.

A number of these birds breed near San José.

Ampelis cedrorum. Cedar Waxwing.

This waxwing is an occasional winter visitant. I have seen none for several years.

Lanius ludovicianus gambeli. California Shrike.

This is a common resident of the valley. I have not found it breeding in the foothills west of Los Gatos, though it is frequently seen there after the nesting season is over. On September 3, 1892, I observed one perched in the top of a cherry tree, singing very sweetly and with much power.

Vireo gilvus. Warbling Vireo.

It is usually early in April that this vireo arrives at Los Gatos. By the middle of that month it becomes common, and a little later nest building begins (April 18, 1890; April 27, 1889). Its eggs are usually four, sometimes only three, and may be found throughout May and the greater part of June (April 26, 1890; June 20, 1889).

Vireo huttoni. Hutton's Vireo.

This is a fairly common winter resident near Los Gatos. I believe it retires to the coast to breed.

Helminthophila celata lutescens. Lutescent Warbler.

It usually is not until about the 1st of April that this warbler becomes common, although individuals arrive a week or two earlier. In this vicinity their nests seem always to be built upon the ground, and those of several years often are not more than a few inches apart. Nestlings may be found from the last week in April until the end of June (April 25–June 30, 1889). Four or five eggs are laid.

Dendroica æstiva. Yellow Warbler.

This is a common summer resident and breeds abundantly, especially on the floor of the valley, in June.

Dendroica auduboni. Audubon's Warbler.

This warbler occurs in large numbers, from October on through the winter. It is most frequently seen in companies, often with the western bluebird and the various goldfinches, and feeds, to some extent, on grapes.

Dendroica townsendi. Townsend's Warbler.

A few specimens of this warbler have been taken at Santa Clara by Mr. J. M. Hyde. I regard them as stragglers from the redwood region near the coast, where this bird is common during migrations.

Geothlypis tolmiei. Tolmie's Warbler.

I have only one record of this warbler. On May 17, 1890, I came upon a fine male in the foothills west of Los Gatos. Seven days later, in the same place, I saw both male and female carrying food. Doubtless they had a nest, but careful search failed to reveal it.

Geothlypis trichas occidentalis. Western Yellow-throat.

A number of these birds breed in the marshes south of San José.

Icteria virens longicauda. Long-tailed Chat.

This beautiful bird is not uncommon along the watercourses, but is so shy that it is rarely seen. It nests in May and June.

Anthus pensilvanicus. American Pipit.

This larklike bird is a very abundant winter resident, arriving usually in October.

Cinclus mexicanus. American Dipper.

One not infrequently meets this bird when wandering along streams in the rougher parts of the county, though it does not breed here in nearly such numbers as among the redwoods of Santa Cruz county.

Minus polyglottos. Mockingbird.

On February 17, 1893, I shot a male mockingbird that had been living for some weeks in a small grove of peppers and cypresses near Stanford University. This is the only one I have seen. It bore no evidence of having been caged.

Harporhynchus redivivus. California Thrasher.

This common resident begins nest building usually in the first week in April. Its eggs—which sometimes are without markings—vary from two to four in number and may be found from the middle of April until the middle of May. The song is clear and powerful, and so frequently includes snatches from the songs and calls of other birds (among which are the flicker, housefinch, quail, goldfinch, black-headed grosbeak, etc.) that this species is often spoken of as the mountain mockingbird.

Thryomanes bewickii spilurus. Vigor's Wren.

Vigor's wren is a resident species, very common in winter and moderately common in summer. I have found fresh eggs as late as June 18 (1890).

Troglodytes aëdon parkmanii. Parkman's Wren.

The earliest of these wrens usually arrive at Los Gatos about the middle of March. By the end of that month they are common

and in full song (during 1896 and 1897 I saw none). Nest building begins during the second half of April. I have found its five to eight eggs from May 9 to June 6 (1890).

Cistothorus palustris paludicola. Tule Wren.

The tule wren breeds in the marshes south of San José, but not very abundantly.

Parus inornatus. Plain Tit.

It can hardly be said that this tit is common at Los Gatos even in winter, though it is seen much more frequently then than during the breeding season. At Palo Alto, and probably in the oak region throughout the valley, it is a very common resident. It has, perhaps, a greater variety of notes than any other of our birds. Its eggs, usually, are seven, and are to be found in April. Occasionally, the nests are built in bird boxes.

Parus rufescens neglectus. California Chickadee.

In the coniferous woods southeast of Saratoga this chickadee is a very common resident and undoubtedly breeds. Straggling flocks occur irregularly near Los Gatos during nearly the whole year, but never are common.

Chamæa fasciata. Wren Tit.

This is a very common resident of the chaparral belt, where its curiously rattlelike call may be heard almost constantly. Its song is a series of beautifully clear whistled notes delivered at constantly lessening intervals, so that it has much the cadence of an ivory ball dropped on a slab of stone. Nest building begins about the middle of April (April 12, 1890) and fresh eggs may be found until late in June (June 20, 1889). Three to five eggs are laid, most frequently four.

Psaltriparus minimus californicus. California Bush Tit.

This is a very common resident. Nest building sometimes begins as early as the middle of February, but usually not until a month later. The nests vary in length from six and one-half inches to more than a foot. Their construction occupies the birds from one to three weeks (extremes are April 5–11; March 16–April 10), depending chiefly upon the abundance of material. Full sets contain from two to eight eggs, and may be found as late as June 16

(1888). When the eggs are taken the birds often remove the nest, bit by bit, to a new location. The following notes show that two broods are reared in the same nest:

April 24, 1888: Found bush tit's nest in live oak, ten feet from ground. May 4: After cutting the nest down and finding that it held five young birds, I tied it in place again. May 12: Young still in nest. June 16: Thinking the nest deserted I again cut it down, was surprised to find five eggs. The birds had stopped up the original hole, made another lower down, and relined the nest.

April 5, 1889. Bush tit's nest in live oak, nine feet from ground. Six young. April 21: Nest empty. April 27: Six eggs. April 28: Seven eggs. April 30: Eight eggs.

Regulus satrapa olivaceus. Western Golden-crowned Kinglet.

This kinglet is a rare winter visitant.

Regulus calendula. Ruby-crowned Kinglet.

This is a very common winter resident, arriving, ordinarily, in October and remaining until March or April.

Myadestes townsendii. Townsend's Solitaire.

A female shot at Los Gatos, February 11, 1893, is the only one observed.

Hylocichla ustulata œdica.

This is a very common summer resident, arriving in April and remaining until September (Mar. 24, 1899–Sep. 3, 1892). It nests very abundantly along watercourses, chiefly in June.

Hylocichla aonalaschkæ. Dwarf Hermit Thrush.

The dwarf thrush is extremely common from late in October (Nov. 7, 1888, Oct. 20, 1899, Oct. 30, 1891, Oct. 22, 1892) until after the thrushes of the *ustulata* type have appeared in the spring. I believe it does not nest in Santa Clara county, although it does among the redwoods a few miles farther west.

Merula migratoria propinqua. Western Robin.

The robin is a common migrant and winter resident, appearing usually in October (Oct. 16, 1887, Nov. 3, 1888, Oct. 9, 1889, Oct. 30, 1891) and remaining until the latter part of March (Mar. 21, 1888; Mar. 24, 1889). One appeared at Los Gatos August 8,

1893, and was seen almost daily until September 10. In November and December, 1889, immense flocks passed southward, almost without intermission for days at a time.

Hesperocichla nævia. Varied Thrush.

It usually is not until several weeks after the arrival of our other winter birds that the varied thrush appears at Los Gatos (Jan. 5, 1889; Dec. 24, 1889; Dec. 9, 1893). Often it is very common, but during the winter of 1889–90 I saw only three. My latest dates are March 22, 1888, and March 30, 1890.

Sialia mexicana occidentalis. Western Bluebird.

This bluebird is a common resident. Its nests may be found from the middle of April until June. In winter it associates with Lawrence's warbler and the pine, green-backed and willow goldfinches.

Sialia arctica. Mountain Bluebird.

The mountain bluebird sometimes occurs as a rare winter visitant.

SOME PASSAMAQUODDY WITCHCRAFT TALES.

BY J. DYNELEY PRINCE, PH.D.

(*Read November 17, 1899.*)

The following six tales of witchcraft were related to me during the summer of 1899 at Bar Harbour, Me., by Mr. Newell S. Francis, of the Passamaquoddy[1] tribe, now resident with his people, numbering some 500 to 600 souls in all, on their reservation at Pleasant Point, Me. (Pass. *Sĭbā́yĭk*). The chief interest of these stories lies in the facts, first, that they are the utterances of a comparatively intelligent Indian who firmly believes in the genuineness of the phenomena which he describes, and, secondly, that they were recorded by means of a phonograph, into which Mr. Francis spoke with great distinctness, thus enabling me to reproduce them with much greater phonetic exactness than if he had written them in the very imperfect system at present followed by the few Indians of this tribe who can write their language.

Any missionary to the Passamaquoddies, or to their kindred, the New Brunswick Maliseets, the Penobscots of Oldtown, Me., or the Micmacs and Abenakis of Quebec, will admit that belief in the ancient Shamanistic sorcery among these Indians has by no means died out. Among the Passamaquoddies and Maliseets[2] particularly there is still a perfect mine of material relating to the wizards and their power over other men and over the curious beings with which the Indians have peopled the mysterious forests of their country. It is to be regretted that more interest is not taken in this highly curious people, who in the course of fifty years are almost bound to disappear, but whose old men and women are still able to impart much that is very valuable both to the philologist and to the student of native American beliefs.[3]

[1] The word Passamaquoddy is a corruption of the Indian *Pĕstŭmwōkā́dyĭk*, the plural of the participial formation *Pĕstŭmwōk-ād* "he who catches the pollock-fish" from *Pĕskŭtŭm-wōk* "pollock-fish," + *-ād*, participial ending. Cf. Pŏnnămwōk-ād "he who catches frost-fish."

[2] The Maliseets, sometimes called St. John Indians, live in New Brunswick, on the river St. John. They are identical with the Maine Passamaquoddies in race and language. They are called in the native idiom: *Wŭlāstŭk-wīyĭk* "Indians of the river St. John (*Wŭlāstŭk*)."

[3] See Prince, *Proc. Amer. Philos. Soc.*, xxxvi, pp. 479–495; *Annals N.Y. Acad. Sci.*, xi, pp. 369–377.

In pre-Christian times the Passamaquoddies, like their other Algic kindred, were Shamanists, worshipers of the demons of the wilderness and the lakes, and firm believers in the almost unlimited power of their *m'dēaulinwŭk* or wizards, many of whom still exist, subordinately, of course, to the Catholic doctrine, which nearly all the Indians profess. Francis informs me that there are only three or four Protestant Passamaquoddy families

A few specimens of these sorcerers' power are described below in the curiously curt style of Algic narrative. We see from the following tales that the wizards could transform themselves into animals at will (see tale i); that they could cast a spell or curse on an enemy, even though he might also be *m'dēaulin* (tale ii); that they could violate the laws of nature so far as to walk in hard ground, sinking up to the ankles or knees at every step (tale iii), and, finally, that they could communicate with each other telepathically (tale iv). I need hardly comment on the first two and the fourth of these wonders, as they are common among all Shamanistic conjurers, but the third phenomenon, *e. g.*, the power to sink into hard ground while walking, is, I believe, characteristically American. Rink states that this is not an unusual feat among the conjurers of the Greenland Eskimo, who frequently sink into rocky and frozen ground "as if in snow." The trick is probably done by some peculiar way of stooping. Leland compares here, however, the Old Norse statements regarding their wizards, who occasionally sank into the ground and who had power to pass through earth with the same ease as through air or water (*Algonquin Legends*, p. 342). It would be hardly permissible to draw a parallel between the ancient Norsemen and the northern Indians on this account, as the case he cites is that of a conjurer who disappeared into the ground *head downwards*, when he was stabbed at by a foe. It should be noticed that in the following tale, my authority did not *see* the actual feat, but only the deep tracks of the wizard where he had sunk into the earth "the night before," as Francis expressed it in his explanation.

The fifth anecdote, of a cannibalistic feast, is highly interesting. The wizards here eat their murdered comrade, evidently with the idea of absorbing into themselves some or all of his power. The cannibalistic orgies of the South Sea Islanders should be compared with this practice. For example, the Fijis and the Maoris of New Zealand ate their enemies with the same object in view, *e. g.*, to

become as brave as the fallen foe had been. All authorities tend to show, however, that cannibalism was extremely rare among the American races, and was only resorted to in isolated cases like the one here noted.

The sixth tale, of the *kĭwā'kw*, or snow-demon, is one of a great number. The Algic Indian believed in many spirits, some benevolent like the *w'nāg'mĕswăk* or little people, who were wont to warn the tribesmen of impending danger,[4] some harmless like the wandering *kĭwā'kw* or the *chĭb'lākwē*, the tree sprite, who sits in the crotch of the large branches, and some distinctly malevolent like the *ăppōd'mk'n* or spirit of the deep water who lurks in the lakes to drag down the unwary swimmer.

In the notation of the tales I have used the following system. The consonants are to be pronounced as in English, with the exception of *ṭ* and *ḳ*, which represent voiceless *tenues*; *ñ*, which is the French nasal *n*; *w'*, the whistled initial peculiar to the Pass., Abn. and Lenape, and ', which is a guttural voice-stop, not unlike the Semitic *ayin*. When *n* and *m* are written in juxtaposition to a following consonant they have their simple nasal tone-value. The vowels, whose exact quantity I have marked in the Passamaquoddy and Penobscot, have the Italian values, except in the case of the apostrophe, ', which is a very short *ŭ*, and *ů*, which is equivalent to *oo* in "good."

The intonation of the Passamaquoddy dialect is difficult to acquire. In the narrative style, the syllables are spoken in what is nearly a monotone, until the tone syllable is reached, when the voice runs up a musical third and drops the same interval on the syllable after the accent. When a word has two accents, one following the other, as, for example, in *pŏhĕ́gŭnŭ́l*, the first accented syllable is unusually prolonged in a sing-song tone and the second is marked by the voice-rise. These peculiarities are perfectly reproduced by the phonograph.

I have made the grammatical analysis following the tales, partly by means of a direct study of the Pass. itself and partly by means of a colloquial knowledge of the kindred Abenaki language of Canada, which is almost identical with the Penobscot idiom of Oldtown, Me., and is very close to the Lenape.

[4] Cf. Prince, *Annals N.Y. Acad. Sci.*, xi, p. 373.

I.

K'chī[1] Joe Bĕnōĭt m'dēaulĭn[2] pōhēgŭnŭl[3] k'chī k'nākwchĭl.[4] Ūmāṭn-nṭēnĭyāl[5] k'd'gĭl skĭṭāpyĭl.[6] Pōhēgŭnŭl k'chī āt-hōzĭswŭl.[7] M'dēaul-ĭnwŭk nē'sēyĭk[8] t'lĭp'n'ltōwŭk. Kĭzĭp'n'ltĭtĭt[9] m'sĭdē nsēyō kŭspĕn.[10] Nōdămĕn[11] Joe Bĕnōĭt kĭstāhāl[12] k'd'gĭl skĭṭāpyĭl. Kĭzĭp'n'ltĭtĭt k'dŭk skĭṭāp mē'chĭnē.[13]

II.

K'chī Lācōt(e) m'dēaulĭn k'chī Sābātĭssĭz'l[14] ūmāṭnṭēnĭyāl. K'chī Lācōt(e), ūnājĭ'tŏn mskwĭglāhēgŏn k'chī'kŏk.[15] Kĭzĭ'tāq pĭzĕssĭn. w'tŭgwĕjĭ'tŏn wāgōnā'kwĕm. W'mājĕtauk kĕgĕskw. Wāgōnā'kwĕm kwĭllhōgăn.[16] Ūkwūssĭz'l ūkĭgw'hŏgŏl (ūsĕb'mōyōgŏl). W'gĭchĭjĭ-tŏn[17] Lācōte Sābātĭssĭz'l ūm'dēaulĭnwĭk-p'nilkŏl.

III.

Nĭl nānānkō kĕsĭg'd'nĭyăn n'mĭhā skĭṭāp m'dēaulĭn'wēū lĭwĭzō[18] Mĭ'kŭmwĕss. Nṭĭōgŭn[20] ngĭzĭkwĕtkēūs[21] nāgā ngĭzĭkĭnōslŭggŏn[22] ēd'lĭ kĭzĭkwĕtkēūsĕt. Nĭl n'mĭtŏn[23] ĕlāptāk[24] wĕjōsĕt.[25]

IV.

N'mĭtaukws[26] nōdwā ēd'lĭntauk nĭbāĭyū ōt'lĭntŭwēwāl wĭdápyĭl. Ūnōdágŏl ēd'lĭntauk-mĕdĕntākw pĭchĕdŏg ngwŭttā t'kĕssōsálkwŭt t'lĭgĕdŏnkē.

V.

Nzĭwĕs nt'lāg'nōd'māk pĭchē kĭskākĕsĭgd'n māṭndŏltĭtĭt m'dēaulĭn-wŭk. Pĕsk'wŏl[27] ūnĕp'hāṇiā. Ūmājĕp'hāṇiā Mná'nŏk ēd'lĭ-spāsē-gĕk. Nĭt ēd'lĭpŏltĭtĭt.

VI.

Nĭzwŭk skĭṭāpyĭk t'lĭg'dŏnkĭyĭk kŭspĕmŭk. Slākĭu ūnōd'wāṇiā wĕnĭl[29] măskwŭlămĭyĭlĭjĭl ĕlmāg'mĕk mē'tāg'mĕk. Nōdausāṇiā—āpch ūnōd'wāṇiā măskwŭlămĭyĭlĭjĭl. Ūnĭmĭyawāl wĕchkōyālĭjĭl. Mālūm'dē pĕchĭ'yĭl ēyĭ'tĭt. Ūtĭyāṇiā: p'lchĭnĕss mĭts.[30] Ō'tĭd'mŭn[31] yōt skĭṭāp: kṭātāmā[32] ngĭzĭjĕnĕs-hĭyū tētĭnt'lĭ ēd'lĭt'kĕyĭk[33] lā'tōgwĕss-nŭk. Yōt skĭṭāp ĕlwĕ'kāl kĭwā'kw.

I.

Old Joe Benoit, the wizard, changed himself into a big turtle. He had quarreled with another man. The latter changed himself into a great serpent. The wizards fought together at *Nĕ'sĕyĭk*.[13] After the fighting, the lake was all stirred up. I heard that Joe Benoit beat the other man. After the fight the other man died.

II.

Old Lacote, the wizard, quarreled with old Sabatis.[14] Old Lacote had made a dead-fall trap for bear in the woods. After he had made it, he crawled in (to test it). He pulled the prop-stick, touching it only a little. The prop-stick fell on him. His son (however) rescued him. Lacote knew that Sabatis had bewitched him.

III.

When I was fifteen years old, I saw a man who was a wizard He was called a *Mĭ'kûmwĕss*[19] (a wood-devil). He told me that he had sunk into hard ground up to his ankles, and he showed me the place where he had done so. I saw the tracks where he had walked.

IV.

I heard my father (once) singing by night to his partner and he (the partner) heard him (my father) singing when he (the partner) was hunting a hundred miles away.

V.

My brother told me that many years ago certain wizards had a quarrel. They killed one (of their number). They brought him to Grand Manan,[28] where there was a steep ledge and there they ate him.

VI.

Two men were hunting on a lake. Suddenly they heard some one whooping along the lake, at the foot of the lake. They went out, and again they heard him whooping. They saw him coming. Right up he comes to where they are. They said to him: "Won't you eat?". That man said: "I cannot stop; I must go to where it is cold, to the north." That man must have been a *Kĭwă'kw*.[34]

Grammatical Analysis.

[1] *K'chī* means properly "big," but in Pass. and Abn. it is frequently used for "old;" cf. Abn. *ādālī k'chīāwĭt* "he who is oldest" (participle). Oj. *kitchi*, Cree *ki'chi* mean "big." In Oj., however, the prefix *kete-*, clearly allied to *k'chī*, means "old." Both the Del. *chinge* "big" and *kikey* "old" (modern *kikes* "adults, parents") undoubtedly belong here. I doubt, however, whether we should compare with this root, as Brinton does (*Lenâpé*, pp. 102–4), the large class of derivatives in Del. beginning with *gisch-*, used to denote successful action, as in *gischigin* "to begin life, to be born;" *gischiton* "he makes it ready;" Abn. *kīzītō*, etc. The Cree *kije-* "perfect" (Lacombe, *Dict. de la Langue des Cris*, s. v.) may be cognate here.

[2] *M'dēaulĭn* "wizard" appears in old Del. as *meteu* "one who drums," *e. g.*, a witch-doctor, referring to the practice of the medicine men of beating drums to drive away evil spirits. Thus, Del. *meteohet* is a drum or any hollow body. In mod. Del., *meteu* denotes a turkey-cock, which drums with its wings (so Anthony in Brinton, *Lenâpé Dict.*, p. 83). Cf. Oj. *mĕdēwĭn* "sorcery" and *ţēwē-īgē* "he beats a drum" (*ţēwē-īgŭn* "drum").

[3] In *pōhēgŭnŭl* and the following word, we have the ending *-ŭl* of the obviative, or accus. of the third person, which appears in all the Algic idioms.

[4] *K'nākwchĭl* "turtle" (note the obv. *-ĭl* as object of pōhēgŭnŭl) is an exact cognate of abn. *Mīkĕnākw* "turtle." Compare Micmac *mĭkchĭkch*, Oj. *mĭshĭkē* "turtle."

[5] *Ūmāţnţēnīyāl*, also in the obv., is clearly cognate with Del. *machtenaļitlin, machtayen* "to quarrel."

[6] In *skiţāp* "man" (*-yŭl*, obv. ending), sometimes *ŭskīţāp*, we evidently have the ending *-āpē*, which is used in Del. as the regular terminal to denote the human male. Thus, *lĕn-āpē* "a Del. Indian" (*lĕnno* "man" + *āpē*). With *lĕnno*, cf. Cr. *ĭlĭlĭ*, Oj. *ĭnĭnĭ*, O. Abn. *ărēn-āñbē*, Mod. Abn. *ăln-ōmbā*, O. Narragansett *nin*, Naugatuck *rinh*, etc. Del. *kīk-āpē*, "a bachelor," is formed in the same way. Brinton (*Len.*, p. 100) derives *-āpē* from a root *ap* "to cover sexually," which he states appears in Oj., used only of the lower animals. I cannot find it so applied. This *-āpē*, however, is found in O. Abn. *ărēn-āñbē*, Modern Abn. *āln-ōmbā* (Penobscot *āln-āmbā*) "indian," and in old Mass. *wusketomp* "man," exactly equivalent to

Pass. *ûskĭṭāp*. Cf. in this connection Pass. *n-ĭd-āp* Mod. Abn. *n-ĭd-ŏmbā* "my friend" (male). I find *nĭdōmbāskwā* "*mon amie*" in Abn. for the feminine. This *-āp* clearly appears also in Pass. *hĭy-āp* "buck" (male deer) and Mod. Abn. *nōmba-lhā* "cock." I am inclined to connect the first syllable of *ûskĭṭāp* "man" (Mass. *wusketomp*) with the Abn. root *ūskĭ* "young," regarding the *ṭ* as a mere connecting consonant.

[7] *Āthōziswûl* is a combination of *āt-hō* + *zĭs* (*sĭs*), diminutive ending, + *-wûl*, obv. termination. This may be connected with Del. *achgook* "snake," with which should be compared Abn. *s-kōg*.

[8] *Nē'sēyĭk* means "the muddy lake." The ending *-ĭk* is locative.

[9] *Kĭzĭp'nĭltĭtĭt*. *Kĭzĭ-*, sign of the past (also "can") from the verb *kĭzĭtō* "he makes," + *p'nĭl*, with which cf. Del. *linolittin* "fright," + the participial ending of the 3 p. pl. *-tĭtĭt*.

[10] *Kŭspĕn*, cf. *ḳŭspémŭk* in vi, probably from *ḳŭs-* "big" also "fast," and *-pē*, the termination denoting water seen in Abn. *sĭbō-bĭ* "river water." The Abn. word for water is *n'bĭ*, cf. Del. *mbi*, Oj. *n'bi*, etc. This appears in Pass. only in compounds such as *wĭkhĭg'n-nŭp* "book-water," *e. g.*, "ink." The regular Pass. expression is identical with the Micmac, *i. e.*, *sămāgwān*. The element *ḳŭs-* appears in Abn. *k'kŭstōñgzĭn* "you talk big, *e. g.*, haughtily." Cf. also *Kŭz-ĭbiā* "paddle quickly."

[11] *Nŏdămĕn*, from *n'*, prefix of 1 p. sing., + √*nod*, + *amen* sign of the inanimate. Cf. Abn. *nŏdămĕn* "I hear" and Oj. *nūndāgē* "he hears" (is not deaf).

[12] *Kĭstāhāl* "he conquers him," perhaps cognate with Abn. *k'kĭs-tōnā-nā* "we decide, settle."

[13] *Mĕ'chĭnē*, cf. Abn. *māchĭnā* "he is dead."

[14] *Sābātĭssĭz'l* is the name *Sābātĭs*, the Indian corruption of Jean Baptiste, + the dim. ending *-sĭs*, + the obv. termination *'l,ul*.

[15] *K'chĭ'kŏk* "in the woods," with the loc. *-ŏk*, is, perhaps, cognate with the Del. *teke-ne-k* "in the woods." If so, we must suppose a metathesis *te-ke* = *k' -chĭ*, in which the *te* corresponds with the probably palatalized *-chi*.

[16] *Kwĭllhōgăn* is probably cognate with the Del. *quillutamen* "he falls upon it, attacks it."

[17] *W'gĭchĭjĭtŏn* "he knows," with inan. ending *-tŏn*, is perhaps cognate with Del. *kigin-amen* "he knows it," the Del. *-gi-* being represented by the palatalized *-chĭ-*, as in note 15.

[18] *Lĭwĭzō*; √*lĭwĭ* + *zō*, reflexive ending of 3 p. sg. Cf. Abn.

ndĕlīwīzī "I am called; *kd-ĕlīwī-t-ămĕn* "you call it," etc. The same root appears in Del. *wdellowunsowagan* "name." The Abn., however, drops the element *li* in the substantive *wīzōwōñgān* "name."

[19] The *Mĭ'kûmwĕss* is a wood-spirit which may become the familiar of a wizard; the Passamaquoddies say, of a certain *m'dĕaulĭn; mĭ'kûmwĕss-û'kē* "he is partner with a *mĭ'kûmwĕss*. The wizard in this story was evidently in possession of such a familiar.

[20] *Nt̤ōgŭn* consists of the prefix of the 1 p. sing. *n-*, the connecting consonant *-t̤-*, the root *ī* and the suffix *-gŭn* "he." For this root, cf. *n-t̤-ī-dăm* "I say;" Abn. *nd-īl-gŏn* "he says to me." The prefix *n-* and suffix *-gŭn* with the root infixed always mean "he .... to me;" cf. Abn. *ngīz-ăgăkĭm-gŏn* "he taught me," and see below note 22.

[21] *Ngīzīk'wĕlk̤ēūs* is direct oration "I sank into the ground." *Kīzī* (see above note 9) becomes *gīzī* here by partial assimilation to the preceding nasal.

[22] *Ngīzīk̤īnōslŭggŏn* cf. the remarks above, note 20, on *nt̤ōgŭn*.

[23] *N'mĭtŏn* "I see it" (inan.). The animate form is *n'mĭhā*, as above *n'mĭhā skĭt̤āp* "I see (him) a man."

[24] *Ĕlāptāk*, cf. Abn. *ălŏmtōk* "tracks which he made" (partc.).

[25] *Wĕjōsĕt*, partc. 3 p. "which he made."

[26] To illustrate the similarity between the Penobscot and Passamaquoddy, I give here the Penobscot version of this and the following anecdote. In the Pen. dialect every syllable receives equal voice-stress.

IV.

Nōdāwā n'mĭtaugŭs ēdālĭntōkw nībāĭhĭ ōdālĭntōwēwăl wĭdāmbāl. Ūnōdāñgŏl wĭdāmbāl ēdālĭntōkw nāwādōgē ngwûdātkwē tkĕssōsōñgwāt tālĭgădōñkē.

V.

Nĭjĭā ndōñdōñkēūkw nauwāt kĭzgōügĕsĭgād'n āwōdĭhĭdwāk m'dĕolĭnwāk. Pĕzgōwāl ūnĭ'hlāōñl. Ūmōüjĭp'hānā Mnā'nōgē ēdālĭ spāsēgĕk ēdālĭ pŏldĭhĭdĭt.

[27] *Pĕskwŏ!* must of course be obviative as the object of the verb *ūnĕp'hānjā* in the 3 p.

[28] *Manan*, Abn. *mĕnăhăn*, Pass. *m'nă'n*, means "island."

[29] *Wĕnĭl*, obv. case of *wĕn* "who, someone;" cf. Abn. *āwānĭ*, Del. *auwen*, Oj. *āwēnēn*.

[30] Pass. *n'mĭts;* Abn. and Del. *n'mĭtzī* "I eat."

[31] This is a combination of *ŏ*, 3 p. prefix, the connecting consonant *t*, the root *ī* (see above note 20), and *-ămĕn*, the inanimate ending.

[32] *Ḳāṭāmā* "not." *Ḳāṭ* or *skāṭ* is the neg. element, cf. the Del. *taku*, an excellent example of metathesis.

[33] *Ēd'lī-t'kēyĭk*. *Ēd'lī* is the relative particle "which, where;" *t'kē* appears in Abn. *t'kā*, Del. *tehek* (sbst.) "cold."

[34] The *kĭwā'kw* is essentially a cold demon, rejoicing in snow and ice. An old Indian told me that his father had seen one running on the snow-crust without snow shoes as swiftly as a deer.

Stated Meeting, December 1, 1899.

Vice-President SELLERS in the Chair.

Present, 23 members.

The resignation of Hon. Wayne McVeagh was read and on motion accepted.

Donations to the Library were announced and thanks were ordered therefor.

Prof. Lewis M. Haupt read a paper entitled "Failure of Dams and Reservoirs."

The annual reports of the Treasurer, the Curators and the Standing Committees were presented.

The Trustees of the Building Fund made a report, which was ordered to be spread upon the Minutes and referred to the Finance Committee.

The Society was then adjourned by the presiding officer.

Stated Meeting, December 15, 1899.

Vice-President SELLERS in the Chair.

Present, 30 members.

The Curators announced that the portrait of Dr. Rush had been restored and placed in the North room of the Society.

The death of Sir Rawson W. Rawson, of London, England, a member of the Society, was announced.

Prof. Haupt made the following remarks supplementary to his paper read October 6, "On the Results Secured at Aransas Pass, Tex., by the Reaction Breakwater:" (See page 135.)

As stated in the paper presented on October 6, the bids for the removal of the obstructing Government jetty were advertised on September 25 for thirty days. When they were opened it was found that there was but one bidder, that his bid was informal and in consequence the work was not undertaken.

On December 7, the Washington dispatches reported that Hon. Rudolph Klebery, representing the Aransas Pass district, introduced a bill into Congress to place the work under the continuing contract system, with authority to complete the double jetty plan as proposed by the U. S. Engineers which were estimated to cost $1,500,000, to create a channel by dredging and thus destroy the utility of a work which has already produced a navigable channel of fifteen feet M.L.W. at a cost of about one-twentieth the usual Government method, in much less time and without dredging. The channel is maintained by the currents, and is therefore relatively permanent.

A year will therefore soon have passed under a renewal of Government jurisdiction, with nothing further done toward the completion of the reaction breakwater.

The report of the Finance Committee was received.

The appropriations for the year 1900 were made.

The Society then held an election for members of the

Society, and the Tellers reported that the following gentlemen had been duly elected:

Coleman Sellers, Jr., Philadelphia.
Edwin Swift Balch, Philadelphia.
James Dewar, London, Eng.
Thomas C. Mendenhall, Worcester, Mass.
Daniel Baugh, Philadelphia.
Lindley M. Keasbey, Bryn Mawr.
L. W. Miller, Philadelphia.
Sir William Henry Preece, London, Eng.
Jacques Loeb, Chicago.
Charles Otis Whitman, Chicago.
Thomas Hunt Morgan, Bryn Mawr.
Henry Kraemer, Philadelphia.
Thomas Harvey Daugherty, Philadelphia.
Capt. Charles D. Sigsbee, U. S. N., Washington, D. C.
Barton C. Hirst, Philadelphia.
W. C. Broegger, Christiania, Norway.
Alexander Jay Wurts, Pittsburg, Pa.
Otis T. Mason, Washington, D. C.
Frederick W. True, Washington, D. C.
William H. Holmes, Washington, D. C.
A. B. Meyer, Dresden, Saxony.
Robert C. H. Brock, Philadelphia.
Gustave Schlegel, Leiden, Holland.
Albert Matthews, Boston, Mass.
J. Rodman Paul, Philadelphia.
Hugo A. Rennert, Philadelphia.
Edward Coles, Philadelphia.
J. Dundas Lippincott, Philadelphia.

Officers and Councillors for the ensuing year were nominated.

The Society was then adjourned by the presiding officer.

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LIST OF MEMBERS

OF THE

American Philosophical Society

HELD AT PHILADELPHIA

FOR PROMOTING USEFUL KNOWLEDGE

(FOUNDED 1743)

January, 1900.

LIST OF MEMBERS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

JANUARY, 1900.

A

Name.	*Date of Election.*	*Present Address.*
1687. ABBE, CLEVELAND, Prof.	July 27, 1871,	U. S. Weather Bureau, Washington, D. C.
2170. ABBOT, CHARLES CONRAD, M.D. .	Dec. 20, 1889,	Trenton, N. J.
1463. ABBOT, HENRY L., Gen. U. S. A.	April 18, 1862,	23 Berkeley St., Cambridge, Mass.
2311. ABBOTT, ALEXANDER C., M.D. . .	Feb'y 19, 1897,	Laboratory of Hygiene, University of Pennsylvania, Philadelphia.
1809. ÅCKERMAN, RICHARD, Prof. . . .	July 21, 1876,	Stockholm, Sweden.
1713. ACLAND, SIR HENRY, Bart. . . .	Jan'y 17, 1873,	Oxford, England.
2128. ADAM, LUCIEN.	Dec. 17, 1886,	41 Bard Sevigné, Rennes, France.
2081. ADAMS, HERBERT B., Prof. . . .	May 21, 1886,	Baltimore, Md.
1779. AGASSIZ, ALEXANDER, Prof. . . .	April 16, 1875,	Cambridge, Mass.
1642. AGASSIZ, MRS. ELIZABETH	Oct. 15, 1869,	Quincy St., Cambridge, Mass.
1860. ALISON, ROBERT HENRY, M.D. .	May 3, 1878,	Ardmore, Montgomery Co., Pa.
2380. ALLEN, ALFRED H.	May 20, 1898,	67 Surrey St., Sheffield, Eng.
1869. ALLEN, JOEL ASAPH, Prof. . . .	Sept. 20, 1878,	Am. Museum of Natural History, New York.
1927. AMES, REV. CHARLES G.	Jan'y 21, 1881,	12 Chestnut St., Boston, Mass.
2064. ANDERSON, GEORGE B., Lt. U.S.A.	Feb'y 19, 1886,	West Point, N. Y.
2164. ANGELL, JAMES B., Pres't.	Oct. 18, 1889,	Ann Arbor, Mich.
2224. APPLETON, WILLIAM HYDE, Prof.	May 19, 1893,	Swarthmore, Pa.
2102. ARGYLL, THE DUKE OF	May 21, 1886,	London, England.
1761. ARMSTRONG, THE RT. HON. LORD	July 17, 1874,	Cragside, Rothbury, England.
1996. ASHHURST, JOHN, JR., M.D. . . .	Jan'y 18, 1884,	2000 Delancey Pl., Phila.
2012. ASHHURST, RICHARD L.	April 18, 1884,	2204 Walnut St., Philadelphia.
2019. AVEBURY, LORD (SIR JOHN LUBBOCK)	July 18, 1884,	High Elms, Down, Kent, Eng.

B

	Name.	*Date of Election.*	*Present Address.*
1995.	BACHE, R. MEADE.	Jan'y 18, 1884,	4400 Sansom St., Philadelphia.
1832.	BACHE, THOMAS HEWSON, M.D.	Feb'y 2, 1877,	233 S. 13th St., Philadelphia.
2394.	BAER, GEORGE F.	Dec. 16, 1898,	Reading, Pa.
2285.	BAILEY, L. H., Prof.	May 15, 1896,	Cornell University, Ithaca, N.Y.
1630.	BAIRD, HENRY CAREY	Jan'y 15, 1869,	810 Walnut St., Philadelphia.
1991.	BAIRD, HENRY M., Prof.	Jan'y 18, 1884,	219 Palisade Ave., Yonkers, N.Y.
2419.	BALCH, EDWIN SWIFT.	Dec. 15, 1899,	1412 Spruce St., Philadelphia.
2345.	BALDWIN, JAMES MARK, Prof. . .	Oct. 15, 1897,	Princeton, N. J.
2191.	BALL, SIR ROBERT STAWELL . .	May 15, 1891,	Observatory, Cambridge, Eng.
1965.	DEBAR, HON. EDOUARD SÊVE . .	July 21, 1882.	Ramsgate, England.
1741.	BARKER, GEORGE F., Prof.	April 18, 1873,	3909 Locust St., Philadelphia.
2011.	BARKER, WHARTON	April 18, 1884,	119 S. 4th St., Philadelphia.
1902.	BARTHOLOW, ROBERTS, M.D. . .	April 16, 1880,	1525 Locust St., Philadelphia.
2119.	BASTIAN, ADOLPH, Prof.	Dec. 17, 1886,	Königgrätzerstrasse 120, Berlin, Germany.
2421.	BAUGH, DANIEL	Dec. 15, 1899,	1601 Locust St., Philadelphia.
1934.	BEAULIEU, M. PAUL LEROY, Prof.	April 15, 1881,	27 Ave. duBois de Boulogne, Paris, France.
1968.	BELL, ALEXANDER GRAHAM, Prof.	July 21, 1882,	1331 Connecticut Ave., Washington, D. C.
1802.	BELL, SIR LOWTHIAN, Bart. . . .	April 21, 1876,	Northallerton, England.
2255.	BEMENT, CLARENCE S.	May 17, 1895,	1804 Spring Garden St., Phila.
2326.	DEBENNEVILLE, JAMES S	Oct. 15, 1897,	University Club, Philadelphia.
2264.	BERTHELOT, M. P. E. MARCELIN.	May 17, 1895,	Paris, France
2253.	BERTIN, GEORGES	May 17, 1895,	11 bis Rue Ballu, Paris.
1920.	BIDDLE, CADWALADER	Oct. 15, 1880,	1420 Walnut St., Philadelphia.
1831.	BIDDLE, HON. CRAIG	Feb'y 2, 1877,	2033 Pine Street, Philadelphia.
2134.	BILLINGS, JOHN S., M.D.	Feb'y 18, 1887,	40 Lafayette Place, New York.
2256.	BISPHAM, GEORGE TUCKER . . .	May 17, 1895,	1805 Delancey Place, Phila.
2157.	BLAIR, ANDREW A.	May 17, 1889,	406 Locust Street, Philadelphia.
1554.	BLAIR, THOMAS S.	Jan'y 19, 1866,	718 Bidwell St., Pittsburg, Pa.
1669.	BLAKE, WM. PHIPPS, Prof. . . .	Oct. 21, 1870,	Tucson, Arizona.
1700.	BLODGET, LORIN	April 19, 1872,	1329 S. Broad St., Philadelphia.
1444.	BÖHTLINGK, M. OTTO	Jan'y 17, 1862,	Seeburgstrasse 35, II. Leipzig.
2235.	BONAPARTE, PRINCE ROLAND . .	Feb'y 15, 1895,	10 Ave. d'Jena 22, Paris, France.
1126.	BOYÉ, MARTIN H., Prof.	Jan'y 17, 1840,	Coopersburg, Lehigh Co., Pa.
1826.	BRACKETT, CYRUS FOGG, Prof. . .	Feb'y 2, 1877,	Princeton, N. J.
2083.	BRANNER, JOHN C., Prof.	May 21, 1886,	Stanford Univ., Palo Alto, Cal.
2195.	BREZINA, ARISTIDES.	May 21, 1886,	VII Siebensterngasse, 46, Vienna, Austria.
2069.	BRINTON, JOHN H., M.D	Feb'y 19, 1886,	1423 Spruce St., Philadelphia.
2433.	BROCK, ROBERT C. H.	Dec. 15, 1899,	1612 Walnut St., Philadelphia.
2080.	BROOKS, WILLIAM KEITH, Prof. .	May 21, 1886,	Johns Hopkins Univ., Baltimore, Maryland.
1881.	BROWN, ARTHUR ERWIN	April 18, 1879,	1208 Locust St., Philadelphia.
2393.	BROWN, ERNEST WILLIAM, Prof.	Dec. 16, 1898,	Haverford College, Pa.
2275.	BRUBAKER, ALBERT P., M.D. . .	Oct. 18, 1895,	105 N. 34th St., Philadelphia.
1547.	BRUSH, GEORGE J., Prof.	Jan'y 20, 1865,	Yale Univ., New Haven, Conn.
2376.	BRYANT, HENRY GRIER.	May 20, 1898,	Room 805 Land Title Building, Philadelphia.
2237.	BRYCE, RIGHT HON. JAMES . . .	Feb'y 15, 1895,	54 Portland Place, London W., England.
2236.	BUDGE, E. A. WALLIS	Feb'y 15, 1895,	British Museum, London, Eng.
1653.	BULLOCK, CHARLES	Oct. 15, 1869,	1017 Clinton St., Philadelphia.
2007.	BURK, REV. JESSE Y	Jan'y 18, 1884,	400 Chestnut St., Philadelphia.
1938.	BUTLER, HON. WILLIAM	April 15, 1881,	West Chester, Pa.

C

Name.	*Date of Election.*	*Present Address.*
1788. CAMPBELL, JOHN LYLE, Prof. . .	July 16, 1875,	Crawfordsville, Ind.
1606. CANBY, WILLIAM MARRIOTT . . .	Oct. 16, 1868,	1101 Delaware Avenue, Wilmington, Del.
2051. CANNIZZARO, TOMMASO	Oct. 16, 1885,	Santa Maria fuori cinta, Casa Roffa, Messina, Sicily.
2416. CADWALADER, JOHN	May 19, 1899,	1519 Locust St., Philadelphia.
1731. CAPELLINI, GIOVANNI, Prof. . .	April 18, 1873,	Portovenere près Spezia, Italy.
1796. CARLL, JOHN F.	Oct. 15, 1875,	Pleasantville, Venango Co., Pa.
1911. CARSON, HAMPTON L.	April 16, 1880,	1033 Spruce St., Phila.
2260. CARTER, HON. JAMES C	May 17, 1895,	54 Wall Street, New York City.
1707. CASSATT, ALEXANDER J	Oct. 18, 1872,	Haverford, Del. Co., Pa.
2147. CASTNER, SAMUEL, JR.	Dec. 16, 1887,	3729 Chestnut St., Philadelphia.
2152. CATTELL, J. MCKEEN, Prof. . . .	May 18, 1888,	Garrison-on-Hudson, N. Y.
1908. CHANCE, HENRY MARTYN, M.D .	April 16, 1880,	4128 Parkside Ave., Phila.
1783. CHANDLER, C. F., Prof. . . .	April 16, 1875,	Columbia Univ., N. Y. City.
1778. CHAPMAN, HENRY C., M.D. . . .	April 16, 1875,	2047 Walnut St., Philadelphia.
2132. DE CHARENCEY, COMTE HYACINTH	Dec. 17, 1886,	25 rue Barbet de Jouy, Paris, France.
2158. CLARK, CLARENCE H.	May 17, 1889,	42d and Locust Sts., Phila.
1717. CLARKE, THOMAS	Jan'y 17, 1873,	127 Duane St., New York, N.Y.
1983. CLAYPOLE, E. W., Prof.	Jan'y 19, 1883,	Pasadena, Cal.
2247. CLEEMANN, RICHARD A., M.D . .	Feb'y 15, 1895,	2135 Spruce St., Philadelphia.
2336. CLEVELAND, HON. GROVER. . . .	Oct. 15, 1897,	Westland, Princeton, N. J.
1999. COHEN, J. SOLIS, M.D.	Jan'y 18, 1884,	1341 Walnut St., Philadelphia.
2429. COLES, EDWARD	Dec. 15, 1899,	1734 Chestnut St., Philadelphia.
2305. CONKLIN, EDWIN GRANT, Prof. .	Feb'y 19, 1897,	University of Penna., Phila.
2386. CONVERSE, JOHN H.	May 20, 1898,	500 N. Broad St., Philadelphia.
2257. COOK, JOEL	May 17, 1895,	849 N. Broad St., Philadelphia.
2129. CORA, GUIDO, Prof.	Dec. 17, 1886,	Corso Vittorio Emanuele, 74, Turin, Italy.
1662. COX, HON. JACOB D.	April 15, 1870,	Cincinnati, O.
2207. CRAMP, CHARLES H	Dec. 16, 1892,	507 S. Broad St., Philadelphia.
1836. CRANE, THOMAS FREDERICK, Prof.	Feb'y 2, 1877,	Cornell Univ., Ithaca, N. Y.
2100. CROOKES, SIR WILLIAM	May 21, 1886,	7 Kensington Park Gardens, London, W., England.
2388. CROWELL, EDWARD P., Prof. . .	Dec. 16, 1898,	21 Amity St., Amherst, Mass.
2172. CRUZ, HON. FERNANDO, M.D. . .	Dec. 20, 1889,	Washington, D. C.
2317. CULIN, STEWART	May 21, 1897,	University of Penna., Philadelphia.
1439. CURWEN, JOHN, M.D.	April 18, 1861,	Warren, Pa.
2296. CUSHING, FRANK HAMILTON. . .	May 15, 1896,	Bureau of Ethnology, Washington, D. C.

D

1567. DA COSTA, J. M., M.D	Oct. 19, 1866,	1700 Walnut St., Philadelphia.
2361. DALL, WILLIAM H.	Dec. 17, 1897,	U. S. National Museum, Washington, D. C.
2402. DANA, CHARLES E.	May 19, 1899,	2013 DeLancey Place, Philadelphia.
2282. DANA, EDW. S., Prof.	May 15, 1896,	Yale Univ., New Haven, Conn
1806. DANNEFELD, C. JUHLIN	April 21, 1876,	27 Gt. Winchester St., London.
2369. DARWIN, GEORGE HOWARD, Prof.	Feb'y 18, 1898,	Newham Grange, Cambridge, England.
2425. DAUGHERTY, THOMAS HARVEY .	Dec. 15, 1899,	School House Lane, Germantown, Philadelphia.

	Name	*Date of Election.*	*Present Address.*
1811.	DAVENPORT, SIR SAMUEL	Oct. 20, 1876,	Beaumont, Adelaide, S. Australia.
1557.	DAVIDSON, GEORGE, Prof.	Jan'y 19, 1866,	2221 Washington St., San Francisco, Cal.
2417.	DAVIS, WILLIAM MORRIS.	Oct. 20, 1899,	Cambridge, Mass.
1923.	DAWKINS, WILLIAM BOYD, Prof.	Oct. 15, 1880,	Woodhurst, Fallowfield, Manchester, England.
2418.	DAY, FRANK MILES	Oct. 20, 1899,	801 Penn Mutual Building, Philadelphia.
2406.	DAY, WILLIAM C., Prof.	May 19, 1899.	Swarthmore, Pa.
2360.	DE GARMO, CHARLES, Prof. . . .	Dec. 17, 1897,	Cornell Univ., Ithaca, N. Y.
2208.	DERCUM, FRANCIS X., M.D. . . .	Dec. 16, 1892,	1719 Walnut St., Philadelphia.
2434.	DEWAR, JAMES, Prof.	Dec. 15, 1899,	The Royal Institution, London, England.
2013.	DICKSON, SAMUEL	April 18, 1884,	901 Clinton St., Philadelphia.
2208.	DIXON, SAMUEL G., M.D., Pres't .	Dec. 16, 1892,	1900 Race St., Philadelphia.
2108.	DOLLEY, CHARLES S., M.D. . . .	Dec. 17, 1886,	3707 Woodland Ave., Phila.
2089.	DONNER, OTTO, Prof.	May 21, 1886,	Helsingfors, Finland.
1946.	DOOLITTLE, C. L., Prof.	Oct. 21, 1881,	Upper Darby, Delaware Co., Pa.
1839.	DOUGLAS, JAMES	April 20, 1877,	Spuytenduyvil, NewYork, N.Y.
1924.	DRAPER, DANIEL	Oct. 15, 1880,	Meteorological Observatory, Central Park, New York.
2303.	DREER, FERDINAND J.	Feb'y 19, 1897,	1520 Spruce St., Philadelphia.
1787.	DROWN, THOMAS M., Pres't . . .	July 16, 1875,	Lehigh Univ., S. Bethlehem, Pa.
1918.	DU BOIS, PATTERSON	Oct. 15, 1880,	1031 Walnut St., Philadelphia.
1878.	DUDLEY, CHARLES BENJAMIN . .	Jan'y 17, 1879,	Drawer 334, Altoona, Blair Co., Pa.
2063.	DUNCAN, LOUIS, U. S. N.	Feb'y 19, 1886,	Johns Hopkins University, Baltimore, Md.
1573.	DUNNING, GEORGE F.	Jan'y 18, 1867,	Farmington, Conn.
1727.	DUPONT, EDOUARD	April 18, 1873,	Royal Museum, Bruxelles.
2227.	DUPONT, HENRY A.	Feb'y 16, 1894,	Winterthur, Montchanen, Del.
1679.	DUTTON, CLARENCE E., Capt. U.S.A.	Jan'y 20, 1871,	U. S. Arsenal, Washington, D.C.

E

2105.	EASTON, MORTON W., Prof. . . .	Dec. 17, 1886,	224 S. 43d St., Philadelphia.
1917.	ECKFELDT, JACOB B	Oct. 15, 1880,	U. S. Mint, Philadelphia.
1825.	EDDY, H. TURNER, Prof	Feb'y 2, 1877,	University of Minnesota, Minneapolis, Minn.
2294.	EDISON, THOMAS A.	May 15, 1896,	Orange, N. J.
2262.	EDMUNDS, HON. GEORGE F. . . .	May 17, 1895,	1724 Spruce St., Philadelphia.
1686.	ELIOT, CHARLES W., Pres't	April 21, 1871,	17 Quincy St., Cambridge, Mass.
2272.	ELLIOTT. A. MARSHALL, Prof. . .	May 17, 1895,	Baltimore, Md.
2313.	ELY, THEODORE N.	May 21, 1897,	Broad St. Station, Phila.
2356.	EMERSON, BENJ. KENDALL, Prof.	Dec. 17, 1897,	Amherst, Mass.
2368.	EMMET, W. L. R	Feb'y 18, 1898,	Schenectady, N. Y.
1981.	EMMONS, S. F., Prof	Jan'y 19, 1883,	U. S. Geological Survey, Washington, D. C.
1943.	EVANS, SIR JOHN, K.C.B.	Oct. 21, 1881,	Nash Mills, Hemel Hempstead, England.
2254.	EWELL, MARSHALL D., M.D . . .	May 17, 1895,	59 Clark St., Chicago, Ill.

F

2234.	FENNELL, C	Feb'y 15, 1895,	Cambridge, England.
2180.	FIELD, ROBERT PATTERSON . . .	May 16, 1890,	218 S. 42d St., Philadelphia.
2364.	FINE, HENRY B, Prof	Dec. 17, 1897,	Princeton, N. J.

Name.	*Date of Election.*	*Present Address.*
2353. FISHER, SYDNEY GEORGE	Dec. 17, 1897,	328 Chestnut St., Philadelphia.
1901. FLINT, AUSTIN, JR., M.D.	April 16, 1880,	14 W. 33d St., New York, N.Y.
2197. FORBES, GEORGE, Prof.	Oct. 16, 1891,	34 GreatGeorge St.,S.W.London.
2390. FORD, PAUL LEICESTER.	Dec. 16, 1898,	247 Fifth Ave., New York City.
1170. FRALEY, HON. FRED., LL.D. . .	July 15, 1842,	2017 Delancey Place, Phila.
1912. FRALEY, JOSEPH C.	April 16, 1880,	1833 Pine St., Philadelphia.
1695. FRAZER, PERSIFOR, Dr. ès-Sc. Nat.	Jan'y 19, 1872,	928 Spruce St., Philadelphia.
2301. FRAZIER, BENJ. W., Prof.	Dec. 18, 1896,	Lehigh Univ., Bethlehem, Pa.
2171. FRIEBIS, GEORGE, M.D.	Dec. 20, 1889,	1906 Chestnut St., Philadelphia.
2179. FULLERTON, GEORGE S., Rev. . .	May 16, 1890,	89, The Gladstone, Philadelphia.
1739. FULTON, JOHN	April 18, 1873,	136 Park Pl., Johnstown, Pa.
1914. FURNESS, HORACE H., Dr. . . .	April 16, 1880,	Wallingford, Del. Co., Pa.
2306. FURNESS, HORACE HOWARD, JR..	Feb'y 19, 1897,	2034 Delancey Place, Phila.
2304 FURNESS, WILLIAM H., 3d, M.D. .	Feb'y 19, 1897,	Wallingford, Del. Co., Pa.

G

1988. GARRETT, PHILIP C	April 20, 1883,	Logan P. O., Philadelphia.
2079. GATES, MERRILL E.	May 21, 1886,	Amherst, Mass.
1025. GATSCHET, ALBERT S.	Oct. 17, 1884,	1331 F St., N. W., Washington, D. C.
1897. GEIKIE, SIR ARCHIBALD	Jan'y 16, 1880,	28 Jermyn St., London, S. W., England.
1803. GEIKIE, JAMES, Prof	April 21, 1876,	31 Merchiston Ave., Edinburgh, Scotland.
2067. GENTH, F. A., JR	Feb'y 19, 1886,	103 N. Front St., Philadelphia.
2274. GIBBS, J. WILLARD, Prof.	May 17, 1895,	121 High St.,New Haven, Conn.
1355. GIBBS, OLIVER WOLCOTT, Prof. .	July 21, 1854,	158 Gibbs Ave., Newport, R. I.
1587. GILL, THEODORE N., M.D.	July 19, 1867,	Smithsonian Inst., Washington, D. C.
1800. GILMAN, DANIEL C., Pres't. . . .	April 21, 1876,	25 N. Charles St.,Baltimore,Md.
2240. GLAISHER, JAMES W. L.	Feb'y 19, 1895,	The Shola, Heathfield Road, South Croydon, England.
2233. GLAZEBROOK, RICHARD T	Feb'y 15, 1895,	4 Sunnyside, Princes Park, Liverpool, England.
2212. GOODALE, GEORGE LINCOLN, Prof.	Feb. 17, 1893,	10 Craigie St., Cambridge, Mass.
2292. GOODSPEED, ARTHUR W., Prof.	May 15, 1896,	Univ. of Pennsylvania, Philadelphia.
2203. GOODWIN, HAROLD.	May 20, 1892,	3927 Locust St., Philadelphia.
2232. GOODWIN, W. W., Prof.	Feb'y 15, 1895,	Cambridge, Mass.
1851. GRAY, ELISHA.	Jan'y 18, 1878,	220 Kinzie St., Chicago, Ill.
2222. GREEN, SAMUEL A., M.D.	Oct. 20, 1893,	Historical Soc., Boston, Mass.
1504. GREEN, WILLIAM HENRY.	April 17, 1863,	Princeton, N. J.
1880. GREENE, WILLIAM H., M.D. . . .	April 18, 1879,	27 S. 5th St., Philadelphia.
2412. GREENMAN, MILTON J., M.D. . .	May 19, 1899,	Wistar Institute, 36th and Darby Road, Philadelphia.
2155. DE GREGORIO, MARCHESE ANTONIO	Dec. 21, 1888,	Al Molo, Palermo, Sicily.
2188. GREGORY, CASPAR RÉNÉ, Prof . .	May 15, 1891,	Naunhofstrasse 25, Marienhöhe, Leipzig-Stotteritz, Germany.
1815. GROTE, AUGUSTUS RADCLIFFE . .	Oct. 20, 1876,	Buffalo, N. Y.
2090. DE GUBERNATIS, ANGELO, Prof . .	May 21, 1886,	Florence, Italy.
1438. DE GUYANGOS, DON PASCUAL . .	April 19, 1861,	London, England.

H

2054. HAECKEL, ERNST, Prof.	Oct. 16, 1885,	University, Jena, Germany.
1658. HALE, REV. EDW. EVERETT . . .	Jan'y 21, 1870,	39 Highland St., Roxbury, Mass.

	Name.	*Date of Election.*	*Present Address.*
1853.	HALL, ASAPH, Prof.	Jan'y 18, 1878,	U. S. Observatory, Washington, D. C.
1795.	HALL, CHARLES EDWARD.	Oct. 15, 1875,	Westport, Essex County, N. Y.
2397.	HALL, CHARLES M.	Dec. 16, 1898,	Niagara Falls, N. Y.
2027.	HALL, LYMAN B., Prof.	Jan'y 16, 1885,	Haverford Coll., Haverford, Pa.
2194.	HAMY, E. T.	May 15, 1891,	40 Rue Lübeck, Ave. du Trocadero, Paris, France.
1337.	HARDING, GEORGE	Jan'y 20, 1854,	2036 Chestnut St., Phila.
2136.	HARRIS, JOSEPH S.	May 20, 1887,	144 School Lane, Germantown.
2246.	HARRISON, CHARLES C., Provost.	Feb'y 15, 1895,	1618 Locust St., Philadelphia.
1827.	HART, JAMES MORGAN, Prof. . .	Feb'y 2, 1877,	1 Reservoir Ave., Ithaca, N. Y.
2378.	HARKNESS, WILLIAM, Prof. . . .	May 20, 1898,	Georgetown Heights, Washington, D. C.
2365.	HATCHER, JOHN B., Prof. . . .	Dec. 17, 1897,	31 Vandeventer Ave., Princeton, N. J.
1764.	VON HAUER, FRANZ RITTER. . .	Oct. 16, 1874,	Leoben, Austria.
1681.	HAUPT, HERMANN.	April 21, 1871,	The Concord, Washington, D.C.
1862.	HAUPT, LEWIS M., Prof.	May 3, 1878,	107 N. 35th St., Philadelphia.
2082.	HAYES, RICHARD SOMERS, Capt .	May 21, 1886,	32 Nassau St., New York, N.Y.
2071.	HAYS, I. MINIS, M.D.	Feb'y, 19, 1886,	266 S. 21st St., Philadelphia.
2395.	HAY, JOHN, Hon.	Dec. 16, 1898,	State Dep't, Washington, D.C.
1985.	HEILPRIN, ANGELO, Prof	April 20, 1883,	Acad. of Natural Sciences, Philadelphia.
2283.	HENDERSON, C. H	May 15, 1896,	Chestnut Hill, Philadelphia.
2218.	HEWETT, WATERMAN T., Prof. .	May 19, 1893,	Cornell Univ., Ithaca, N. Y.
2266.	HEYSE, PAUL, Ph.D.	May 17, 1895,	Munich, Bavaria.
2349.	HILDEBURN, CHARLES R	Oct. 15, 1897,	Care of J. S. Morgan & Co., London, England.
2307.	HILLER, H. M., M.D.	Feb'y 19, 1897,	Care of Charles Hiller, Esq., Kohoka, Mo.
2110.	HILPRECHT, HERMANN V., Prof .	Dec. 17, 1886,	403 S. 41st St., Philadelphia.
1768.	HIMES, CHARLES FRANCIS, Prof. .	Oct. 16, 1874,	Dickinson Coll., Carlisle, Pa.
2438.	HIRST, BARTON COOKE, M.D. . .	Dec. 15, 1899,	1821 Spruce St., Philadelphia.
1663.	HITCHCOCK, CHAS. HENRY, Prof.	April 15, 1870,	Dartmouth Coll., Hanover, N.H.
2355.	HOLDEN, EDWARD S.	Dec. 17, 1897,	Smithsonian Institution, Washington, D. C.
2068.	HOLLAND, JAMES W., M.D. . . .	Feb'y 19, 1886,	2006 Chestnut St., Philadelphia.
2440.	HOLMES, WILLIAM H., Prof. . . .	Dec. 15, 1899,	U. S. National Museum, Washington, D. C.
1624.	HOOKER, SIR JOSEPH D.	Jan'y 15, 1869,	The Camp, Sunningdale, Eng.
2224.	HOPPIN, J. M., Prof.	Oct. 20, 1893,	New Haven, Conn.
2070.	HORNER, INMAN.	Feb'y 19, 1886,	1811 Walnut St., Philadelphia.
1696.	HOUGH, GEORGE W., Prof.	Jan'y 19, 1872,	N.W. University, Evanston, Ill.
1698.	HOUSTON, EDWIN J., Prof. . . .	Jan'y 19, 1872,	1809 Spring Garden St., Phila.
2346.	HOWE, HENRY M., Prof.	Oct. 15, 1897,	27 W. 73d St., New York.
2239.	HUGGINS, SIR WILLIAM, K. C. B .	Feb'y 15, 1895,	90 Upper Tulse Hill, S. W. London.
1843.	HUMPHREY, H. C.	July 20, 1877,	?
2248.	HUNTER, RICHARD S.	Feb'y 15, 1895,	1413 Locust St., Philadelphia.
2373.	HUTCHINSON, EMLEN	May 20, 1898,	2006 Delancey Place, Phila.
2231.	HYATT, ALPHEUS, Prof.	Feb'y 15, 1895,	Francis Ave., Cambridge, Mass.
1426.	HYRTL, JOSEPH, Prof.	July 20, 1860,	k. k. Akad. d. Wissenschaften, Vienna, Austria.

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1773.	INGHAM, WM. ARMSTRONG.	April 16, 1875,	320 Walnut St., Philadelphia.
2221.	D'INVILLIERS, EDWARD VINCENT.	May 19, 1893,	711 Walnut St., Philadelphia.

J

Name.	*Date of Election.*	*Present Address.*
2010. JAMES, EDMUND J., Prof.	April 18, 1884,	Univ. of Chicago, Chicago, Ill.
1933. JANNET, CLAUDIO	April 15, 1881,	11 Rue las Casas, Paris, France.
2302. JASTROW, MORRIS, JR., Prof. . . .	Feb. 19, 1897,	248 S. 23d St , Philadelphia.
2375. JAYNE, HENRY LA BARRE	May 20, 1898,	1826 Chestnut St., Phila.
2049. JAYNE, HORACE, M.D	Oct. 16, 1885,	318 S. 19th St., Philadelphia.
1954. JEFFERIS, WILLIAM W	Jan'y 20, 1882,	442 Central Park West, New York.
2017. JORDAN, FRANCIS, JR.	April 18, 1884,	111 N. Front St., Philadelphia.

K

1989. KANE, ELISHA KENT.	April 20, 1883,	Kushequa, Pa.
2322. KARPINSKY, ALEX. PETROVITCH, Prof.	May 21, 1897,	Geological Survey, St. Petersburg, Russia.
2169. KEANE, JOHN J., Right Rev. . .	Dec. 20, 1889,	Washington, D. C.
2422. KEASBEY, LINDLEY M., Prof. . .	Dec. 15, 1899,	Bryn Mawr, Pa.
2329. KEEN, GREGORY B.	Oct. 15, 1897,	3237 Chestnut St., Philadelphia.
2021. KEEN, WILLIAM W., M.D., Prof.	July 18, 1884,	1729 Chestnut St., Philadelphia.
2392. KEISER, EDWARD H., Prof. . . .	Dec. 16, 1898,	Bryn Mawr, Pa.
1723. KELVIN, LORD.	April 18, 1873,	The Library, The University, Glasgow, Scotland.
2278. KENNELLY, A. E., D.Sc	Feb. 28, 1896,	Crozer Building, 1420 Chestnut St., Philadelphia.
1708. KING, CLARENCE	Oct. 18, 1872,	18 Wall St., New York, N. Y.
1767. KÖNIG, GEORGE A., Prof.	Oct. 16, 1874,	School of Mines, Houghton, Mich.
2389. KNIGHT, WILLIAM A., Prof. . . .	Dec. 16, 1898,	St. Andrew's, Scotland.
2424. KRAEMER, HENRY, Prof.	Dec. 15, 1899,	145 N. 10th St., Philadelphia.
2167. KRAUSS, FRIEDERICH S., Ph.D. .	Dec. 20, 1889,	VII Neustiftgasse 12, Vienna, Austria.

L

1694. LAMBERT, GUILLAUME, Prof. . .	Jan'y 19, 1872,	Univ. of Louvain, Belgium.
2411. LAMBERTON, WILLIAM A., Prof .	May 19, 1899,	University of Penna., Phila.
2377. DE LANCEY, EDWARD F	May 20, 1898,	20 E. 28th St., New York, N. Y.
2344. LANCIANI, RUDOLFO, Prof	Oct. 15, 1897,	2 Via Goito, Rome, Italy.
1858. LANDRETH, BURNET.	Jan'y 18, 1878,	Bristol, Pa.
1781. LANGLEY, SAMUEL P., Sec'y. . .	April 16, 1875,	Smithsonian Institution, Washington, D. C.
1721. LA ROCHE, C. PERCY, M.D. . . .	Jan'y 17, 1873,	1518 Pine Street, Philadelphia.
1974. LAWES, SIR JOHN B., Bart.. . . .	Jan'y 19, 1883,	Rothamsted, St. Albans, Eng.
1595. LEA, HENRY CHARLES.	Oct. 18, 1867,	2000 Walnut St., Philadelphia.
2407. LEARNED, MARION D., Prof . . .	May 19, 1899,	University of Penna., Phila.
1737. LE CONTE, JOSEPH, Prof.	April 18, 1873,	Univ. of California, Berkeley, Cal.
1986. LEHMAN, AMBROSE E.	April 20, 1883,	711 Walnut St., Philadelphia.
2182. LELAND, CHARLES G.	May 16, 1890,	Baring Bros. & Co., London.
2174. LE MOINE, HON. J. M.	Dec. 20, 1889,	Quebec, Canada.
2324. LEONARD, JAMES B.	Oct. 15, 1897,	The Lincoln, Philadelphia.
1382. LESLEY, J. PETER, Prof.	July 13, 1856,	Milton, Mass.
2085. LEVASSEUR, EMILE, Prof.	May 21, 1886,	26, Rue Mons le Prince, Paris, France.
1415. LEWIS, FRANCIS W., M.D.	Jan'y 20, 1860,	2016 Spruce St., Philadelphia.
2300. LEWIS, G. ALBERT	Dec. 18, 1896,	1834 Delancey Place, Phila.

	Name.	*Date of Election.*	*Present Address.*
2338.	LIBBEY, WILLIAM, Prof.	Oct. 15, 1897,	20 Bayard Ave., Princeton, N.J.
2432.	LIPPINCOTT, J. DUNDAS	Dec. 15, 1899,	1333 Walnut St., Philadelphia.
2312.	LISTER, THE RIGHT HON. LORD .	May 21, 1897,	12 Park Crescent, Portland Place, London, England.
1756.	LOCKYER, SIR JOSEPH NORMAN, K. C. B.	April 17, 1874,	Royal College of Science, S. Kensington, London S. W., England.
2435.	LOEB, JACQUES, Dr.	Dec. 15, 1899,	University of Chicago, Chicago, Ill.
1728.	LONGCHAMPS, BARON DE SELYS .	April 18, 1873,	Liège, Belgium.
1872.	LONGSTRETH, MORRIS, M.D. . . .	Sept. 20, 1878,	1416 Spruce St., Philadelphia.
2202.	LOW, HON. SETH	Feb. 19, 1892,	Columbia College, New York.
2350.	LOWELL, PERCIVAL	Oct. 15, 1897,	Lowell Observatory, Flagstaff, Arizona.
2003.	LUDLOW, WILLIAM, Col. U. S. A.	Jan'y 18, 1884,	War Dept., Washington, D.C.
1629.	LYMAN, BENJAMIN SMITH	Jan'y 15, 1869,	708 Locust St., Philadelphia.

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2319.	MABERY, CHARLES F., Prof. . . .	May 21, 1897,	57 Adelbert St., Cleveland, O.
2107.	MACALISTER, JAMES, Pres't. . . .	Dec. 17, 1886,	119 N. 18th St., Philadelphia.
2209.	MACFARLANE, JOHN M., Prof. . .	Dec. 16, 1892,	Lansdowne, Delaware Co., Pa.
2404.	MACKENZIE, ARTHUR S., Prof. . .	May 19, 1899,	Bryn Mawr, Pa.
2363.	MCCAY, LEROY W., Prof.	Dec. 17, 1897,	Princeton, N. J.
2366.	MCCLURE, CHARLES F. W., Prof.	Dec. 17, 1897,	Princeton, N. J.
2280.	MCCOOK, HENRY C., Rev., D.D. .	Feb. 28, 1896,	3700 Chestnut St., Philadelphia.
1888.	MCCREATH, ANDREW S.	July 18, 1879,	223 Market St., Harrisburg, Pa.
1821.	MCKEAN, WILLIAM V.	Feb'y 2, 1877,	200 N. 19th St., Philadelphia.
2299.	MAGIE, WM. FRANCIS, Prof. . . .	Dec. 19, 1896,	Princeton, N. J.
2339.	MAHAN, ALFRED T., Capt. U. S. N.	Oct. 15, 1897,	160 W. 86th St., New York.
2042.	MALLET, JOHN WM., M.D. . . .	Jan'y 16, 1885,	University of Virginia, Charlottesville, Va.
1847.	MANSFIELD, IRA FRANKLIN . . .	Jan'y 18, 1878,	Cannelton, Beaver Co., Pa.
1857.	MARCH, FRANCIS ANDREW, Prof.	Jan'y 18, 1878,	Lafayette College, Easton, Pa.
1861.	MARKS, WILLIAM D., Prof. . . .	May 3, 1878,	Westport, Essex Co., N. Y.
2078.	MARSHALL, JOHN, M.D	May 21, 1886,	1718 Pine St., Philadelphia.
2184.	MASCART, E., Prof.	Dec. 19, 1890,	176 Rue de l'Université, Paris, France.
1572.	MASON, ANDREW	Jan'y 18, 1867,	30 and 32 Wall St., New York.
2431.	MASON, OTIS T., Prof.	Dec. 15, 1899,	Washington, D. C.
2279.	MASON, WM. PITTS, M.D., Prof. .	Feb. 28, 1896,	Rensselaer Polytechnic Institute, Troy, N. Y.
2196.	MASPERO, GASTON, Prof.	May 15, 1891,	Paris, France.
2427.	MATTHEWS, ALBERT.	Dec. 15, 1899,	145 Beacon St., Boston, Mass.
1486.	MAX-MUELLER, PROF., RT. HON. FRIEDRICH.	Jan'y 16, 1863,	University of Oxford, Oxford, England.
1677.	MEEHAN, THOMAS	Jan'y 20, 1871,	Germantown, Philadelphia.
2399.	MEIGS, ARTHUR V., M.D.	May 19, 1899,	1322 Walnut St., Philadelphia.
2115.	VON MELTZEL, HUGO, Prof. Dr. .	Dec. 17, 1886,	Koloszvar, Hungary.
2339.	MELVILLE, GEO. W., Como. U.S.N.	Oct. 15, 1897,	Navy Dept., Washington, D. C.
2430.	MENDENHALL, THOMAS C , Prof.	Dec. 15, 1899,	Worcester, Mass.
2387.	MENGARINI, GUGLIELMO, Prof. .	May 20, 1898,	Rome, Italy.
2251.	MERCER, HENRY C.	Feb. 15, 1895,	Doylestown, Pa.
1903.	MERRICK, JOHN VAUGHAN	April 16, 1880,	Roxborough, Philadelphia.
1947.	MERRIMAN, MANSFIELD, Prof. .	Oct. 21, 1881,	Lehigh Univ., Bethlehem, Pa.

Name.	*Date of Election.*	*Present Address.*
1744. MESSCHERT, MATTHEW HUIZINGA.	Oct. 17, 1873,	Douglassville, Berks Co., Pa.
2436. MEYER, A. B., Prof.	Dec. 15, 1899,	K. Zoölogisches u. Anthropologisch-Ethnographisces Museum, Dresden, Germany.
2142. MICHAEL, MRS. HELEN ABBOTT .	May 20, 1887,	44 Mt. Vernon St., Boston, Mass.
2423. MILLER, LESLIE W., Prof.	Dec. 15, 1899,	N. W. cor. Broad and Pine Sts., Philadelphia.
2284. MINOT, CHAS. SEDGWICK, M.D. .	May 15, 1896,	Harvard Univ., Cambridge, Mass.
2175. MITCHELL, HON. JAMES T. . . .	Feb'y 21, 1890,	1722 Walnut St., Philadelphia.
1461. MITCHELL, S. WEIR, M.D	Jan'y 17, 1862,	1524 Walnut St., Philadelphia.
2267. MONTEGAZZA, PAOLO	May 17, 1895,	Florence, Italy.
2367. MONTGOMERY, THOMAS H., JR . .	Feb'y 18, 1898,	Wistar Institute, 36th and Darby Road, Philadelphia.
2323. MOORE, CLARENCE B.	Oct. 15, 1897,	1321 Locust Street, Phila.
2029. MOORE, JAMES W., M.D.	Jan'y 16, 1885,	Lafayette College, Easton, Pa.
1841. MOREHOUSE, GEORGE R., M.D. .	April 20, 1877,	2033 Walnut St., Philadelphia.
2340. MORLEY, FRANK, Prof.	Oct. 15, 1897,	Haverford, Pa.
2409. MORRIS, HARRISON S.	May 19, 1899,	Academy of Fine Arts, Philadelphia.
2397. MORRIS, ISRAEL W.	May 19, 1899,	225 So. 8th St., Philadelphia.
1976. MORRIS, J. CHESTON, M.D. . . .	Jan'y 19, 1883,	1514 Spruce St., Philadelphia.
2265. MORSE, EDWARD S., Prof. . . .	May 17, 1895,	Essex Institute, Salem, Mass.
1577. MORTON, HENRY, Pres't. . . .	Jan'y 18, 1867,	Hoboken, N. J.
2121. MUCH, MATHÆUS, Ph.D.	Dec. 17, 1886,	XIII Penzingerstrasse, 84, Vienna, Austria.
1866. MUHLENBERG, REV. FRED A. . .	Sept. 20, 1878,	34 S. 5th St., Reading, Pa.
2192. MUNROE, CHARLES E., Prof. . .	May 15, 1891,	Columbian Univ., Washington, D. C.
2062. MURDOCK, J. B., Lieut. U.S.N. .	Feb'y 19, 1886,	Navy Dept., Washington, D.C.
1937. MURRAY, JAMES A. H.	April 15, 1881,	Sunnyside, Banbury Road, Oxford, England.

N

2087. DE NADAILLAC, MARQUIS.	May 21, 1886,	18 Rue Duphot, Paris, France.
2316. NANSEN, FRIDTJOF	May 21, 1897,	Godthaab, Lysaker, Norway.
1852. NEWCOMB, SIMON, Prof.	Jan'y 18, 1878,	Washington, D. C.
1703. NICHOLS, STARR HOYT	July 19, 1872,	64 Exchange Place, New York, N. Y.
2060. NIKITIN, SERGE, Chief Geol. . .	Feb'y 19, 1866,	Geological Survey, St. Petersburg, Russia.
1805. NORDENSKIÖLD, ADOLF ERIC, Prof.	April 21, 1876,	Stockholm, Sweden.
1712. NORRIS, ISAAC, M.D.	Oct. 18, 1872,	Fair Hill, Bryn Mawr, Pa.
2106. NORRIS, WILLIAM F., M.D. . . .	Dec. 17, 1886,	1530 Locust St., Philadelphia.
2046. NORTH, EDWARD, LL.D., Prof. .	Oct. 16, 1885,	Hamilton College, Clinton, N.Y.
2269. NUTTALL, MRS. ZELIA	May 17, 1895,	Care of London County Bank, Oxford, England.

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2072. OLIVER, CHARLES A., M.D. . . .	Feb'y 19, 1886,	1507 Locust St., Philadelphia.
2354. OLNEY, RICHARD, HON	Dec. 17, 1897,	23 Court Street, Boston.
2195. OPPERT, JULIUS, Prof.	May 15, 1891,	Paris, France.
2362. ORTMANN, ARNOLD E., Prof. . . .	Dec. 17, 1897,	66 Williams St., Princeton, N.J.
2135. OSBORN, HENRY F., Prof.	Feb'y 18, 1887,	American Museum of Natural History, New York.
2039. OSLER, WILLIAM, M.D	Jan'y 16, 1885,	1 West Franklin St., Baltimore, Md.

P

Name.	*Date of Election.*	*Present Address.*
1868. PACKARD, A. S., M.D.	Sept. 20, 1878,	Providence, R. I.
1578. PACKARD, JOHN H., M.D.	Jan'y 18, 1867,	Hotel Stenton, Philadelphia.
2396. PANCOAST, HENRY S	Dec. 16, 1898,	267 E. Johnson St., Germantown, Phila.
2035. PATTERSON, C. STUART.	Jan'y 16, 1885,	1000 Walnut St., Philadelphia.
2385. PATTERSON, LAMAR GRAY . . .	May 20, 1898,	176 Washington St., Cumberland, Md.
1282. PATTERSON, ROBERT	April 18, 1851,	329 Chestnut St., Philadelphia.
1320. PATTERSON, THOMAS LEIPER . .	April 15, 1853,	176 Washington St., Cumberland, Md.
2213. PATTISON, ROBERT E., Hon . .	Feb. 17, 1893,	5930 Drexel Rd., Overbrook, Pa.
2357. PATTON, FRANCIS L., D.D., Pres't	Dec. 17, 1897,	Princeton, N. J.
2428. PAUL, J. RODMAN	Dec. 15, 1899,	903 Pine St., Philadelphia.
1772. PEARSE, JOHN B.	Jan'y 15, 1875,	317 Walnut Av., Roxbury, Mass.
2318. PECKHAM, S. F., Prof.	May 21, 1897,	Ann Arbor, Mich.
1859. PEIRCE, C. NEWLIN	May 3, 1878,	1415 Walnut St., Philadelphia.
1722. PEMBERTON, HENRY.	Jan'y 17, 1873,	1947 Locust St., Philadelphia.
2104. PEÑAFIEL, ANTONIO	May 21, 1886,	Ciudad, Mexico, Mexico.
2073. PENNYPACKER, SAMUEL W., Hon.	May 21, 1886,	1540 N. 15th St., Philadelphia.
1518. PENROSE, R. A. F., M.D.	July 17, 1863,	1331 Spruce St., Philadelphia.
2059. PEPPER, EDWARD, M.D.	Feb'y 19, 1886,	El Afia, El Biar, Alger, Algerie
2333. PEPPER, GEORGE WHARTON . . .	Oct. 15, 1897,	701 Drexel Building, Phila.
2383. PETTEE, WILLIAM HENRY, Prof.	May 20, 1898,	554 Thomson St., Ann Arbor, Mich.
2281. PETTIT, HENRY	Feb. 28, 1895,	5951 Overbrook Ave., Philadelphia.
2261. PHELPS, EDWARD J., Hon. . . .	May 17, 1895,	Burlington, Vt.
2403. PHILLIPS, FRANCIS C., Prof. . .	May 19, 1899,	P. O. Box 126, Allegheny, Pa.
2295. PICKERING, EDW. C., Prof. . . .	May 15, 1896,	Harvard Univ., Mass.
2342. PIERSOL, GEORGE A., M.D.	Oct. 15, 1897,	Chester Ave. and 49th St., Philadelphia.
2277. PILSBRY, HENRY A., Prof.	Dec. 20, 1895,	Academy of Natural Sciences, Philadelphia.
2374. PLATT, CHARLES.	May 20, 1898,	237 S. 18th St., Philadelphia.
1760. PLATT, FRANKLIN	July 17, 1874,	1617 Chestnut St., Philadelphia.
2127. PLATZMANN, JULIUS, Ph.D. . . .	Dec. 17, 1886,	Reichsstrasse 2, Leipzig, Germany.
2415. POINCARÉ, HENRI, Prof.	May 19, 1899,	Rue Claude Bernard, Paris, France.
2053. POMIALOWSKY, JOHN, Prof. . . .	Oct. 16, 1885,	St. Petersburg, Russia.
1539. PORTER, THOMAS C., Rev.	Oct. 21, 1864,	Paxinosa Ave., Easton, Pa.
2097. POSTGATE, JOHN P., Prof.	May 21, 1886,	Cambridge, England.
2161. POWELL, J. W.	Oct. 18, 1889,	910 M. St., N. W., Washington, D. C.
2437. PREECE, SIR WILLIAM HENRY . .	Dec. 15, 1899,	13, Queen Anne's Gate, London, S. W., England.
2382. PRESCOTT, ALBERT B., Prof. . . .	May 20, 1898,	734 S. Ingalls St., Ann Arbor, Mich.
1780. PRIME, FREDERICK	April 16, 1875,	1008 Spruce St., Philadelphia.
2414. PRITCHETT, HENRY S.	May 19, 1899,	U. S. Coast Survey, Washington, D. C.
1758. PUMPELLY, RAPHAEL	April 17, 1874,	Newport, R. I.
2293. PUPIN, MICHAEL I., Prof.	May 15, 1896,	7 Highland Pl., Yonkers, N. Y.
2268. PUTNAM, F. W., Prof.	May 15, 1895,	Peabody Museum, Cambridge, Mass.

R

	Name.	*Date of Election.*	*Present Address.*
2131.	RADA, JUAN DE DIOS-Y DELGADO,	Dec. 17, 1886,	Calle de la Corredera baja de S. Pablo No. 12, Madrid, Spain.
2401.	RAMSAY, WILLIAM, Prof.	May 19, 1899,	University College, Gower St., W. C., London, Eng.
1736.	RAND, THEODORE D	April 18, 1873,	Radnor, Del.Co., Pennsylvania.
1849.	RANDALL, F. A., M.D.	Jan'y 18, 1878,	Warren, Pa.
2391.	RAWLE, FRANCIS	Dec. 16, 1898,	"The Lincoln," Philadelphia.
2398.	RAWLE, WILLIAM BROOKE. . . .	May 19, 1899,	230 So. 22d St., Philadelphia.
2099.	RAYLEIGH, JOHN W. S., LORD . .	May 21, 1886,	Terling Pl., Witham, Essex, Eng.
1784.	RAYMOND, ROSSITER W.	April 16, 1875,	99 John St., New York, N. Y.
2381.	REDWOOD, BOVERTON	May 20, 1898,	4, Bishopsgate St. Within, London, England.
2405.	REMINGTON, JOSEPH P., Prof. . .	May 19, 1899,	1832 Pine St., Philadelphia.
1889.	REMSEN, IRA, Prof.	July 18, 1879,	Johns Hopkins Univ., Baltimore, Md.
1948.	RENARD, A. F., Prof.	Oct. 21, 1881,	Acad. of Sciences, Brussels, Belgium.
1343.	RENARD, CHARLES, M.D.	Jan'y 20, 1854,	Moscow, Russia.
1890.	RENEVIER, E., Prof.	July 18, 1879,	Univ. Lausanne, Switzerland.
1816.	REULEAUX, F., Prof.	Feb'y 2, 1877,	Ahornstrasse 2, Berlin, Germany.
2122.	RÉVILLE, ALBERT, Prof.	Dec. 17, 1886,	21 Rue Guénégaud, Paris, France.
2315.	RHOADS, SAMUEL NICHOLSON . .	May 21, 1897,	Academy of Natural Sciences, Philadelphia.
2226.	ROBERTS, ISAAC	Oct. 20, 1893,	Starfield, Crowborough, Sussex, England.
1957.	ROBINS, JAMES W., Rev	April 21, 1882,	2023 Pine St., Philadelphia.
1390.	ROGERS, FAIRMAN	Jan'y 16, 1857,	Univ. of Pennsylvania, Philadelphia.
2177.	ROGERS, ROBERT W., Prof. . . .	Feb'y 21, 1890,	Drew Theological Seminary, Madison, N. J.
1462.	ROHRIG, F. L. OTTO, Prof.	April 18, 1862,	Los Angeles, Cal.
2050.	ROLLETT, HERMANN, Ph.D. . . .	Oct. 16, 1885,	Baden bei Wien, Austria.
1907.	ROOD, OGDEN N., Professor . . .	April 16, 1880,	Columbia College, New York.
2198.	ROSENGARTEN, JOSEPH G.	Oct. 16, 1891,	1704 Walnut St., Philadelphia.
1964.	DE ROSNY, LÉON, Prof.	July 21, 1882,	47 Ave. Duquêsne, Paris, France.
1838.	ROTHROCK, JOSEPH T., Prof. . .	April 20, 1877,	West Chester, Pa.
2291.	ROWLAND, HENRY A., Prof. . .	May 15, 1896,	Johns Hopkins Univ., Baltimore
1620.	RÜTIMEYER, CARL L., Prof. . . .	Jan'y 15, 1869,	Basle, Switzerland.

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2230.	SACHSE, JULIUS F.	Feb'y 16, 1894,	4428 Pine St., Phila.
1766.	SADTLER, SAMUEL P., Prof. . . .	Oct. 16, 1874,	1042 Drexel Building, Phila.
2148.	SAJOUS, CHARLES E., M.D	Feb'y 17, 1888,	2043 Walnut St., Philadelphia.
2358.	SAMPSON, ALDEN	Dec. 17, 1897,	Haverford, Pa.
1563.	SANDBERGER, FREDOLIN, Prof. .	April 20, 1866,	Univ. of Würtzburg, Bavaria.
2327.	SANDERS, RICHARD H.	Oct. 15, 1897,	1225 Locust St., Philadelphia.
1958.	SARGENT, CHARLES SPRAGUE, Prof.	April 21, 1882,	Jamaica Plain, Mass.
1730.	SAUSSURE, HENRI DE.	April 18, 1873,	Geneva, Switzerland.
2211.	SCHÄFFER, CHARLES, M.D. . . .	Feb'y 17, 1893,	1309 Arch St., Philadelphia.
1498.	SCHOTT, CHARLES ANTHONY, Prof.	April 17, 1863,	U. S. Coast and Geodetic Survey, Washington, D. C.
1864.	SCHURZ, CARL, Hon	Sept. 20, 1878,	54 William St., New York, N.Y.

	Name.	*Date of Election.*	*Present Address.*
1725.	SCLATER, PHILIP LUTLEY	April 18, 1873,	3 Hanover Square, London, W England.
2372.	SCOTT, C. F.	Feb'y 18, 1898,	Pittsburgh, Pa.
2112.	SCOTT, W. B., Prof.	Dec. 17, 1886,	Princeton, N. J.
1870.	SCUDDER, SAMUEL HUBBARD. . .	Sept. 20, 1878,	Cambridge, Mass.
2352.	SEE, T. J. J., LL.D.	Dec. 17, 1897,	Lowell Observ., Flagstaff, Ariz.
1704.	SELLERS, COLEMAN.	July 19, 1872,	3301 Baring St., Philadelphia.
3420.	SELLERS, COLEMAN, JR.	Dec. 15, 1899,	410 N. 33d St., Philadelphia.
1533.	SELLERS, WILLIAM.	April 15, 1864,	Clifton, Edgemoor, Delaware.
1770	SELWYN, ALFRED R. C., LL.D. .	Oct. 16, 1874,	28 Nepean St., Ottawa, Canada.
2057	SERGI, GIUSEPPE, Prof.	Oct. 16, 1885.	Università Romana, Rome, Italy
2410.	SHAPLEIGH, WALDRON	May 19, 1899,	2223 Delancey Pl., Philadelphia.
2076.	SHARP, BENJAMIN, M.D.	May 21, 1886,	317 N. 35th St., Philadelphia.
1944.	SHARPLES, PHILIP PRICE	Oct. 21, 1881,	West Chester, Pennsylvania.
1960.	SHARPLES, STEPHEN PASCHALL. .	April 21, 1882,	13 Broad St., Boston, Mass.
1797.	SHERWOOD, ANDREW	Oct. 15, 1875,	Mansfield, Tioga Co., Penna.
1822.	SHIELDS, CHAS. W., Rev., D.D. .	Feb y 2, 1877,	Princeton, N. J.
2351.	SMITH, A. DONALDSON, M.D . . .	Oct. 15, 1897,	Care of S. H. Thomas, 210 S. 4th St., Phila.
2146.	SMITH, EDGAR F., Prof, ...	Oct. 21, 1887,	210 S. 37th St., Philadelphia.
1789.	SMITH, STEPHEN, M.D	Oct. 15, 1875,	57 W. 42d St., New York, N. Y.
2335.	SMOCK, JOHN C., Prof.	Oct. 15, 1897,	Trenton, N. J.
2141.	SMYTH, ALBERT H., Prof. . .	May 20, 1887,	Radnor, Delaware Co., Pa.
2229	SNELLEN, HERMAN, JR., Ph.D. .	Feb'y 16, 1894,	Utrecht, Netherlands.
1742.	SNOWDEN, A. LOUDON	Oct. 17, 1873,	1812 Spruce St., Philadelphia.
2009.	SNYDER, MONROE B., Prof. . . .	Jan'y 18, 1884,	2402 N. Broad St., Philadelphia.
1720.	SPOFFORD, A. R., ...	Jan'y 17, 1873,	Washington, D. C.
2332.	SQUIBB, EDWARD R., M.D	Oct. 15, 1897,	152 Columbia Heights, Brooklyn, N. Y.
1949.	STALLO, HON. JOHN B.	Oct. 21, 1881,	Cincinnati, O.
2348.	STEPHENS, H. MORSE, Prof. . . .	Oct. 15, 1897,	Cornell Univ., Ithaca, N. Y.
1990.	STEVENS, WALTER LECONTE, Prof.	Jan'y 18, 1884,	Rensselaer Polytechnic Institute, Troy, N. Y.
1840.	STEVENSON, JOHN JAMES, Prof. .	April 20, 1877,	University Heights, New York, N. Y.
2276.	STEVENSON, SARA Y.	Oct. 18, 1895,	237 S. 21st St., Philadelphia.
2371.	STILLWELL, L. B.	Feb'y 18, 1898,	Buffalo Ave., Niagara Falls, N.Y.
2168.	STOKES, SIR GEORGE G., Bart. .	Dec. 20, 1889,	Lensfield Cottage, Cambridge, England.
2193.	STUBBS, RT. REV. WILLIAM, Lord Bishop of Oxford	May 15, 1891,	Cleveden Palace, Oxford, Eng.
2094.	SUESS, EDWARD, Prof.	May 21, 1886,	Geol. Reichsanstalt, Vienna, Austria.
2258.	SULZBERGER, MAYER, Hon. . . .	May 17, 1895,	1303 Girard Ave., Philadelphia
2092.	SZOMBATHY, JOSEF, Prof.	May 21, 1886,	Burgring 7, Vienna, Austria.

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2328.	TATHAM, WILLIAM	Oct. 15, 1897,	1811 Walnut St., Philadelphia.
2243.	TAYLOR, ISAAC, Rev.	Feb'y 15, 1895,	York, England.
2098.	TEMPLE, RICHARD CARNAC, Lt.-Col.	May 21, 1886,	Port Blair, Andeman Islands.
2289.	TESLA, NIKOLA	May 15, 1896,	46 E. Houston St., New York.
2006.	THOMAS, ALLEN C., Prof.	Jan'y 18, 1884,	Haverford, Pa.
1993.	THOMPSON, HEBER S.	Jan'y 18, 1884,	Pottsville, Pa.
1726.	THOMPSON, SIR HENRY.	April 18, 1873,	35 Wimpole St., Cavendish Square, London, England.

Name.	*Date of Election.*	*Present Address.*
1807. THOMSON, ELIHU, Prof.	April 21, 1876,	Swampscott, Mass.
1909. THOMSON, WILLIAM, M.D.	April 16, 1880,	1426 Walnut St., Philadelphia
2052. IM THURN, EVERARD F.	Oct. 16, 1885,	Pomeroon River, Georgetown, British Guiana, S. A.
1530. THURY, A., Prof.	April 15, 1864,	Univ. of Geneva, Switzerland.
2379. TIELE, D. P., Prof.	May 20, 1898,	Stationsveg 23, Leyden.
1688. TILGHMAN, BENJAMIN C.	July 21, 1871,	1114 Girard St., Philadelphia.
1657 TILGHMAN, WILLIAM M.	Jan'y 21, 1870,	1114 Girard St., Philadelphia.
2176. TIMMINS, SAMUEL	Feb. 21, 1890,	Arley, near Coventry, England.
2123. TOPINARD, PAUL, Prof.	Dec. 17, 1886,	105 Rue de Rennes, Paris.
2065. TOPPAN, ROBERT NOXON.	Feb'y 19, 1886,	54 Highland St., Cambridge, Mass.
2249. TOWER, CHARLEMAGNE, JR., Hon.	Feb'y 15, 1895,	U. S. Embassy, St. Petersburg, Russia.
2413. TREVELYAN, GEORGE OTTO, Rt.-Hon. Sir	May 19, 1899,	8 Grosvenor Crescent, S. W., London, England.
2288. TROWBRIDGE, JOHN, Prof.	May 15, 1896,	Harv. Univ., Cambridge, Mass.
2024. TRUMBULL, HENRY C., Rev., D.D.	July 18, 1884,	1031 Walnut St., Philadelphia.
2321. TSCHERNYSCHEW, THEODORE. . .	May 21, 1897,	Geological Survey, St. Petersburg, Russia.
1973. TSCHERMAK, GUSTAV.	Oct. 20, 1882,	Universität, Vienna, Austria.
1529. v. TUNNER, PETER R., Prof. . . .	April 15, 1864,	Leoben, Austria.
1983. TURRETTINI, THEODORE, Prof .	Dec. 19, 1890,	Geneva, Switzerland.
2166. TUTTLE, DAVID K	Oct. 18, 1889,	U. S. Mint, Philadelphia.
2163. TYLER, LYON G., Pres't	Oct. 18, 1889,	Williamsburg, Va.
2138. TYSON, JAMES, M.D	May 20, 1887,	1506 Spruce St., Philadelphia.

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2185. UNWIN, WILLIAM C., Prof.	Dec. 19, 1890,	7 Palace Gate Mansions, London, England.

V

2400. VAUCLAIN, SAMUEL M.	May 19, 1899,	1533 Green St., Philadelphia.
2325. VAUX, GEORGE, JR.	Oct. 15, 1897,	404 Girard Building, Phila.
2045. DE VERE, M. SCHELE, Prof. . . .	Oct. 16, 1885,	University of Virginia, Charlottesville, Va.
1475. VIRCHOW, RUDOLPH, Prof. . . .	Oct. 17, 1862,	Universität, Berlin, Germany.
1670. VOSE, GEORGE L., Prof.	Oct. 21, 1870,	Massachusetts Institute of Technology, Boston.
2186. VOSSION, LOUIS	Dec. 19, 1890,	Consulate of France, Honolulu.

W

2034. WAGNER, SAMUEL	Jan'y 16, 1885,	Greenbank Farm, West Chester, Pa.
1748. WAHL, WILLIAM H.	Jan'y 16, 1874,	15 S. 7th St., Philadelphia.
2331. WALCOTT, CHARLES D.	Oct. 15, 1897,	U. S. Geological Survey, Washington, D. C.
1724. WALLACE, ALFRED RUSSEL. . . .	April 18, 1873,	Parkstone, Dorset, England.
2156. WARD, LESTER F.	May 17, 1889,	1464 Rhode Island Ave., Washington, D. C.
1925. WARE, LEWIS S	Jan'y 21, 1881,	Phila. Book Co., 15 S. 9th St., Phila.
2359. WARFIELD, ETHELBERT D., Pres't	Dec. 17, 1897,	Easton, Pennsylvania.

	Name.	*Date of Election.*	*Present Address.*
2033.	WEIL, EDWARD HENRY	Jan'y 16, 1885,	1720 Pine St., Philadelphia.
2028.	WEISBACH, ALBIN, Prof.	Jan'y 16, 1885,	Bergakad, Freiberg, Saxony.
2286.	WELCH, WILLIAM H., M.D. . . .	May 15, 1896,	935 St. Paul St., Baltimore, Md.
1639.	WHARTON, JOSEPH.	April 16, 1869,	P. O. Box 1332, Philadelphia.
1637.	WHITE, ANDREW D., Prof. . . .	April 16, 1869,	Cornell Univ., Ithaca, N. Y.
1848.	WHITE, ISRAEL C., Prof.	Jan'y 18, 1878,	119 Wiley St., Morgantown, W. Va.
2384.	WHITEFIELD, R. P., Prof	May 20, 1898,	American Museum of Natural History, New York.
2439.	WHITMAN, CHARLES OTIS, Prof. .	Dec. 15, 1899,	The University of Chicago, Chicago, Ill.
1863.	WILDER, BURT G., Prof	May 3, 1878,	60 Cascadilla Pl., Ithaca, N. Y.
2250.	WILLCOX, JOSEPH	Feb. 15, 1895,	"The Gladstone," Philadelphia.
2347.	WILLIAMS, EDWARD H., JR., Prof.	Oct. 15, 1897,	Lehigh Univ., Bethlehem, Pa.
2151.	WILLIAMS, TALCOTT	May 18, 1888,	916 Pine Street, Philadelphia.
2178.	WILLIS, HENRY, Prof.	Feb'y 21, 1890,	4036 Baring St., Philadelphia.
2041.	WILSON, JAMES CORNELIUS, M.D.	Jan'y 16, 1885,	1437 Walnut St., Philadelphia.
1747.	WILSON, JOSEPH M.	Jan'y 16, 1874,	1036 Drexel Building, Phila.
2137.	WILSON, WILLIAM P., M.D. . . .	May 20, 1887,	233 S. 4th St., Philadelphia.
2341.	WILSON, WOODROW, Prof.	Oct. 15, 1897,	50 Library Pl., Princeton, N. J.
2220.	WISTAR, GEN. ISAAC J.	May 19, 1893,	269 Broad Street Station, Phila.
2314.	WISTER, OWEN	May 21, 1897,	328 Chestnut Street, Phila.
2343.	WITMER, LIGHTNER, Prof	Oct. 15, 1897,	University of Penna., Phila.
1884.	WOOD, RICHARD.	April 18, 1879,	1620 Locust St , Philadelphia.
2408.	WOOD, STUART.	May 19, 1899,	1620 Locust St., Philadelphia.
1762.	WOODWARD, HENRY.	July 17, 1874,	British Museum, London, England.
2290.	WRIGHT, ARTHUR W., Prof. . . .	May 15, 1896,	73 York Sq., New Haven, Conn.
2244.	WUNDT, WILLIAM, Prof.	Feb. 15, 1895,	Leipzig, Germany.
2426.	WURTS, ALEXANDER JAY	Dec. 15, 1899,	Allegheny, Pa.
1932.	WURTS, CHARLES STEWART, M.D.	Jan'y 21, 1881,	1701 Walnut St., Philadelphia.
2061.	WYCKOFF, A. B., Lieut. U. S. A. .	Feb'y 19, 1886,	War Department, Washington, D. C.

Y

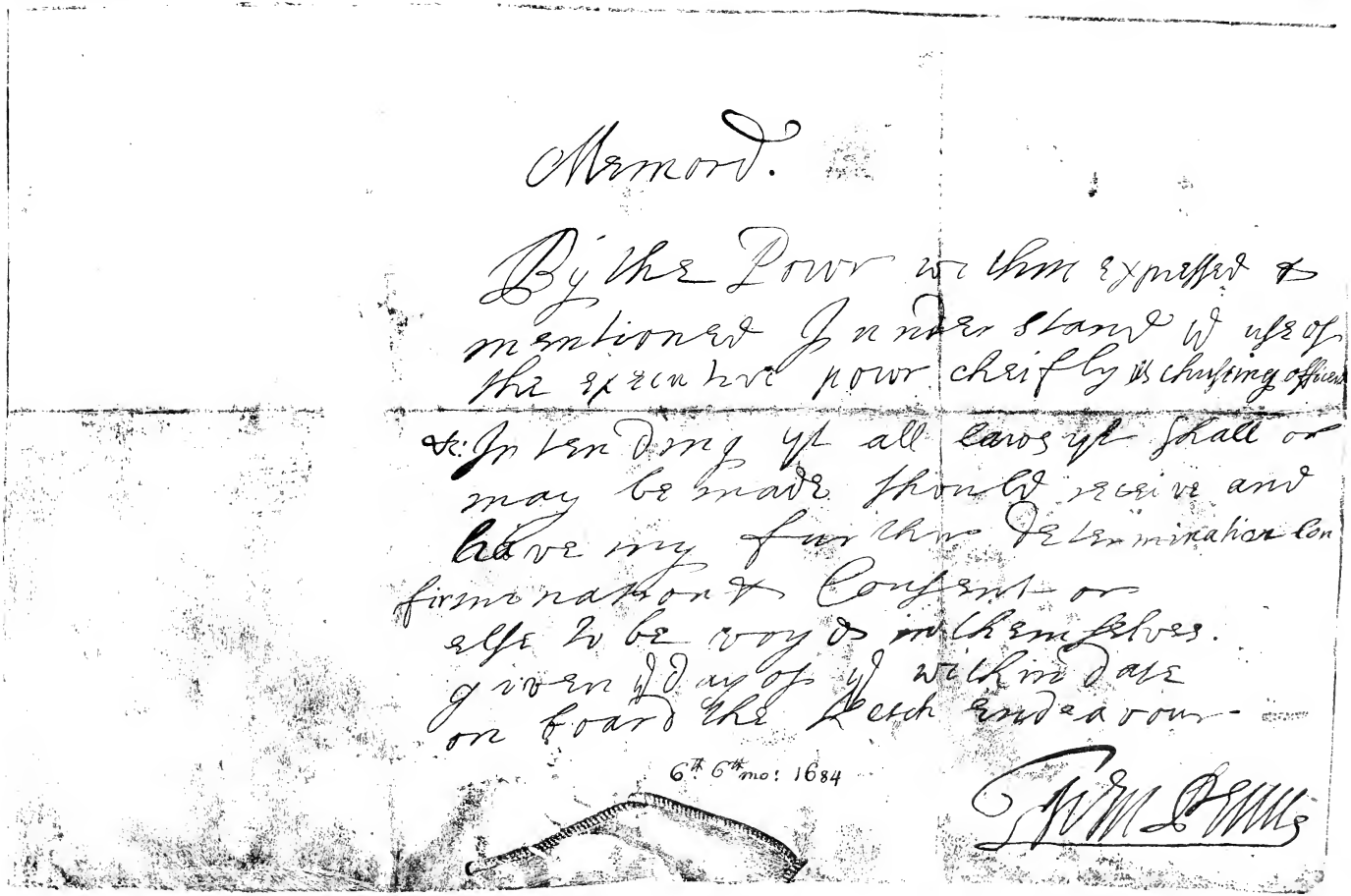
1904.	YARNALL, ELLIS	April 16, 1880,	420 Walnut St., Philadelphia.
1759.	YOUNG, CHARLES AUGUSTUS, Prof.	April 17, 1874,	16 Prospect Av., Princeton, N.J.


William Penn Proprietary & Govern^r of y^e Province of Pennsilvania &^c Territories thereunto belonging

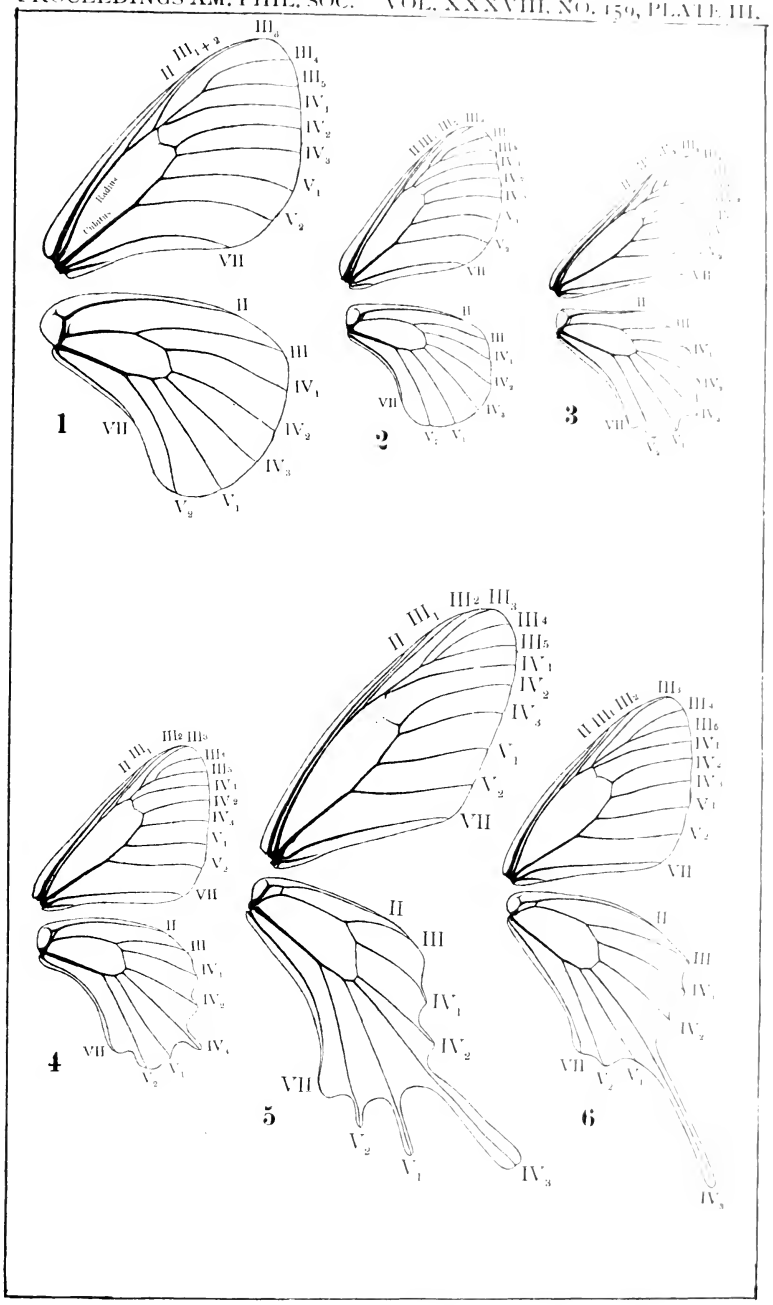
To y^e Members of y^e Provincial Councill of y^e Province of Pennsilvania & y^e Territories thereunto belonging

Since it hath pleased God so to dispose of me as to call me by his Providence into England & y^t it is requisite that y^e Power I have should be left to maintain & exercise Government for y^e Good of the Provinces & Territories To y^e end that y^e People may be sensible of y^e Justice Confidence I have in them w^ch I hope will beget the like in them to me I do hereby commit y^e Power vested in me to You their chosen Provincial Councill, & do hereby Nominate & appoint my Trusty & Loving Friend Thomas Loyd President of y^e same to Act & do all things, that by Law & Charter you may do for y^e Good of y^e Province & not to y^e Detrimont of me my Heirs & Assigns, which power shall remain as Grant & till further Ord^r Given at Philadelphia y^e Sixth day of y^e Sixth Month One Thousand Six Hundred Eighty Four being y^e Thirty Sixth Yeare of y^e King's Reign & of my Government

Fac-simile of Penn's Commission for the Government of Pennsylvania during his first visit to England, 1684, in possession of the American Philosophical Society.



Fac-simile of Penn's Commission for the Government of Pennsylvania during his first visit to England, 1684, (Reverse) in possession of the American Philosophical Society.



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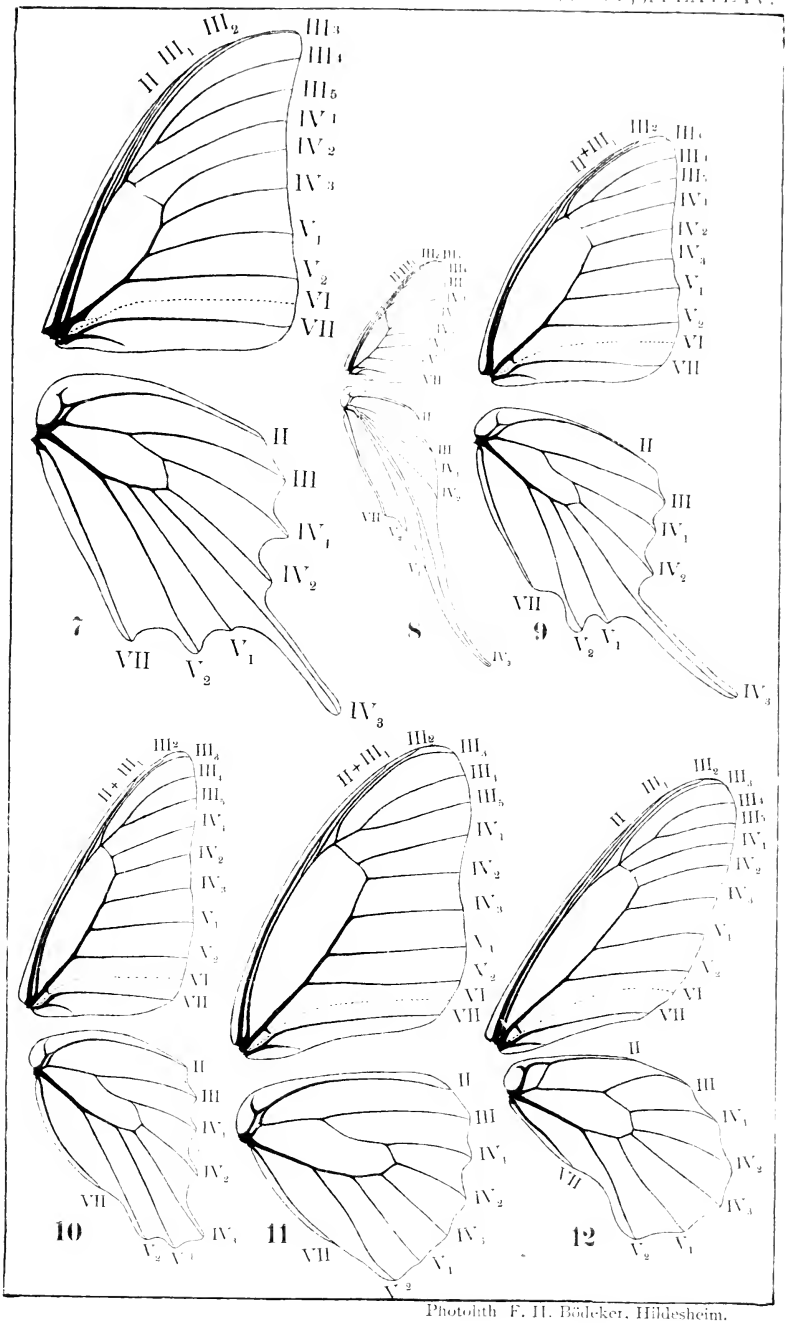

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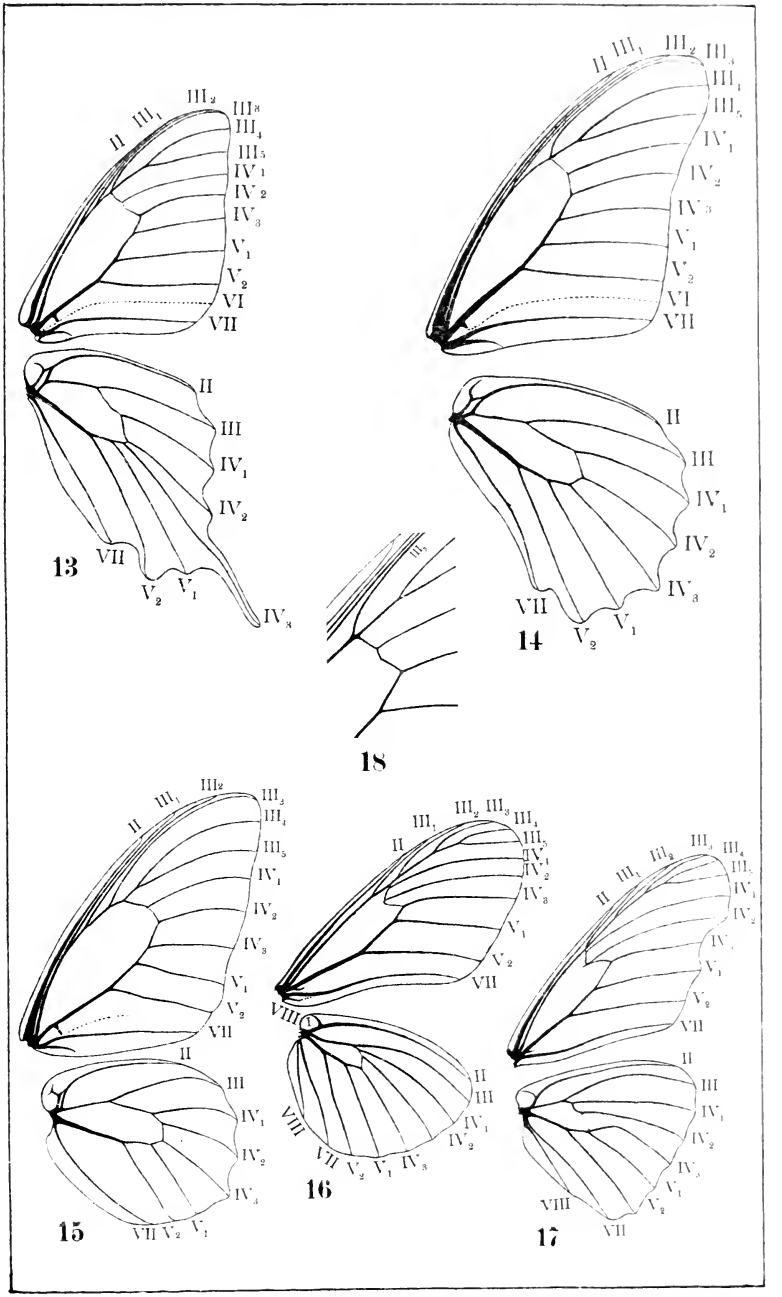
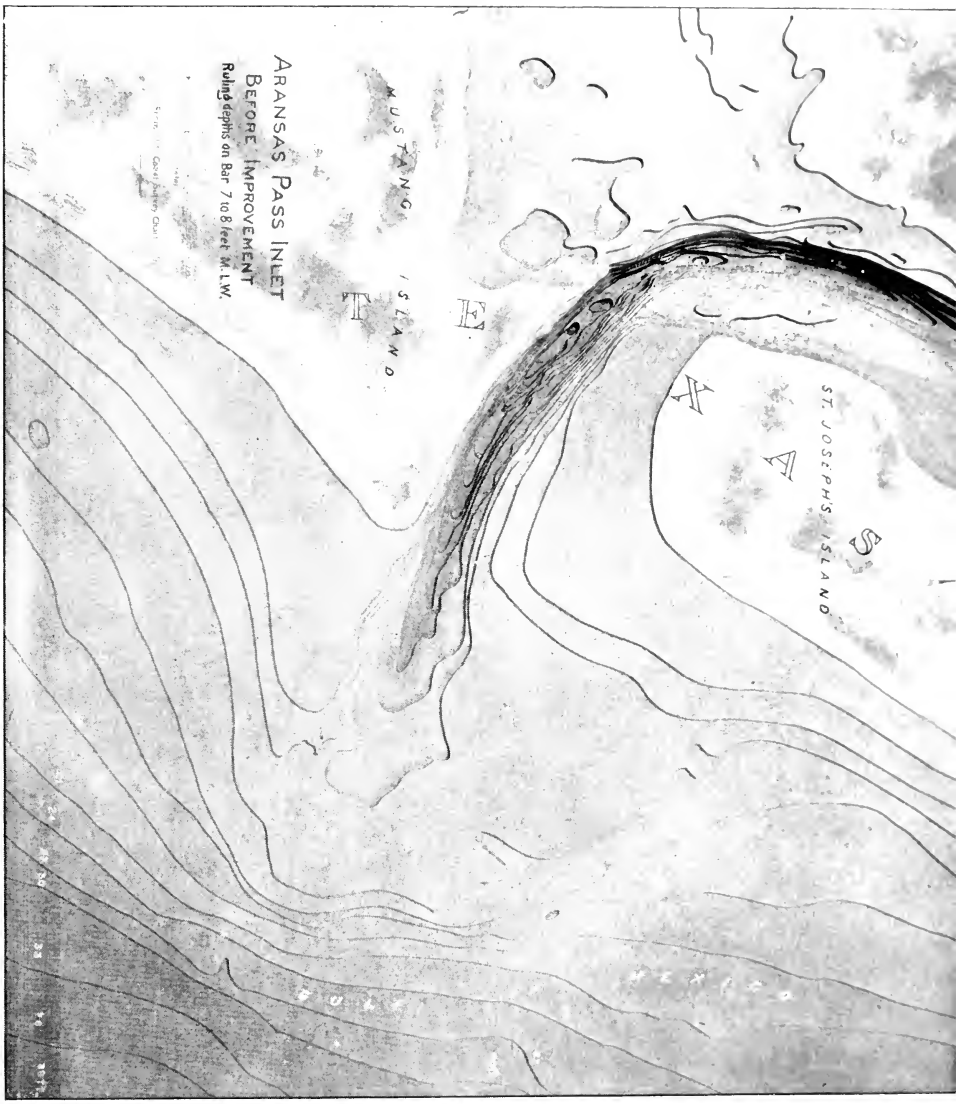
A. Radcliffe Grote — Wings of Butterflies.

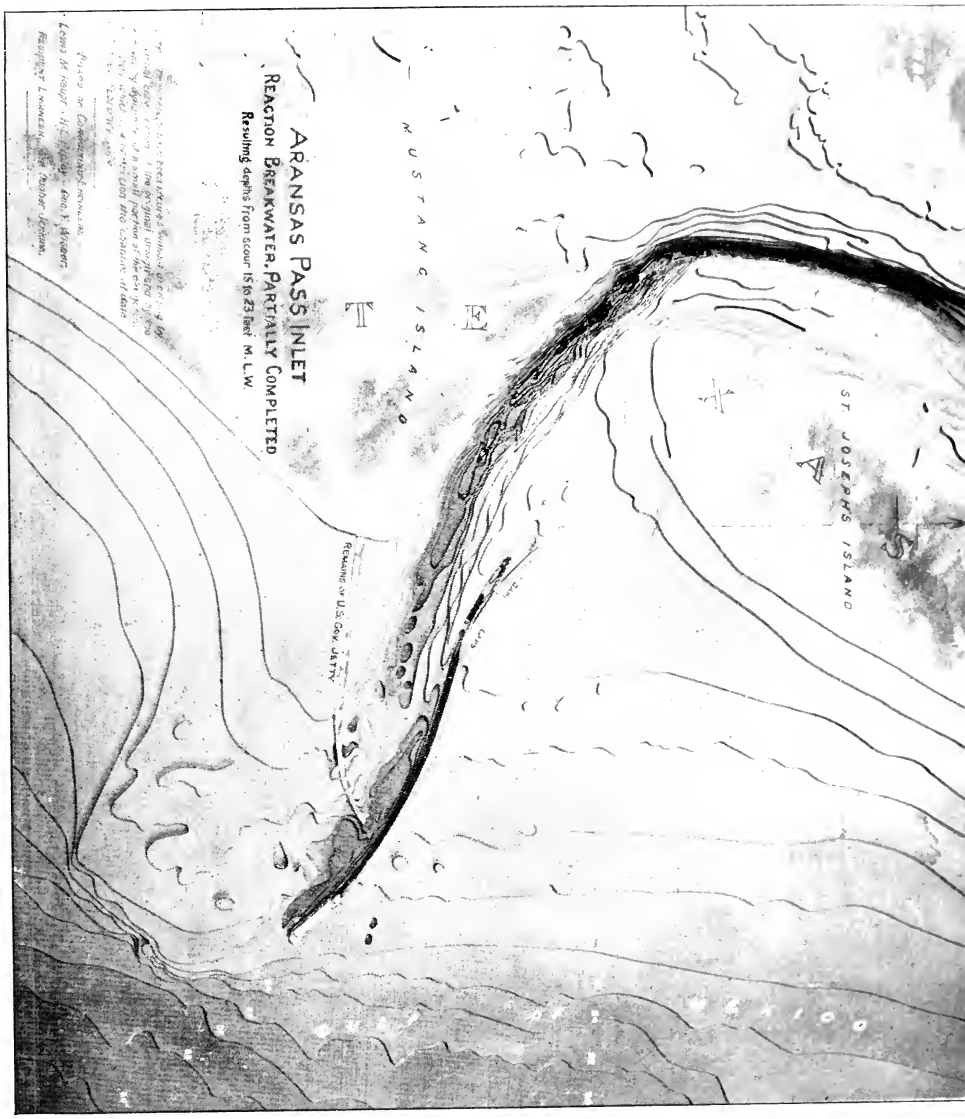


Photolith. F. H. Bödeker, Hildesheim.

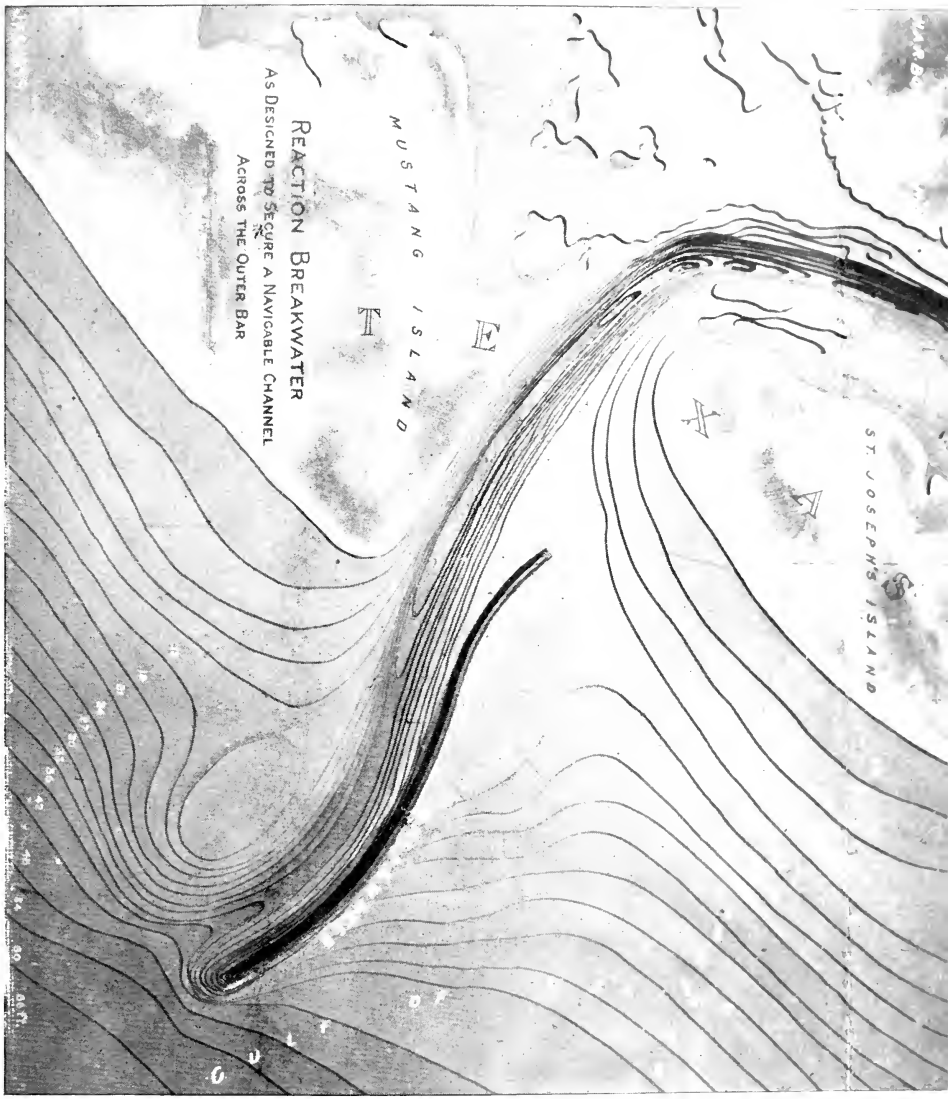
A. Radcliffe Grote — Wings of Butterflies.



CONDITION OF BAR OFF ARANSAS PASS AFTER SUSPENSION OF GOVERNMENT OPERATIONS IN 1889.
AUTHORITY, U. S. COAST SURVEY.



CONDITION OF BAR AFTER SUSPENSION OF WORK BY THE ARANSAS PASS HARBOR CO.
U. S. COAST SURVEY, FEB., 1899, SHOWING HALF-COMPLETED BREAKWATER AND OBSTRUCTING, SUBMERGED JETT



PROBABLE CONDITION OF BAR TO BE EFFECTED BY THE COMPLETION OF THE REACTION BREAKWATER AND REMOVAL OF OBSTRUCTING JETTY.

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2. Persons of any nation, sect or denomination whatever, shall be admitted as candidates for this premium.

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