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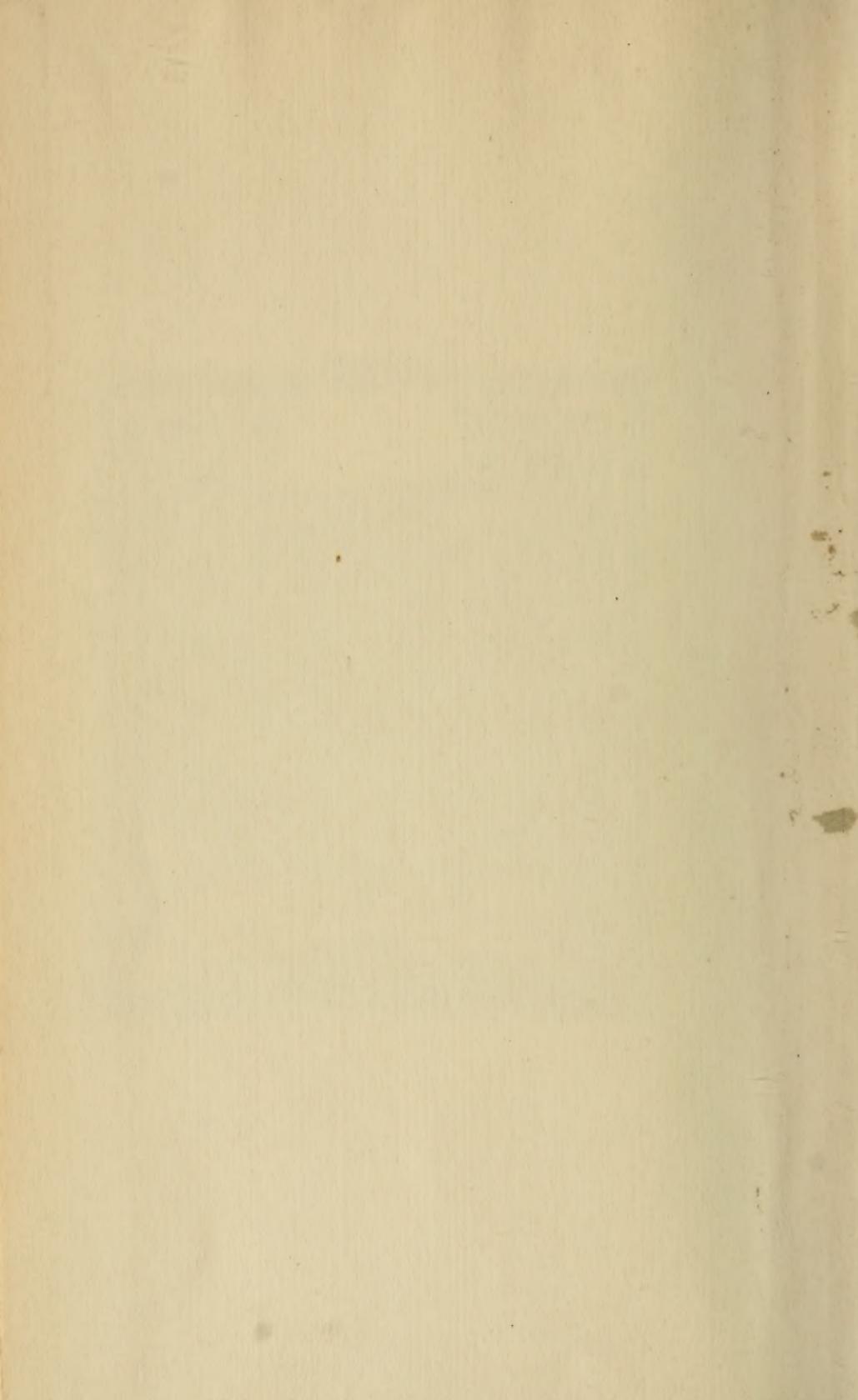


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PROCEEDINGS

OF THE

CLEVELAND ACADEMY

OF

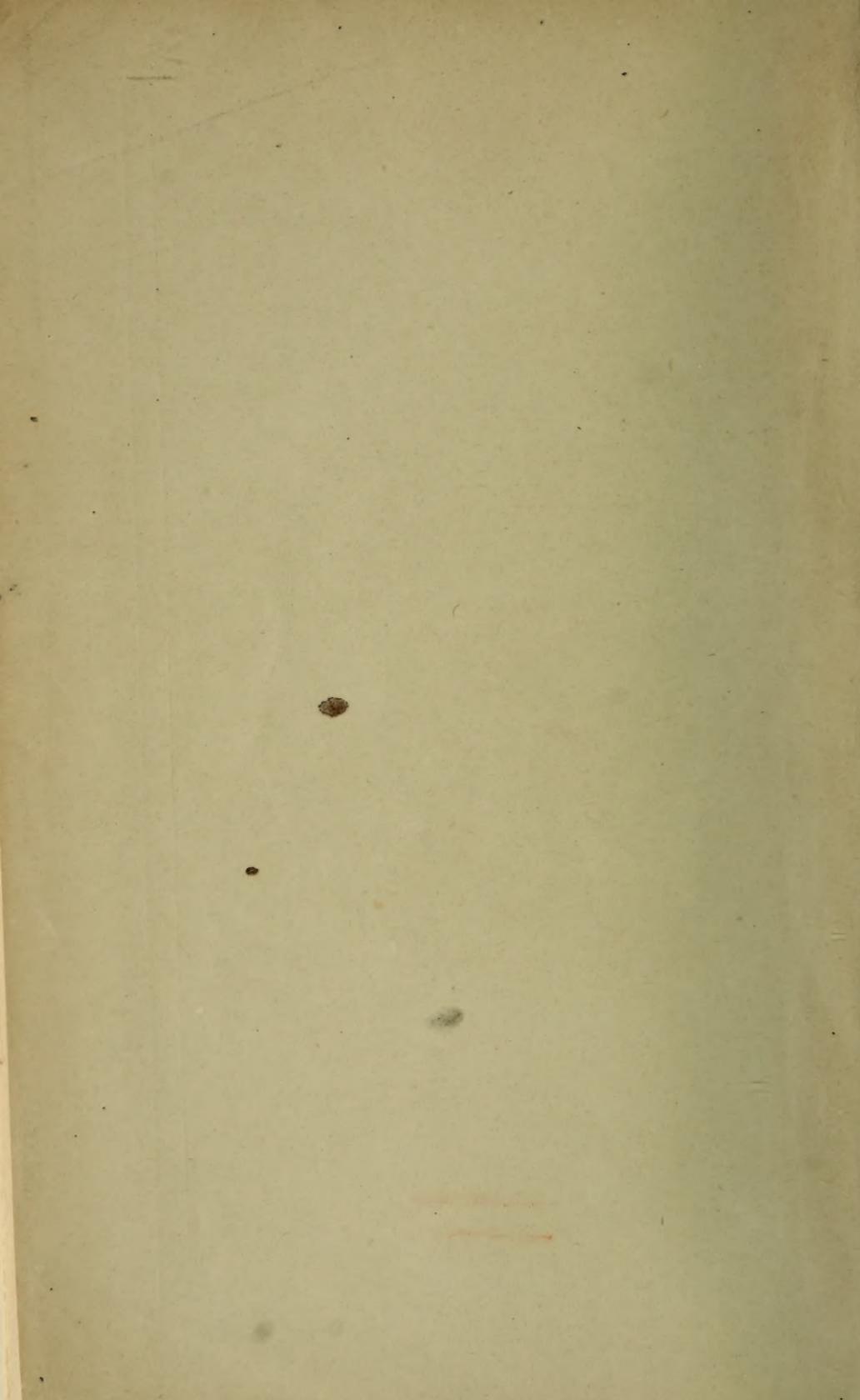
NATURAL SCIENCE

1845 TO 1859.

PUBLISHED BY A GENTLEMAN OF CLEVELAND.

CLEVELAND, OHIO.

1874.



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Arthur Hollick
PROCEEDINGS.

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CLEVELAND ACADEMY

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INTRODUCTION.

ORIGIN OF THE SOCIETY.

In 1843 a branch of the *Western Reserve College*, located at Hudson, Ohio, was organized at Cleveland, under the name of the *Cleveland Medical College*. The Faculty were Professors Jared Potter Kirtland, John J. Delamater, Samuel St. John, J. Lang Cassells and H. A. Ackley. In their respective departments they represented a high grade of scientific attainment, and naturally gave an impulse to the cultivation of science. There had been, as early as 1811, a Library for circulation in Cleveland, which was dissipated, in 1813, by the excitement of the war with Great Britain.

A Lyceum was established in 1833, which embraced the general discussion of popular subjects, in debates, lectures and written essays. Since that time, numerous literary societies have been organized, most of them dying out after a brief career, and many of them leaving no records.

Until 1845 no attempt was made in the line of a strictly scientific association. At the suggestion of Prof. Kirtland a meeting of citizens was held on the 24th day of November, in the Council Chamber, at which measures were taken for the formation of a Constitution, and a corporate existence.

JUL 19 1919
H. A. Hollander

At the same meeting, November 24th, 1845, the following officers were elected :

President—JARED P. KIRTLAND, M. D.

First Vice President—SHERLOCK J. ANDREWS.

Second Vice President—CHARLES W. HEARD.

Third Vice President—WILLIAM D. BEATTIE.

Curators:

| | |
|--------------------|---------------------|
| WILLIAM CASE, | RUFUS K. WINSLOW, |
| HAMILTON L. SMITH, | JARED P. KIRTLAND, |
| SAMUEL ST. JOHN, | J. LANG CASSELLS, |
| HENRY C. KINGSLEY, | CHARLES WHITTLESEY. |

Profs. Kirtland, Cassells and St. John are, by the Constitution, the legal Trustees for life.

The managers of the College Building, at the corner of St. Clair and Erie streets, which was then surrounded by vacant grounds outside of the city, reserved a fine room on the second floor, over the lecture room, for a Museum.

A large part of the expense of fitting it for that purpose was assumed by the society. As usual, in associations based on annual payments, the treasury very soon became empty. Resort was had to a ladies' fair, a very common device to meet the difference between expenses and receipts. It was an enthusiastic and successful affair.

The cost of furnishing the room was about \$1,000, of which the members had paid a little less than \$400, and the ladies a little more.

No written stipulation was entered into, showing the relations of the society to the College, and no record of the contents of the Museum is to be found until 1858. As the papers which were then executed come nearer to a history and a record of that part of the business than anything extant, they are given below in full.

In the meantime the interest of the public had abated, the members paid few of their dues, very few visitors went to the room, and the Curators, to avoid personal liability for

the debts, sold several of the comfortable sofas which no one cared to occupy.

But there was a small band of devotees to science, meeting occasionally in Prof. Kirtland's room, at the College, who discussed questions of importance in a way to do credit to a society, in all other respects defunct. The essays delivered from time to time in the lecture room were both interesting and valuable. Sometimes the audiences were good, but the place was then so far outside the population that the attendance was quite uncertain.

It is the object of the present publication to present the records, which are not very complete, and to print such of the papers as can be recovered. A part of them were published in the *Annals of Science*, at Cleveland, by Prof. Hamilton Smith, now of Hobart College, New York; some got into the daily papers, and more were reported for the *Ohio Farmer*, by the late Mr. Kirkpatrick, while he was Secretary of the Academy.

Lectures were delivered by Prof. Kirtland, Hamilton L. Smith, J. S. Newberry, J. Brainerd, Col. Whittlesey and others, of which the records give no account.

CONSTITUTION.

ARTICLE 1.—This society shall be styled the Cleveland Academy of Natural Science.

ARTICLE 2.—It shall consist of three classes of members, viz: Resident, Corresponding and Honorary. Resident Members, such as reside in the city of Cleveland, or its vicinity. Corresponding Members, such as reside at a distance from said city, or in other States, and Honorary Members, such as may be judged worthy, from their attainments in Natural Science, or favors conferred upon the society, to be admitted into this Academy.

ARTICLE 3.—All Corresponding and Honorary Members shall be elected by ballot, and two-thirds of the votes of the members present shall be necessary to an election. Any resident of Cleveland or its vicinity may become Resident Members by subscribing this Constitution and paying an initiation fee of one dollar.

ARTICLE 4.—None but Resident Members shall be entitled to vote or be eligible to any office in the Society.

ARTICLE 5.—The officers of this society shall consist of a President, three Vice Presidents, a Corresponding Secretary, a Recording Secretary, a Treasurer and eight Curators, who shall be chosen annually, on the third Tuesday of November in each year, (except as stated in Article 6th,) the person having the greatest number of votes shall be declared duly elected.

The President, Vice Presidents and Curators shall be ex-officio Trustees of this Academy. The Treasurer shall give security to the satisfaction of the Trustees for the faithful discharge of the duties of his office.

ARTICLE 6.—Professors Jared P. Kirtland, J. Lang Casells and Samuel St. John shall be Trustees for life of this Academy.

ARTICLE 7.—The rooms of this Academy shall be open at all proper times, under the direction of the Curators, for the inspection and study of the specimens by the public.

ARTICLE 8.—Five members at a stated meeting shall form a quorum, and ten at a special meeting.

ARTICLE 9.—By-Laws, for the further regulation of the society, may be made from time to time.

ARTICLE 10.—No alteration shall be made in this Constitution, unless by a vote of a majority of all the Resident Members present, at a meeting called for that purpose.

In the records of the proceedings are the autographs of the following persons attached to the Constitution. Those designated by a * are not living, and probably others.

| | |
|----------------------|---------------------|
| Jared P. Kirtland, | T. P. Handy, |
| J. Lang Cassels, | W. D. Beatie,* |
| Samuel St. John, | W. Bingham, |
| William Case,* | N. C. Winslow, |
| S. J. Andrews, | P. M. Weddell,* |
| J. W. Gray,* | L. B. Hutchinson, |
| Hamilton L. Smith, | R. K. Winslow, |
| M. C. Younglove, | M. L. Knight,* |
| John M. Wolsey,* | N. E. Crittenden,* |
| H. C. Kingsley, | M. Miller, |
| F. W. Bingham,* | U. Morgan, |
| Samuel Starkweather, | O. A. Brooks, |
| Charles A. Terry,* | W. T. Goodwin,* |
| John W. Allen, | W. J. Warner, |
| George A. Benedict, | George F. Marshall, |
| Junius B. Cobb, | William T. Smith, |
| Charles D. Brayton,* | Samuel Williamson, |
| H. F. Brayton, | James D. Cleveland, |
| F. J. Prentiss, | H. A. Ackley,* |
| C. S. MacKenzie, | John A. Foot, |
| James J. Tracy, | J. A. Harris, |
| J. L. Severance,* | T. W. Morse, |
| J. L. Weatherly,* | E. F. Punderson,* |
| P. Anderson, | A. A. Bliss, |
| D. O. Fanning, | George Woodward, |
| R. Gale, | John Shelley, |
| C. W. Heard, | Jehu Brainerd, |
| George Whitelaw, | Charles Whittlesey, |
| Dudley Baldwin, | William Richards, |
| Nicholas Bartlett, | S. W. Crittenden, |
| Thomas Day,* | William Milford,* |
| H. B. Payne, | William Corlett, |
| Charlès Stetson,* | Thomas Brown,* |
| Aaron Clark, | Oren Smith, |

Samuel Wheat,
 Henry H. Dodge,
 F. T. Backus,*
 James M. Hoyt,
 E. Wade,*
 Samuel L. Mather,
 S. J. Noble,*
 J. J. Delamater,*
 J. K. Hitchcock,
 J. P. Bishop,
 John Erwin,
 William S. Craig,
 O. Klemm,
 C. C. Carlton,
 S. C. Green,
 Jeremiah Coon,
 S. B. Canfield,*
 E. Sterling,*
 Erastus Cushing,
 Arthur Quinn,
 John E. Carey,
 H. O. Mack,
 James McCoy,
 E. L. Austin,
 J. H. Coulter,
 Thomas J. Eaton,
 George Mygatt,
 John G. Stearns,*
 John C. Reeve,*
 L. M. Cobb,
 Jacob W. Kinnaman,
 Thomas M. Cook,
 John J. Todd,
 Jacob V. Cantville,
 William Laird Hazlett,
 William Wirt Taggart,
 William T. Swart,

John McMillen,
 William M. Carell,
 Alonzo I. Holt,*
 Benjamin Rouse,*
 James A. Briggs,
 Benjamin A. Stanard,
 A. Underhill,
 Allen Smith, Jr.
John S. Newberry,
 Charles Hickox,
 D. J. Robinson,
 W. N. Reno,
 John Black,
 Almon D. Teachout,*
 James Herbert Peck,
 William W. Day,*
 David P. Chamberlin,
 Sumner Pixley,
 H. P. Anderson,
 Byron Chapman,
 Joseph Eastman,
 Benj. Noe Freeman,
 Lucius B. Smith,
 Tamer W. Cox,
 Anthony D. Schuyler,
 George W. Dick,
 James M. Newman,
 James H. Woodworth,
 Thomas H. Lavery,
 C. A. Bellows,
 Josiah A. McFarland,
 Horace O. Crane,
 Orestes C. Gibbs,
 Henry Foster,
 William M. Swayze,
 B. Stedman,
 —— Nash,

| | |
|-------------------------|----------------------|
| Wyman Brookins, | John G. Coats, |
| Isaac Barclay, | John B. Suddarth, |
| T. A. Eagle. | John J. Crawford, |
| William H. Beaumont,* | R. C. Hopkins,* |
| F. E. Bailey, | George A. Smith, |
| E. V. H. Morris, | William H. Atkinson, |
| David Greenlee, | Theodatus Garlick, |
| J. Holmes Marshall, | Robert L. Harris, |
| Thomas McGovney, | J. H. Seymour, |
| Hanson Hard, | William C. Turner,* |
| Zalmon S. Booth, | James Renton,* |
| Thomas G. Cleveland,* | Seth Freeman, |
| William O. Luce, | John H. Beardsley, |
| R. H. McCall, | John Kirkpatrick,* |
| J. C. Burroughs, | Thomas Wall,* |
| Edward S. Snow, | Wilmot Garlick, |
| Jonathan Morris, | R. F. Humiston, |
| T. Rearden, | Sidney A. Norton, |
| Elihu Gallup, | Theodore Sterling, |
| J. B. Trembly, (Toledo) | J. W. Smith, |
| Gustavus A. Hyde. | |

One hundred and eighty-three members.

DECEMBER 23, 1845.

The Association met at the lecture room of the Medical College, when the Committee on By-Laws made a report. As adopted, the By-Laws are in the usual form for such societies, briefly describing the duties of officers, and read as follows.

BY-LAWS.

ARTICLE 1.—It will be the duty of the President to preside at all the meetings of the Academy, and to call special meetings, when in his opinion the interests of the Academy require, and also on the written application of ten members of the Academy.

ARTICLE 2.—It shall be the duty of the Vice Presidents, in the absence of the President, to perform the duties devolved on the President, in the order of election, and, in the absence of the President and Vice Presidents, any member of the Academy may be called on to preside at any meeting of the Academy.

ARTICLE 3.—It shall be the duty of the Corresponding Secretary to conduct the correspondence of the Academy.

ARTICLE 4.—It shall be the duty of the Recording Secretary to keep in a suitable book, prepared for the purpose, a record of the proceedings of the Academy; to preserve files of such papers as may be directed to be preserved by the Academy, and to draw orders on the Treasurer for such sums of money as may be directed by the Curators.

ARTICLE 5.—It shall be the duty of the Treasurer to keep all the moneys belonging to the Academy; to pay out the same on the orders of the Recording Secretary; to keep accurate accounts of his receipts and expenditures, and to render to the Academy, at the expiration of the term for which he may be elected, and at such other times as may be required by the Academy, a just and faithful statement of the finances of the Academy, and on the expiration of his office to deliver over to his successor all moneys in his hands with the books and vouchers.

ARTICLE 6.—It shall be the duty of the Curators to prepare and furnish a suitable room or rooms for the meetings of the Academy, and for the cabinets belonging to the Academy. To receive, prepare and arrange the cabinets and all specimens of natural curiosities that may be presented to the Academy, and which, in their opinion, may be worthy of preservation; to sell, exchange and dispose of duplicates, as in their opinion may be advisable; to determine the times of public admission to the cabinets, and publish the same, and generally to control and manage all things pertaining to the cabinets, subject to the direction

of the Academy; to procure, at such times as in their opinion may be proper, or as may be directed by the Academy, suitable lectures to be delivered before the Academy, and to make a report of their doings at the expiration of their term of office, and at such other times as may be required by the Academy.

ARTICLE 7.—The regular meetings of the Academy shall be held on Tuesday of every alternate week.

ARTICLE 8.—The regular order of proceedings at each alternate regular meeting shall be,

First.—The presentation of written papers on scientific subjects, which shall be entered upon a docket to be kept by the Recording Secretary, and taken up in their order.

Second.—Any statements by any member of the Academy upon scientific subjects.

Third.—Any miscellaneous business.

And at each alternate meeting a lecture.

ARTICLE 9.—Any collection of natural curiosities may be received by the curators for a temporary period, if any owner of such collection shall so desire.

ARTICLE 10.—The rooms of the Academy's collections shall be open on two afternoons in each week in the year for public inspection.

NOVEMBER 5, 1846.

At a meeting of Curators a committee was raised to confer with the ladies on the proposed fair.

NOVEMBER —, 1846.

The annual meeting was held and the officers of 1845 re-elected, except Capt. B. Stanard as Curator in place of Col. Whittlesey, and Prof. J. J. Delamater as Recording Secretary in place of J. D. Cleveland.

Debts \$305.24; assets \$35.00.

CLEVELAND, November —, 1847.

Society met at Dr. Kirtland's room, Medical College, for the election of officers for the ensuing year, Dr. Kirtland in the chair.

On balloting, the following gentlemen were found to be duly elected, viz:

President—JARED P. KIRTLAND, M. D.

First Vice President—J. A. HARRIS.

Second Vice President—WILLIAM D. BEATTIE.

Third Vice President—SAMUEL STARKWEATHER.

Curators:

| | |
|--------------------|----------------------|
| WILLIAM CASE, | RUFUS K. WINSLOW, |
| HAMILTON L. SMITH, | JARED P. KIRTLAND, |
| SAMUEL ST. JOHN, | J. LANG CASSELLS, |
| HENRY C. KINGSLEY, | BENJAMIN A. STANARD. |

Treasurer—M. C. YOUNGLOVE.

Recording Secretary—HAMILTON L. SMITH.

Corresponding Secretary—SAMUEL ST. JOHN.

[There is here a hiatus in the record, no entries appearing on the Minute Book of the transactions of the Academy for more than a year.]

CLEVELAND, November 27, 1849.

At the annual meeting of the members of the Academy of Natural Science, held at the library room of the Medical College, in accordance with the provision of the Constitution, public notice of said meeting having been duly given in the several newspapers of the city, a quorum not being present, the meeting was adjourned till the hour of half past 6 P. M., on Tuesday next, to meet at the same place.

JARED P. KIRTLAND, *Secretary pro tem.*

Convened in pursuance of the above; no other person being present, save and except myself, *Voted*: That the

meeting be adjourned till such times as a quorum can be collected, or till the —— day of ——, 185—.

[Here occurs another hiatus in the record.]

CLEVELAND ACADEMY OF NATURAL SCIENCE.

During the winter months, upon each alternate Tuesday, for a number of years, a series of public lectures have been given upon some subject connected with Natural Science. At the regular meetings between the lectures, written papers, upon various subjects, have been presented and read, and a general discussion held upon any scientific subject that might be offered. It is to these conversational meetings, especially, we are to look for valuable contributions in the various branches of Natural Science, and, for the purpose of rendering the labors of the Academy more generally useful, it has been determined to print the record of their transactions in this journal from time to time, and the first contribution of this kind will be found in the present number.

The collection of specimens of natural history, particularly in the departments of ornithology and conchology, belonging to the Academy, is undoubtedly one of the best in the country. Not only does it contain the fine cabinet of Dr. Kirtland, which was generously donated by him to the Academy, but also the exceedingly beautiful specimens of the sylvias and water birds donated by Mr. R. K. Winslow. In addition to these valuable contributions of birds, at home, which have been increased, from time to time, through the kind offices of the gentlemen named, and the Hon. William Case, Capt. B. A. Stanard and others, large and most valuable donations of foreign birds, chiefly through the assiduous attention of the Hon. Elisha Whitteley, have been received from time to time. The latest donation of this kind was from Lieut. S. L. Phelps, U. S. N.,

comprehending complete sets of Chilian birds, in excellent preservation, and, to enhance this contribution, through the courtesy of Prof. Spencer F. Baird and Mr. J. Cassin, the distinguished ornithologist, they were all named and labelled previous to their reception, thus giving the Academy the benefit of the experience of these gentlemen.

A fine geological and mineralogical cabinet has also been donated by Profs. St. John and Cassels, and a complete suite of coal fossils by Dr. J. S. Newberry. The museum also contains a great variety of fresh water and marine shells, collections of eggs, Chinese, Indian, and other curiosities, and some fine specimens of the antiquities of this country, so that at the present time the collection may justly rank as second to but few in the United States.

Annals of Science, Jan. 1854.

PROCEEDINGS OF THE CLEVELAND ACADEMY OF NATURAL SCIENCE.

SPECIAL MEETING, November 21, 1853.

Dr. J. P. Kirtland in the chair.

At this meeting a number of papers were read and received for publication, after which some discussion ensued upon various topics connected with the papers, and upon the donations recently received by the Academy, being a very fine collection of Chilian birds, in complete sets, fully named and labelled, and a unique specimen of Indian pottery. Dr. Kirtland also presented specimens of a new fish recently discovered by him, a description of which was furnished and will be found below.

The following resolutions were then passed:

Resolved, That the thanks of the Academy be tendered to the Hon. Elisha Whittlesey, for his kind offices in behalf of the society, also to Lieut. S. L. Phelps, U. S. N., for his valuable donation of Chilian birds, and to Prof. S. F. Baird

and J. Cassin, Esq., for their attention in examining and labelling this collection.

Resolved, That the thanks of this Academy be tendered to H. F. Walworth, Esq., for his donation of ancient pottery.

Resolved, That the proceedings of this Academy be published, from time to time, in the *Annals of Science*.

Resolved, That a commission of three be appointed, to whom shall be referred all papers offered for publication.

Resolved, That the Course of Lectures this winter be commenced forthwith.

Commission—Samuel St. John, John S. Newberry and Hamilton L. Smith.

Dr. J. S. Newberry, having been invited by the Curators, consented to deliver the first lecture on Tuesday evening, November 29th. Subject: *The formation of Coal and the Carboniferous Flora*.

The following papers were read before the Academy.

PÆCILOSOMA ERYTHROGASTRUM.

BY PROF. J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, November 21, 1853.



FORM—Eliptic, oval, compressed.

COLOR—*Head*, above the upper margins of the orbits, dark brown.

Body, superior to the lateral line, dark brown, below, marked with about twelve perpendicular blue bands which are lost above the brown color, and gradually disappear

NOTE.—The engravings for Prof. Smith's "Annals of Science," and a large portion of those in the "Ohio Farmer," illustrating papers read before the Academy, were made by Messrs. BRAINERD & BURRIDGE, of this city. They have generously given the use of such of them as are yet preserved for this publication.

on the belly, more clearly defined near the caudal than the pectoral fins. Intervening spaces whitish, shaded with red. Each scale is frequently dotted with a brown, rhomboidal spot, darker on the side and back than on the abdomen.

Throat, bright reddish orange, which grows fainter behind the pectorals.

Anterior dorsal semi-circular, margined above with a greenish blue stripe, which is bordered below with another of orange, succeeded by white, brown and blue to the back.

Posterior dorsal rhomboidal, pellucid on the margin, below which is a clear blue band, the remainder pellucid, striped perpendicularly between the rays with orange and the rays pencilled transversely with fine lines of blue.

Pectorals translucent, pale red at their base.

Abdominals pellucid, inner margins, near the base, orange colored.

Anal Fin. Base and margin bluish, remainder pale orange.

Caudal Fin. An interrupted orange band at the base, margin above and below blue, the rays transversely marked with fine blue lines. Scales on the body and operculum, examined by aid of a microscope, exhibit serrations on their posterior margins.

RAYS.—Ant. Dor. 10. Post. Dor. 12. Pec. 14. Abd. 7. Anal 9. Caud. 16.

LENGTH 2 inches.

HABITAT—Rocky River, seven miles west of Cleveland.

OBSERVATIONS.—The habits of this species are similar to others of the family *Etheostoma*. It inhabits shoals and rapid parts of the stream. In its general appearance it resembles the *Etheostoma variatum* Nob. (*Pœcilosoma variatum* of Agassiz,) but the colors are less brilliant and is less in size and more regular in its contour.

The colors of all the species of *Etheostoma* are far more brilliant in the spring than during the summer or autumn.

DIURNAL LEPIDOPTERA OF NORTHERN AND MIDDLE OHIO.

BY PROF. J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, November 21, 1853,
and January 17, 1854.

| NO. | LOCALITY. | FOOD OF LARVA. | |
|-----|-------------------------------|---------------------|---------------------------------------|
| 1 | Papilio Ajax. Smith & Abbott, | Hudson, Columbus, | Asimina triloba. |
| 2 | " Marcellus. Cramer, | Rockport, Poland, | " " |
| 3 | " Asterias. Fabricius, | Ubique, | Umbelliferæ. |
| 4 | " Turnus. Linnæus, | " | Liriodendron tulipifera. |
| 5 | " Philenor. Lin. | Rockport, | Aristolochia pubescens, &c. |
| 6 | " Troilus. Lin. | Ub. | Laurus Sassafras & Ben- zoin. |
| 7 | " Cresphontes. Cram. | Rockport, Dayton, | Zanthoxylum, |
| 8 | Pieris protodice. Boisduval. | " | Cruciferæ. |
| 9 | Pontia oleracea. Harris, | Toledo, | " |
| 10 | Xanthidia Lisa. Bois'd'l. | Rockport, | ? |
| 11 | " Nicippi. Fab. | Columbus, Dayton, | Trifolium. |
| 12 | Colias philodice. Godart, | Ub. | Leguminosæ. |
| 13 | " Cœsonia. Godart, | Xenia, Dayton, | " |
| 14 | Callydrias eubule. Sm. & Abb. | Dayton, Cincinnati, | Cassia chamæcrista. |
| 15 | Argynnis Idalia. Drury, | | |
| 16 | " aphrodite. Fab. | Ub. | Violacææ. |
| 17 | " bellona. | Rockport, | " ? |
| 18 | Melitæa Phaeton. Dru. | Poland, | ? |
| 19 | " Myrina. Cramer, | | ? |
| 20 | " Tharos. Cramer, | Rockport, | ? |
| 21 | Vanessa Antiopa. Lin. | Ub. | Salix and Populus. |
| 22 | " J. album. | Rockport, Poland, | ? |
| 23 | " interrogationis. Fab. | " " | Ulmus Amer. and Humu- lus lupulus. |
| 24 | " comma. Har. | Rockport, | Humulus lupulus. |
| 25 | " progne. Fab. | " | Ulmus Americana. |
| 26 | " furcillata. Say, | " | ? |
| 27 | Cynthia Atalanta. Lin. | Ub. | Urticacææ. |
| 28 | " Cardui. Lin. | Rockport, | Cirsium. |
| 29 | " Hunterii. Fab. | " | Myosotis & Gnaphalium. |
| 30 | Apatura celtis. Bois'd'l. | " | Celtis occidentalis. |
| 31 | Satyrus alope. Fab. | Dayton, | Gramineæ. |
| 32 | " canthus. Bois'd'l. | Rockport, Poland, | " |
| 33 | " eurythius. Fab. | " | " |
| 34 | " andromacha. Hubn'r | Western Prairies, | " |
| 35 | Limenitis ephiston. Stoll, | Rockport, | Salicacææ. |
| 36 | " Artemis. Dru. | Poland, | ? |
| 37 | " Missippus. Lin. | Ub. | Quercus rubra. |

| NO. | LOCALITY. | FOOD OF LARVA. |
|---|-----------------|--|
| 38 <i>Danaus Archippus</i> . Fab. | Ub. | <i>Asclepiadaceæ</i> . |
| 39 <i>Lycæna Americana</i> , Har. | Ub. | <i>Rumex acetosella</i> & <i>crispus</i> . |
| 40 <i>Thecla Favonius</i> . Sm. & Abb. | Rockport, | <i>Quercus rubra</i> . |
| 41 " <i>Humuli</i> . Har. | " | <i>Humulus lupulus</i> . |
| 42 <i>Polyommatus pseudargiolus</i> , Boisd'l. | " | ? |
| 43 " <i>Comyntis</i> . Godart, | " | ? |
| 44 " <i>Thœ</i> . Boisd'l. | " | ? |
| 45 " <i>Epixanthe</i> , Boisd'l. | " | ? |
| 46 <i>Libythea Bachmanii</i> , Kirtland. | Poland, Dayton, | <i>Rubus strigosus</i> , &c. ? |
| 47 <i>Hesperia Tityrus</i> . Fab. | Ub. | <i>Robinia</i> . |
| 48 " <i>Peckius</i> . Kirby, | Rockport, | ? |
| 49 " <i>catullus</i> . Sm. & Abb. | " | ? |
| 50 " <i>puer</i> . Hub. | " | ? |
| 51 " <i>Bathyllus</i> . Sm. & Ab. | " | ? |
| 52 " <i>Buleata</i> . Boisd'l. | " | ? |
| 53 " <i>Juvenalis</i> . | " | ? |

NO. 1.—*PAPILLIO AJAX*.—Successive broods appear from May till October. The perfect insect is occasionally met with several miles distant from any locality of the Pawpaw bush, on which its larva feeds, and it is frequently found reconnoitering the blossoms of the red clover, from which it collects sustenance. At other times the female may be observed rapidly passing from one bush to another of the Pawpaw, depositing her eggs upon the leaves. One only is usually laid upon a single leaf. Its motions are rapid but very unsteady. The entomologist will not easily capture it except at the moment it is either collecting food or depositing its eggs.

In the *Arcana Entomologica*, Mr. Westwood, on the authority of the late Mr. Doubleday, limits the locality of this species to Florida. It is far from unknown in all parts of Ohio where the favorite food of its larva is found.

NO. 2.—*P. MARCELLUS*.—The perfect insect resembles, somewhat, the preceeding, but has only one red spot on the inner margin of the posterior wing, while the other has two. Its form is handsomer and more elongate, and while

on the wing it sails with a steady motion like the swallow-tailed hawk, and does not rotate to and fro like the ajax. The larvæ of the two live on the same shrub, but they differ both in shape and color.

This species also appears in successive broods during spring, summer and autumn. I have met with it near Cleveland as early as the last of April. Its beauty and its graceful flight rarely fails to attract attention, but its sagacity enables it often to evade attempts at its capture.

Mr. Doubleday names Wheeling as the Northern limits of its sojournings.

No. 3.—P. ASTERIAS.—The Fennel worm is well known to every observer, but that it is the larva of our common blue and yellow spotted butterfly is not, perhaps, as universally known. In this state it frequently does great injury to the crops of carrots, parsnips, fennel and dill, by consuming their foliage, while in other seasons, from causes not fully comprehended, hardly an individual will be seen. Its numbers are much diminished by the attacks of small ichneumon insects, who deposit their eggs in the pupa.

The strong markings and bright colorings of the male in the perfect state, contrast so strikingly with the duller and paler hues of the female, that the inexperienced entomologist often considers them as distinct species.

The larva will eat, with impunity, the leaves of the *Conium Maculatum* and the still more poisonous *Cicuta Virosa* of the meadows.

No. 4.—P. TURNUS.—This fine and showy species is known among us as the large yellow butterfly. It is not very abundant. Moist and muddy flats and the margins of wet cow-yards seem to be favorite localities to which it resorts in clear and hot weather.

No. 5.—P. PHILENOR.—The figure of the perfect insect of this species, contained in Say's American Entomology, is erroneously colored, and that in Boisduval and Le Conte is

somewhat correct, yet it fails to give the splendid play of colors so conspicuous in a recent specimen of the male sex. It was among the most rare of our butterflies until I introduced into my garden a few plants of the *Aristolochia Siphon* and *Pubescens*. Since then they have multiplied in immense numbers.

No. 6.—*P. TROILUS*.—The larvæ may be discovered during summer, inclosed in an involucre, formed by rolling together the margins of a leaf of the sassafras or the spice bush. In this they remain concealed except while occupied in feeding. When they attain maturity, and are about to change into a chrysalis, they forsake these temporary investments.

This species and the female of the *Asterias* often perplex and confuse the young entomologist by their near resemblance. A little experience in rearing the two species will soon enable one to detect the differences.

No. 7.—*P. CRESPHONTES*.—This is the largest of our indigenous species. It has hitherto been considered exclusively a southern species, where it feeds, in its larva state, on the orange and lemon tree, but it is occasionally met with in this vicinity. Here the larva substitutes the hercules club and prickly ash for the citrus genus as its means of sustenance.

No. 8.—*PIERIS PROTODICE*.—This plain white butterfly is common, though it has its favorite localities. A cabbage or turnip field, or waste grounds overrun with the shepherds purse are its usual resorts. The darker brown stripes on a white ground, point out the male sex. A few individuals may be seen during the whole season, but in September they become quite numerous.

No. 9.—*PONTIA OLERACEA*.—At Madison, Wisconsin, this species is very abundant. From thence to Toledo I traced it, but east of the latter place it does not exist in our State, at least it has never fallen under my observation. Prof. Agassiz found it near Lake Superior, and I observed many

specimens on the hills in Berkshire county, Massachusetts, which, from the railroad cars, appeared to be this species.

No. 10.—*XANTHIDIA LISA*.—I have taken a few specimens at Rockport, but it is among the most rare species.

No. 11.—*X. NICIPPI*.—This species occasionally is found in the valley of the Mahoning river, and is abundant at Columbus and Dayton, but I have never observed it in the vicinity of Cleveland. Both the larvæ and perfect insects usually resort to the clover fields.

No. 12.—*COLIAS PHILODICE*.—The common small yellow butterfly is familiar to every one. It collects in large numbers about muddy and moist places. It is probable that more than one species is embraced under this name.

No. 13.—*C. CÆSNONIA*.—At Dayton, Xenia and Columbus this species is very numerous, yet I have never found it near Cleveland. On the west side of Lake Michigan it is abundant in a latitude north of ours.

No. 14.—*CALLYDRIAS EUBULE*.—This large and nerly pure yellow colored butterfly never reaches the northern extremity of Ohio, but is found at Dayton and Columbus occasionally, and at Cincinnati in great numbers. It is said to appear there only in the fore part of the summer. Its history is unknown to me.

No. 15.—*ARGYNNIS IDALIA*.—This showy species I have found abundant in Connecticut and Wisconsin, while in Northern Ohio I have never met with it, but have obtained a few specimens from Dayton. Why it should exist both east and west of us, and not in this locality, is an interesting fact, explainable only upon the supposition that our vicinity does not furnish suitable food for its larva. Of what that consists, I have not been able to ascertain. Drury, Boisduval and Le Conte have figured and described this butterfly, but neither have furnished any light upon this point.

No. 16.—*A. APHRODITE*.—One of our most common species. Its successive generations are constantly appearing during spring and summer, but the greatest number are met with early in autumn. The beautiful display of large and numerous silvery spots on the under surface of its wings, render it an interesting object to the eye of every observer.

No. 17.—*A. BELLONA*.—This smaller species is equally abundant with the preceding. The food of the larva is unknown to me.

No. 18.—*MELITÆA PHÆTON*.—In one instance only have I seen this species in Northern Ohio. A few specimens, captured at Dayton, I observed in the cabinet of the late William Jenison, of that city.

No. 19.—*M. MYRINA*.—In the same cabinet I observed this species, from the same locality, and have met with it very rarely at the north. Like *Argynnis Idalia*, it is abundant in the States of Connecticut and Wisconsin.

No. 20.—*M. THAROS*.—A common species.

No. 21.—*VANESSA ANTIOPA*.—Though a species introduced from Europe, it has become very common. It often, in its perfect state, survives over winter, and may be seen flying during the first days of spring. The larva, which often feeds on the foliage of the lombardy poplar, excited strong prejudice, some years since, against such trees, from an erroneous belief that their tenant was venomous, like *Cleopatra's asp*.

No. 22.—*V. J. ALBUM*.—Appears in small numbers during spring and again in autumn. It seems to have a predilection for ripe or decaying fruit, and often visits our cider mills, where apples are collected in large quantities. The food of its larva I have not been able to ascertain.

No. 23.—*V. INTERROGATIONIS*.—Is frequently seen about our hop vines, upon which its larva frequently feeds.

No. 24.—V. *COMMA*.—This, like the preceding, is seen about our hop vines, but occurs in greater abundance.

No. 25.—V. *PROGNE*.—A far less common species, and is occasionally to be seen about our gardens and lawns, especially if elm trees are in the vicinity. Upon them the larva feeds.

No. 26.—V. *FURCILLATA*.—Solitary specimens are occasionally met with on the margins of our forests early in spring, and at that time are usually found alighting on dry leaves, in sunny exposures, apparently for the purpose of receiving warmth. In autumn they are sometimes more numerous. The food of the larva I have not been able to detect, nor do Say, Kirby, Boisduval and Le Conte, who have described the species, afford any information on this point. The four last named species of *Vanessa* very closely resemble each other to a superficial observer, yet their specific characters are clear and satisfactory to one capable of making close investigation.

No. 27.—*CYNTHIA ATALANTA*—PAINTED LADY.—Though it is said to be an introduced species, it is common in every section of our Western States in which I am acquainted. The larva feeds indiscriminately on all the species of the nettle.

No. 28.—C. *CARDUI*.—This, like the preceding, is an introduced species, which in some seasons becomes extremely numerous, while in others the collector of insects will hardly discover a solitary individual. All the thistle family are eaten by the larva. Even the forbidding Canada thistle I found, in Wisconsin, to be stripped of its leaves by the larva.

No. 29.—C. *HUNTERII*.—To a superficial observer this and No. 28 resemble each other, but this is a native species with only two eye-like spots on the under surface of the hind wings. The *Cardui* has spots of less size on the same

part. The present species feeds, while in the larva state, on the mouse-ear and everlasting.

No. 30.—*APATURA CELTIS*.—Is figured in Boisduval and Le Conte, but no description of it is furnished in their unfinished publication. The larva is supposed to feed on the *Celtis*. One specimen was taken at Dayton two years since, and was presented to me by the late Mr. Jenison.

No. 31.—*SATYRUS ALOPE*.—To the same respectable entomologist I was indebted for a pair of this insect. Another specimen I have received from West Chester, New York, and also observed it in Wisconsin. It seems not to be very abundant in any known locality. All the species of this genus feed upon coarse grasses.

No. 32.—*S. CANTHUS*.—In Northern Ohio this species is somewhat rare, while in the centre of the State and especially in the western prairies it is excessively abundant.

No. 33.—*S. EURITHIUS*.—Is subject to the same remark.

No. 34.—*S. ANDROMACHA*.—Is among the most rare of our butterflies, and even on our prairies is only occasionally seen.

No. 35.—*LEMINITIS EPHISTION*.—This is an abundant species in every locality.

No. 36.—*L. ARTEMIS*.—Is rarely seen in this vicinity. I have met with it in only two or three instances in Ohio. At Racine it is more common among the oak forests. It is one of our most active and handsome butterflies, though its plumage is plain. From its resorting almost exclusively to oak forests, it is inferred that the larva obtains its sustenance from that tree.

No. 37.—*L. MISSIPPUS*.—This species is equally common with No. 35. The larva is found upon several species of oak.

No. 38.—*DANAUS ARCHIPPUS*.—To a common observer this and the preceding species closely resemble each other, but the larva of the former has some spinous appendages which are not found on this, and the crysalid of the one has a roman nose-like protrusion on its side, while the other is uniformly cylindrical, without any appendage, and is green, decked with gilt spots.

No. 39.—*LYCÆNA AMERICANA*.—This little and common species resembles the European analogue, but is specifically distinct. Early in the spring a small green worm, which is the larva, may be found in considerable numbers upon the leaf of dock and sorrel.

No. 40.—*THECLA FAVONIUS*.—This plain species is occasionally seen hovering about oak bushes, yet it is among our most rare species. At Catskill, on the Hudson river, I once saw numbers of them.

No. 41.—*T. HUMULI*.—This is sometimes found among our hop vines.

No. 42.—*POLLYOMMATUS PSEUDARGIOLUS*, and three other species, are frequently seen about our gardens and fields, though from their small size they attract little attention. The food of the larvæ is not known to us.

No. 46.—*LYBITHEA BACHMANII*.—I first discovered this new species in Mahoning county, Ohio, many years since, but learned nothing of its habits. Last summer I met with a number of specimens at Dayton, and still greater numbers in possession of Dr. Hoy, at Racine. From him I learn that while the common raspberry of the garden is in flower, that it is a common resort of this insect, and it is probable the larva feeds on the leaves of this shrub.

No. 47.—*HESPERIA TITYRUS*.—Is abundant wherever the locust tree flourishes. The other species of *Hesperia* are equally common, though their habits are less known.

FOSSIL PLANTS FROM THE OHIO COAL BASIN.

BY J. S. NEWBERRY, M. D.

Read before the Cleveland Academy of Natural Science, January 1853, and
at Subsequent Meetings.

The following catalogue is not intended fully to represent the Fossil Flora of Ohio, of which the species enumerated probably form but a small part, but only includes such species as have, up to the present time, been collected in this State by Col. Charles Whittlesey,—who has kindly committed his fine collection to me for examination—or myself.

The species contained in this list are mostly from the rocks associated with the lowest stratum of coal in the Ohio basin, along the line of its northern outcrop—a region which furnishes a greater number and variety of fossil plants than any other with which I am acquainted of equal geographical extent and geological range.

The fossils from this region include many new and interesting forms, and are generally beautifully preserved, exhibiting none of that distortion of form, or obliteration of details of structure, so common in those derived from localities nearer the centres of igneous action.

CALAMITES—SUCKOW.

1. *C. Suckowii*, Brongniart, *Histoire des Vegetaux Fossiles*, Tab. 15.

The most common species in Northern Ohio. Fine specimens occur in the carboniferous conglomerate at Cuyahoga Falls. The superior termination is not rare, and the root is sometimes found, agreeing closely with Lindley & Hutton's figure, Vol. I., Tab. 78.

2. *C. ramosus*, Artis, *Ant. Phyt.*, Tab. 2.

Frequently found in the roof of the coal mines at Cuyahoga Falls. I have a compressed specimen from that locality six inches in diameter, joints about three inches apart, beautifully marked, with its characteristic cicatrices.

3. *C. undulatus*, Sternberg, *Flor. der Vorwelt*, 1, 4, p. 16.

From the coal mines at Cuyahoga Falls. This was a large plant. I have compressed specimens eight inches in diameter.

4. *C. Cistii*, Brong., *Hist. Veget. Foss.*, Tab. 20.

Conglomerate, Cuyahoga Falls.

5. *C. dubius*, Artis, *Ant. Phyt.*, Tab. 13.

Zanesville.

6. *C. cannæformis*, Brong., *Hist. Veget. Foss.* Tab. 21.

C. psuedo bambusia, Artis.

Conglomerate, Cuyahoga Falls.

7. *C. Voltzii*, Brong.

8. *C.* ———?

CALAMODENDRON—BRONG.

9. *C. approximatum*, Brong., *Tab. des Gen.* p. 50.

Calamites approximatus, Brong.

Calimates ornatus, Sternb.

Conglomerate, Cuyahoga Falls.

10. *C. nodosum*, Brong., *Tab. des Gen.*, p. 50.

Calamites nodosus, Schloth.

Conglomerate, Cuyahoga Falls.

11. *C. pachyderma*, Brong. *Tab. des Gen.*, p. 50.

Calamites pachyderma, Brong.

Conglomerate, near Akron.

ARTISIA—STERNBERG.

12. *A. transversa*, Sternb., *Unger, Gen. et Spec.*, p. 253.

13. *A. approximata*, Brong., *Op. cit.*, p. 276.

These fossils are evidently the casts of the medullary centers of plants, as shown by Dawes and Corda. No. 12 is considered by Corda as the cast of the medullary cavity of *Diploxyton* and 13 of *Lepidophloios*, (*Lomatophloios*, Corda,)

both allied to *Lepidodendron*. These casts are very abundant in the conglomerate, where I have found them retaining two of their coatings, the exterior of which is highly ornamented, but without distinct leaf scars. Its markings bear considerable resemblance to those of the woody axis of *Sempervivum Canariense*, figured by Sternberg.

SIGILLARIA—BRONG.

14. *S. Saulii*, Brong., *Hist. Veget. Foss.*, *Tab.* 151.

15. *S. Menardi*, Brong., *Op. cit.*, *Tab.* 158.

Common, with foliage, in coal mines, Cuyahoga Falls. Leaves long, linear, uni-nerved—plant always small, much branched, perhaps creeping.

16. *S. Sillimani*, Brong., *Op. cit.*, *Tab.* 147.

With foliage. Middlebury.

17. *S. Marineria*, Hildreth, *Amer. Jour. Science*, *Vol.* xxxi.
p. 31.

Cuyahoga Falls and Poland.

18. *S. grandis*, (*n. sp.*)

Cuyahoga Falls.

19. *S. Biercei*, (*n. sp.*)

For this beautiful species, which resembles, somewhat, *S. Menardi* in the form of the cicatrices, but which are about six times as large, I am indebted to my friend L. V. Bierce, Esq., of Akron, Ohio, whose name I have transferred to it. Coshocton.

20. *S. acuminata*, (*n. sp.*)

Cuyahoga Falls.

21. *S. centralis*, (*n. sp.*)

Cuyahoga Falls.

22. *S. pulchra*, (*n. sp.*)

Cuyahoga Falls.

23. *S. dentata*, (*n. sp.*)
Cuyahoga Falls.
24. *S. minuta*, (*n. sp.*)
Cuyahoga Falls.
25. *S. squamosa*, (*n. sp.*)
Cuyahoga Falls.
26. *S. ———?*
Cuyahoga Falls.

SYRINGODENDRON—STERNB.

27. *S. pachyderma*, Brong., *Hist. Veget. Foss.*, *Tab.* 156.
Cuyahoga Falls.
28. *S. Americanum*, (*n. sp.*)
Cuyahoga Falls.
29. *S. ———?*
Cuyahoga Falls.

LEPIDODENDRON—STERNB.

30. *L. obovatum*, Sternb., *Vers.* I., *Tab.* 6.
Cuyahoga Falls.
31. *L. elegans*, Brong., *Hist. Veget. Foss.*, *Vol.* II., *Tab.* 14.
Cuyahoga Falls.
32. *L. gracile*, Brong., *Hist. Veget. Foss.*, *Vol.* II., *Tab.* 15.
Cuyahoga Falls.

Unger considers these three species as mere varieties of the same plant, (*L. obovatum*, Sternb.,) but from a careful study of numerous specimens—having, in one instance, an opportunity of examining the trunk, branches, foliage and fruit, all in connection, of one individual—I am convinced that certainly Nos. 30 and 31, and probably 32, are distinct species.

33. L. ———?

Doylestown, Wayne county.

34. L. ———?

Doylestown.

35. L. ———?

Doylestown.

36. L. ———?

Cuyahoga Falls.

37. L. ———?

Cuyahoga Falls.

Brongniart is now at work on the *Lepidodendra* and will soon publish another number of his great work, which will embrace a revision of this genus and many new species; I therefore refrain, for the present, from giving names to such species as are found in our vicinity, which seem to be different from those already described.

LEPIDOPHLOIOS—STERNB.

Lomatophloyos, Corda. *Pachyphloeus*, Goepp.

38. L. *laricinum*, Sternb., *Vers.* I., 3, p. 13.

Lepidodendron laricinum, Sternb., *Vers.* I., 2, *Tab.* 11.

Cuyahoga Falls.

39. L. *crassicaule*, Brong., *Tab. des Gen.*, p. 43.

Lomatophloyos laricinum, Corda, *Beitrag.*, *Tab.* 1-7.

Cuyahoga Falls.

40. L. ———?

Cuyahoga Falls.

These plants are exceedingly abundant in the coal mines in the vicinity of Cuyahoga Falls, where they are frequently marked with cicatrices similar to those of *Ulodendron*. I have seen one trunk, less than a foot in diameter, marked with three rows of cicatrices on each side—a character

which seems to unite this genus with *Ulodendron*. The casts of the medullary cylinders of these plants form part of the genus *Artisia*.

ULODENDRON—RHODE.

Ulodendron and Bothrodendron, L. & H.

41. *U. majus*, Lind. & Hutt., *Foss. Flor.*, *Tab.* 5.
Salineville.

MEGAPHYTUM—ARTIS.

42. *M. discretum*, (*n. sp.*)
Cuyahoga Falls.

Are not the species of *Megaphytum* merely decorticated trunks of the preceding genus?

KNORRIA—STERNB.

43. *K. taxina*, L. & H., *Foss. Flor.*, *Tab.* 95.
Cuyahoga Falls; with foliage.
44. *K. Hildrethii*, (*n. sp.*)
Ficoidites scabrosus, Hild., *Amer. Jour. Sci.*, *Vol.* XXXI.,
p. 31.
45. *K. distans*, (*n. sp.*)
Middlebury, Summit county.

HALONIA—LIND. & HUTT.

46. *H.* ———?
Zanesville.

PSARONIUS—COTTA.

47. *P.* ———?
Found in great abundance in Athens county.

LEPIDOSTROBUS—BRONG.

48. *L. variabilis*, L. & H., *Foss. Flor.*, *Tab.* 10.
Cuyahoga Falls, &c.

49. *L. gracilis*, (*n. sp.*)

With a peduncle, as in many species of *Lycopodium*; interior structure visible; sporangia six or more. Cuyahoga Falls.

50. *L. macrolepis*, (*n. sp.*)

Cuyahoga Falls.

LEPIDOPHYLLUM—BRONG.

51. *L. lineare*, Brong., *Prod.*, p. 87.

Cuyahoga Falls.

52. *L. tri-nervii*, Brong., *Loc. cit.*

Cuyahoga Falls.

53. *L. lanceolatum*, Brong., *Loc. cit.*

ASTEROPHYLLITES—BRONG.

54. *A. dubia*, Brong., *Prod.*, p. 156.

Bechera grandis, Sternb.

Presenting marked differences from the European plant, but perhaps only a variety. Cuyahoga Falls.

55. *A.* ———?

Near *A. longifolia*, Brong., which occurs abundantly higher up in the series in Pennsylvania, but probably distinct. Cuyahoga Falls.

These are the only specimens I have which I can refer to the genus *Asterophyllites*, as distinct from *Sphenophyllum*. I have several specimens of what I long considered distinct species of *Asterophyllites*, but which I have discovered to be *but the stems, with cauline capillary leaves, of Sphenophyllum*. And since the genus *Sphenophyllum* was first created, and the wedge shaped leaves are more characteristic of these plants than their stellate arrangement, I have thought best to enumerate them under *Sphenophyllum*. The spikes of fructification of *Asterophyllites* and *Sphenophyllum*, (*Volkmania*, Sternb., Unger, Presl., *Asterophyllites*

tuberculata, Lind. & Hutt., Tab. 180,) are not uncommon in the coal mines of Northern Ohio, where they sometimes exhibit the superior and inferior terminations, and with considerable distinctness the details of the internal structure.

The jointed striated stem, the verticillate arrangement of the leaves and similar fructification have been considered as proofs of the close affinity of *Asterophyllites* and *Sphenophyllum*, but the wedge shaped leaves of the latter genus have been considered as quite distinctive. Since I have found the two forms of leaves on the same plant, this distinction will no longer serve, and many species of these two genera must be united.

ANNULARIA—STERNB.

56. *A. brevifolia*, Brong., *Prod.*, p. 156.

Zanesville.

57. *A. longifolia*, Brong., *Op. cit.*, p. 156.

Asterophyllites equisetiformis, L. & H.

Bornia stellata, Sternb., *Vers.* 1, 4, p. 28.

Zanesville.

SPHENOPHYLLUM—BRONG.

58. *S. Schlotheimii*, Brong., *Prod.*, p. 68.

Palmacites verticillatus, Schloth., *Flor. der Vor.* Tab. 2.

My specimens of this plant, which is abundant in the upper coal measures in Ohio and Pennsylvania, agree perfectly with the specific description given in Unger's *Genera et Species*, but not with Schlotheim's figure, which gives the leaves an entire rounded extremity, nor Lindley and Hutton's figure and description, which represents the number of leaves, in a verticil, as varying from six to nine. I have seen no American specimen in which there were more than six leaves in a whorl. Salineville.

59. *S. erosum*, L. & H. *Foss. Flor.* Tab. 13.

I have found, apparently, this species terminating branches

surrounded by verticils of 12-14 long linear leaves distinctly separated and equidistant at their base, greatly resembling *Asterophyllites grandis*, L. & H., Tab. 19, Fig. 2. Cuyahoga Falls.

60. *S. peltatum*, (*n. sp.*)

Cuyahoga Falls.

61. *S. laciniatum*, (*n. sp.*)

62. *S. brevifolium*, (*n. sp.*)

Cuyahoga Falls.

The difference in form between the superior and inferior leaves of *Sphenophyllum*, to which I have alluded, would seem to indicate that it was an aquatic plant, the submerged leaves being linear, uni-nerved, almost capillary; the emerged leaves broad with a compound nervation, precisely as in many recent aquatic plants. This supposition is further strengthened by the extreme length and tenuity of the branches of this apparently herbaceous plant, which would seem to have required the support of a denser medium than air.

HIPPURITES—LIND. & HUTT.

63. *H. longifolia?* L. & H., *Foss. Flor.*, Tab. 190.

Zanesville.

NEUROPTERIS—BRONG.

64. *N. cordata*, Brong., *Hist. Veg. Foss.*, Tab. 64.

Salineville.

65. *N. flexuosa*, Sternb., *Vers. I.*, p. 16.

Poland and Cuyahoga Falls.

66. *N. Grangeri*, Brong., *Op. cit.*, Tab. 68.

Zanesville.

67. *N. Cistii*, Brong., *Op. cit.*, Tab. 70.

Salineville.

68. *N. Loshii*? Brong., *Op. cit.*, *Tab.* 73.

Cuyahoga Falls.

69. *N. lancifera*, (*n. sp.*)

Cuyahoga Falls.

DICTYOPTERIS—GUTBIER.

70. *D. obliqua*, Bunbury, *Jour. Geol. Soc.*, *Vol.* III., *Tab.* 21.

This beautiful fern is abundant in the upper coal measures at Salineville, generally occurring as detached pinnules, which are sometimes much more acute than those figured by Bunbury. In the collection of Col. Whittlesey there are, however, specimens in which the pinnules are attached to the rachis. These show that the frond was of large size, and that the pinnules descended on the principal rachis—(as in *D. Brongniartii*, Gutb., and in *Neuropteris auriculata*),—where they become orbicular.

ODONTOPTERIS—BRONG.

71. *O. neuropteroides*, (*n. sp.*)

Cuyahoga Falls.

CYCLOPTERIS—BRONG.

72. *C. orbicularis*? Brong., *Hist. Veg. Foss.*, *Tab.* 61.

Salineville.

WHITTLESEYA—(N. GEN.)

73. *W. elegans*, (*n. sp.*)

This is the plant figured in *Amer. Jour. Science*, New Series, Vol. VIII., p. 375, by Col. Whittlesey, in honor of whom I have named it. It will be figured and described in the next number of the *Annals of Science*. Cuyahoga Falls and Poland, Ohio.

PYCNOPHYLLUM—BRONG.

Flabellaria, Sternb. *Cordaites*, Unger.

74. *P. borassifolium*? Brong., *Tab. des Gen.*, p. 65.

Flabellaria borassifolia, Sternb., *Vers. I.*, *Tab.* 18.

Cordaites borassifolia, Unger, *Gen. et Spec.* p. 277.

Cuyahoga Falls.

CASEA—(N. GEN.)

75. *C. membranacea*, (*n. sp.*)

An interesting plant, resembling somewhat, in the form of its leaves, some species of *Cyclopteris*, but with a very different nervation. I have named it in honor of my friend William Case, Esq. Middlebury, Ohio.

SPHENOPTERIS—BRONG.

76. *S. latifolia*, Brong., *Hist. Veg. Foss.*, *Tab.* 57.

Cuyahoga Falls.

77. *S. obtusiloba*, Brong., *Op. cit.*, *Tab.* 53.

Cuyahoga Falls.

78. *S. furcata?* Brong., *Op. cit.*, *Tab.* 49.

Hymenophyllites furcatus, Goeppl., *Syst. Fil. Foss.*,
p. 259.

Cuyahoga Falls.

79. *S. parvifolia*, (*n. sp.*)

Cuyahoga Falls.

80. *S. concinna*, (*n. sp.*)

Cuyahoga Falls.

81. *S. uncinata*, (*n. sp.*)

Cuyahoga Falls.

82. *S. Kirtlandiana*, (*n. sp.*)

This, the most beautiful fossil fern with which I am acquainted, I have named in honor of my distinguished friend, Prof. J. P. Kirtland. Poland, O.

83. *S. simplex*, (*n. sp.*)

Poland, O.

84. *S. subspinosa*, (*n. sp.*)

Cuyahoga Falls.

85. *S. tenuis*, (*n. sp.*)
Cuyahoga Falls.
86. *S. foliosa*, (*n. sp.*)
Cuyahoga Falls.
87. *S. coriacea*, (*n. sp.*)
Salineville.

HYMENOPHYLLITES—GOEPPERT.

88. *H. dissectus?* Goebb., *Syst. Fil. Foss.*, p. 260.
Sphenopteris dissecta, Brong., *Op. cit.*, Tab. 79.
Cuyahoga Falls.

ADIANTITES—BRONG.

Adiantites, *Spec.*, Goebb. *Sphenopteris*, *Spec.*, Brong.
Cyclopteris, *Spec.*, Goebb.

89. *A. rotundiloba*, (*n. sp.*)
Cuyahoga Falls.
90. *A. Lesquereuxii*, (*n. sp.*)

This species, which occurs in great abundance and perfection in the coal mines in Poland, Ohio, I have named in honor of my friend, M. Leo Lesquereux, of Columbus, whose cabinet contains beautiful specimens of it.

ALETHOPTERIS—STERNB.

91. *A. lonchitides*, Sternb., *Vers.*, I., p. 21.
Pecopteris lonchitica, Brong., *Op. cit.*, Tab. 84.

The most abundant fern contained in the shales overlying the lowest stratum of coal in Northern Ohio. It agrees in all points with the European plant, except that the pinnules are universally and distinctly *obtuse*.

92. *A. Serlii*, Goebb., *Sys. Fil. Foss.*, p. 301.
Pecopteris Serlii, Brong., *Op. cit.*, Tab. 85.
Zanesville.

93. *A. grandifolia*, (*n. sp.*)

Cuyahoga Falls.

94. *A. gracilis*, (*n. sp.*)

Cuyahoga Falls.

PECOPTERIS—BRONG.

95. *P. plumosa*, Brong., *Op. cit. Tab.* 121-122.

Alethopteris plumosa, Goepp.

Splendid specimens of this species are found at Cuyahoga Falls, where I have seen a single frond five feet long by two and a half wide, spread out on the roof-stone of the coal mine, as beautifully preserved and as perfectly expanded as though it had been plucked when growing, and carefully laid between the leaves of a lady's herbarium.

96. *P. nervosa*? Brong., *Op. cit., Tab.* 94.

Alethopteris nervosa, Goepp.

The specimens which I have doubtfully referred to this species do not agree at all with Brongniart's figure, nor very well with Lindley's, (L. & H., *Tab.* 94.) Our plant is considerably larger, and the pinnae and pinnules near the summit of the frond are prolonged into spines; fructification preserved; sori (5-8,) about half way between the midrib and margin of the pinnule, apparently covered by a peltate indusium; sporangia few; sori resembling those of *Matonia*. Salineville.

97. *P. Sillimanii*, Brong., *Op. cit., Tab.* 96.

Zanesville.

98. *P. arborescens*, Brong., *Op. cit., Tab.* 101.

Cyatheites arborescens, Goepp.

Salineville.

99. *P. Cyathea*, Brong. *Loc. cit.*

Cyatheites Schlotheimii, Goepp.

100. *P. elliptica*, Bunbury, *Jour. Geol. Soc. Vol.* II., *p.* 82.

Zanesville.

101. *P. Miltoni*? Brong., *Op. cit.*, *Tab.* 113.

P. polymorpha, Brong.

Cyatheites, Miltoni, Goepp.

Salineville.

102. *P. inflata*, (*n. sp.*)

Cuyahoga Falls.

103. *P. parvifolia*, (*n. sp.*)

Cuyahoga Falls.

104. *P.* ———?

Salineville.

CONIOPTERES—BRONG.

Pecopteris Spec., Sphenopteris Spec., Brong.

105. *C. Gravenhorstii*? Brong., *Tab. des Gen. p.* 26.

Sphenopteris Gravenhorstii, Brong.

106. *C. latirachis*, (*n. sp.*)

Cuyahoga Falls.

SCHIZOPTERIS—BRONG.

107. *S. robusta*, (*n. sp.*)

Cuyahoga Falls.

CANNOPHYLLITES—BRONG.

108. *C. cordata*, (*n. sp.*)

Cuyahoga Falls.

NOGGERATHIA—STERNB.

109. *N. Beinertiana*? Goepp. *Gatt. Foss. Pflanz.* 5, 6, *Tab.* 12.

Cuyahoga Falls.

110. *N. microphylla*, (*n. sp.*)

Cuyahoga Falls.

CARPOLITHES—STERNB.

111. *C. retusus*, Sternb., *Vers.* 1, 4, *Tab.* 7.

Cuyahoga Falls.

112. *C. bicuspidatus*, Sternb., *Loc. cit.*

Cuyahoga Falls.

113. *C. minutus*, (*n. sp.*)

Cuyahoga Falls.

114. *C.* ——?

Cuyahoga Falls.

RHABDOCARPOS—GOEPP. & BERG.

115. *R. compressus*, (*n. sp.*)

Cuyahoga Falls.

TRIGONOCARPON—BRONG.

116. *T. Noggerathii*, Brong., *Prod.*, p. 137.

Cuyahoga Falls.

117. *T. tricuspdatum*, (*n. sp.*)

Cuyahoga Falls.

118. *T. magnum*, (*n. sp.*)

Coshocton.

119. *T. multistriatum*, (*n. sp.*)

Cuyahoga Falls.

Some of my specimens of *Trigonocarpon* are so well preserved as to exhibit something more of the structure of this fruit than has been hitherto known. They show it to have been monospermous; the nucleus, which was ovoid, and without ridges, being marked exteriorly much like the nutmeg. Surrounding the nucleus was the shell, composed of three segments, separating by sutures, which seem to have divided the three principal ridges. Between these three ridges were three or more secondary ridges, which were sometimes obsolete. The three principal ridges were expanded into wings, which had sometimes a breadth at their widest part, equal to half the diameter of the nut, and which, uniting at the apex, were prolonged, much

narrowed, to form a triangular column, which was again expanded into a small triangular area. Exterior to the shell was a drupaceous, somewhat fibrous envelope, covered with a coriaceous rind.

CARDIOCARPON—BRONG.

120. *C. samaræforme*, (*n. sp.*)

Cuyahoga Falls.

121. *C.* ———?

Cuyahoga Falls.

122. *C.* ———?

Cuyahoga Falls.

POLYSPORIA—(N. GEN.)

123. *P. mirabilis*, (*n. sp.*)

Cuyahoga Falls.

PINNULARIA—LIND. & HUTT.

124. *P. capillacea*, L. & H., *Foss. Flor.*, *Tab.* 3.

STIGMARIA—BRONG.

125. *S. ficoides*, Brong., *Prod.*, *p.* 88.

Cuyahoga Falls.

126. *S.* ———?

Cuyahoga Falls.

HYDATICA—ARTIS.

127. *H.* ———?

Cuyahoga Falls.

It will be seen that the foregoing catalogue contains a large number of species which I have called new, and yet I am confident that the number of undescribed species is not

exaggerated. I have carefully avoided the creation of species from unique, imperfect or doubtful specimens, for every one who is at all familiar with the subject, must be aware how much the science of fossil botany has been retarded by a neglect of this necessary caution, on the part of those who have published figures and descriptions of fossil plants.

One principal reason why this catalogue contains so many species different from those before found in this country, is that most of the fossil plants collected in America have been obtained from the upper part of the coal series, where the flora is quite different from that of the base of the formation.

The identity of our coal plants with those of Europe is a matter that will require much careful study; and their coincidences and differences can only be satisfactorily determined by a comparison of numerous *specimens* of the plants of the two countries. Indeed, I am disposed to think that there has been much hasty generalization on this subject, and that when the matter shall be fully investigated, it will be found that, while generically there is all the coincidence claimed, specifically there will be, perhaps, less correspondence than has been supposed—probably not much greater than among living plants of the same classes.

Nearly one fourth of all the living ferns of Europe are found in North America, and the proportion of the lower cryptogamous plants, common to the two continents, is probably somewhat greater.

Among our fossil plants, there are almost none which present a perfect identity with those of Europe. And the range which may be allowed to a species is yet an open question, and one which must be determined, before deductions from the geographical distribution of fossil plants will be conclusive. *

em. Up to this point the article is identical with the article published in *Annals of Science*, Vol. i. (1853) nos. 8 & 9, with the same title. —

A.H.

found the following, as far as indicated on p. 46, under
the title "New Fossil Plants from Ohio".

A. P.

FOSSIL COAL PLANTS.

43

x In the last and preceding numbers of the *Annals of Science* was published a catalogue of such fossil plants as have, up to the present time, come under my observation.

Among the species there enumerated are many which I have considered new to science. Of these I propose to publish figures and descriptions in the succeeding numbers of that journal, selecting a medium which will spread such information as I have to communicate, on the subject of fossil botany, more widely than any other, throughout the region where this interesting branch of natural science can be most successfully cultivated.

By doing this I flatter myself I shall render some service to such of the geological collectors of the West as have, for want of the necessary books of reference, been compelled to leave their fossil plants, however beautiful or abundant, among their *res dubiae*.

WHITTLESEYA—NEWB.

Fronde simple or pinnate—nerves fasciculate—confluent at the base, not dichotomous, (median nerve none.) Fructification unknown.

The characters of this genus can not be fully given until other species are discovered, which may be associated with the one upon which the generic description given above is based. It is evident, however, that the peculiar nervation of this plant, (*W. elegans*,) must exclude it from all known genera.

W. ELEGANS—NEWB.

Fronde (pinna?) simple, thick, sub-cuneiform, truncate, acutely dentate, rounded at the base, and abruptly contracted into a long slender petiole, nerves parallel, converging into the teeth, in which the fascicles terminate.

This interesting fossil was first discovered by Col. Charles Whittlesey, in a coal mine, opened by him, two miles south-east of Cuyahoga Falls. He published a notice of it in *Amer. Jour. Science*, New Series, Vol. VIII., p. 375, but with his characteristic modesty refrained from naming it. As an act of justice to one who has done so much to extend our knowledge of the geology and paleontology of the West,

as well as a slight acknowledgment of the many personal favors received at his hands, I have given it his name.

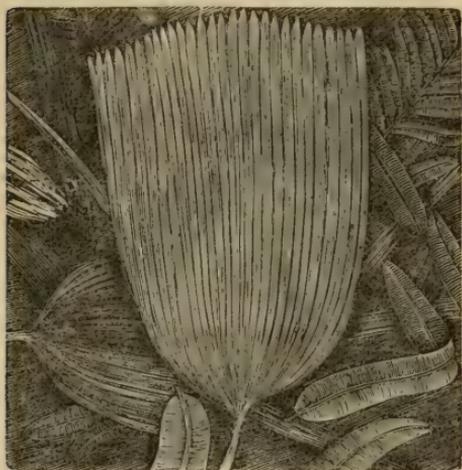


Fig. 1.—*Whittlesea elegans*.

have been discovered of the flora of a former world.

The usual form and dimensions of the leaf are accurately represented by fig. 1, but it is subject to considerable variation both of form and size—varying from half an inch to two inches in width, and from one and a quarter to three inches in length.

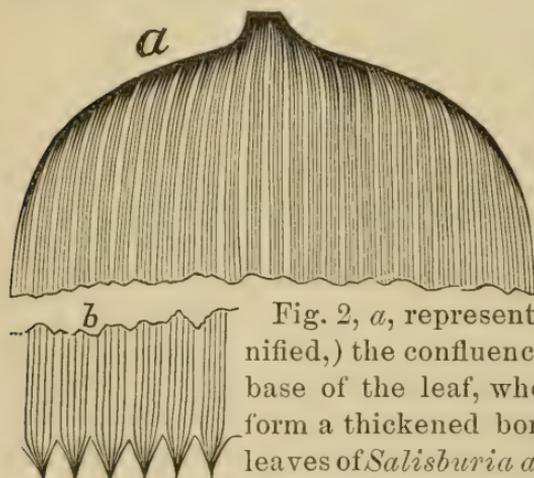


Fig. 2.

Fig. 2, *a*, represents, (somewhat magnified,) the confluence of the nerves at the base of the leaf, where they combine to form a thickened border—much as in the leaves of *Salisburia adiantifolia*, of which however the nervation is quite different.

Fig. 2, *b*, exhibits a portion of the other extremity of the

The symmetry and the graceful outline of the leaf of this plant of which the unique form cannot be expressed by any one botanical term, (being precisely that of a longitudinal section of an air pump receiver,) the beautiful dentation of the remote border, and its peculiar nervation, render it one of the most interesting specimens which

The petiole is very slender, becoming more so as it recedes from the base of the leaf. I have specimens in which it is nearly two inches in length.

leaf, also magnified, showing the convergence of the nerves of each fascicle into the teeth in which they terminate.

I have not yet been able to determine whether these leaves formed part of a compound frond, or whether they were entirely simple. In the locality mentioned above, they are found in great abundance and in a fine state of preservation—sometimes as many as a dozen being spread out on a surface a foot square; but although I have examined several thousands of them, I have never detected any distinct connection between them and any other fossil, the extreme tenuity of the petiole having favored the separation of the leaf from the parent stem. Nor do they ever bear such relations to each other in position as to lead one to infer that they had originally the verticillate arrangement of the leaves of *Sphenophyllum* or *Marsilea*, which they slightly resemble in form.

The plants most frequently associated with this fossil are *Alethopteris lonchitidis*, *Alethopteris gracilis*, *Trigonocarpon tricuspdatum*, *Sphenopteris concinna*, &c., with none of which could it have had any connection. I have, however, seen mingled with the leaves of the plant in question, slender stems which give off alternate petioles, having much the character of the petioles attached to these leaves, and I suspect we shall sometime find the two in connection.

The affinities of *Whittleseya* with other plants, whether recent or fossil, are by no means clear. Among fossil plants there are perhaps none with which it can be compared, unless with *Noggerathia* and *Pychnophyllum*, and the differences from both these genera, which it presents, are so striking as to render its relations to them doubtful.

Among living plants, *Salisburia*, *Marsilea* and *Chamaerops* are the only ones in which I have noticed any points of resemblance to our fossil, and all these are separated so widely from it by other characters, that the comparison is quite unsatisfactory.

When we are able, from the discovery of all the compo-

ment parts, to reconstruct this curious plant, and especially if its fructification can be obtained, its classification will be a matter of much less difficulty than now.

CARDIOPARPON SAMARÆFORME.

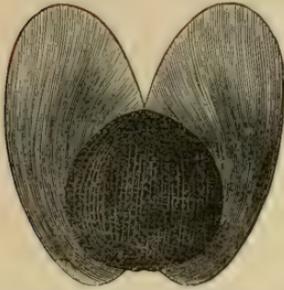


Fig. 1.—*C. Samaræforme*.

Nucleus round-cordate flat, $\frac{3}{4}$ inch in diameter, faintly concentrically striate and reticulate, a fine elevated line running from base to apex; base strongly marked with the cicatrix formed by the detachment of the organs of support and nutrition. Attached to the nucleus are broad, apparently membranous wings, which spring from

the cicatrix at the base, encircle the nucleus, becoming broader as they approach the apex, where they meet; from this point they rise, diverging from each other with a rounded outline, to a height nearly equal to the diameter of the nucleus. Wings distinctly veined and having a thickened border.

Shale over coal at Cuyahoga Falls.



Fig. 2.

C. Annulatum.

Nucleus heart shaped, or short ovoid acuminate, $\frac{1}{2}$ inch in diameter, flattened, faintly striate, marked at base by the cicatrix of pedicle, surrounded by an annular margin of nearly equal breadth, which is sometimes emarginate at the summit. This species re-

sembles *C. emarginatum*, Goepf. & Berger, but differs from it in the absence of the emargination of the border at the base, and in the slight emargination at the apex, a character frequently wanting in my specimens.

Shale over coal. Youngstown.



Fig. 3.—*C. Latum*.

Nucleus broad, heart shaped, flat, smooth, sharply acuminate, marked with a cicatrix at base, and surrounded, except at the basal cicatrix, with a narrow margin terminating like the nucleus in a sharp point at the summit. A

Mem. Beginning at this point, and continuing to the place indicated on p. 48, this is identical with the article in Annals of Science Vol. 1. (1853) No. 1.

fine line runs from the apex of the nucleus to the summit of the margin.

Roof of coal mines, Cuyahoga Falls.

Nucleus ovate acuminate smooth, from $\frac{1}{2}$ to $\frac{5}{8}$ inch in length, marked by a small cicatrix at base, and by a short elevated line which passes through the apex, extending to the distance of about 1 line toward the base. Margin entirely surrounding the nucleus, conforming to its outline, broadest at the summit,

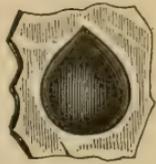


Fig. 4.
C. Minus.

Bituminous shale immediately below coal. Cuyahoga Falls.

Nucleus orbicular, $\frac{1}{4}$ inch in diameter, flat, or a little raised, smooth, with a minute cicatrix at base, entirely surrounded by a very narrow border, which is narrowest at base.



Fig. 5.
C. Orbiculare.

Shale over coal. Cuyahoga Falls.

Nucleus ovoid acuminate, $\frac{1}{4}$ inch long, flat, smooth, with cicatrix at base, entirely surrounded by a margin, which is very narrow at the base, is much prolonged beyond the apex of the nucleus, and terminates in a rounded summit, which is sometimes emarginate. A line passes from the summit of the margin into the apex of the nucleus.



Fig. 6.
C. Elongatum.

Shale over coal. Youngstown.

Nucleus transversely elliptical or reniform, flat, smooth, abruptly acuminate, without cicatrix at base, surrounded by a very narrow margin, which is broadest at the summit. This is probably the species figured by Sternberg, although I have never seen a specimen from this vicinity which was bicuspidate. As he has given no description with his figure, it is impossible to determine whether his species is the same with ours. Both evidently belong to the genus *Cardiocarpon*.



Fig. 7.
C. Bicuspidatum.
Carpolithes
Bicuspidatus.
Sternb.



Fig. 8.
C. Retusum.
Carpolithes
Retusis,
Sternberg.

Nucleus heart shaped, obtuse, with cicatrix at base, strongly rugose or tubercular, bordered by a very narrow striated margin. Sternberg's figure is more rounded at the apex than our fossil generally is, and is destitute of the striated margin. I have specimens, however, which agree precisely with his figure.

SIGILLARIA ACUMINATA.

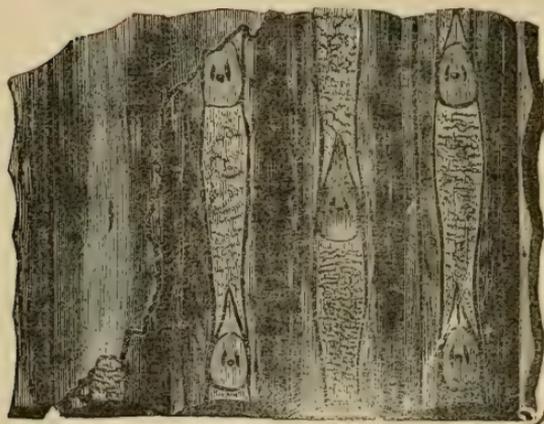


Fig. 1.—S. Acuminata.

Trunk ribbed, ribs parallel, moderately elevated, $\frac{5}{8}$ inch wide, each rib divided into five bands or stripes, of which the central is most prominent, widest, rugous and of unequal width, being contracted above the leaf scars and expanded below them; lateral stripes striated longitudinally. Cicatrices pyriform, abruptly rounded below, often truncated, above crowned by a long claw-like appendage, which is sometimes bifid. Vascular impressions low down in the leaf-scar, two exterior straight, or slightly curved, central punctiform. Decorticated trunk ribbed, smooth, marked by linear depressions under the leaf-scars of the exterior.

In obscure specimens the acuminate appendage of the leaf-scar is hardly perceptible. In this state it greatly resembles *S. rugosa*, Brong., differing from that species, however, in the low place of the vascular impressions, and in the variations of the width of the central rugose stripe.

In shale over coal, Cuyahoga Falls.

In shale over coal, Cuyahoga Falls.

Mem. Beginning at this point and continuing to the place indicated on p. 51, this is identical with the article in Annals of Science Vol. i. (1853) No. under the title "New Fossil Plants from Ohio".

Trunk mamillated, sulci separating mamillæ, reticulated, distinct, mamillæ contiguous at the base, having the form of hexagonal truncated pyramids. Angles of mamillæ sharply defined, and marked with a fine salient

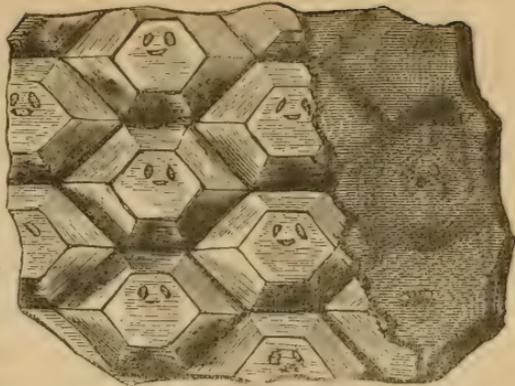


Fig. 2.—*S. Bierceii*.

line, with the exception of the two upper, which are a little rounded and often want the salient line. Cicatrices hexagonal, angles well defined, two lateral most prominent. Vascular impressions three, two exterior ovoid, central transversely linear, slightly curved. Decorticated trunk, mamillated, strongly striated longitudinally. Angles of mamillæ more rounded than those of the exterior. Vacular impressions conspicuous. There is no described species with which this is very likely to be confounded. Allied to *S. Brardii* and *S. Menardii*, Brong., it is far removed from them by the size and geometrical regularity of its markings.

For this beautiful species I am indebted to my friend L. V. Bierce, Esq., of Akron, O., a gentleman who, in the midst of arduous professional duties, is still a diligent and successful cultivator of science.

Trunk ribbed, ribs about $\frac{3}{8}$ of an inch in width, prominent, slightly rugose, alternately expanded and contracted. Leaf-scars lenticular, rounded above and below, lateral angles acute. Vascular impressions two in number, nearly round, separated by a rounded tubercle. Decor-



Fig. 3.—*S. Pulchra*.

ticated trunk longitudinally striated and bearing obscure impressions of the leaf-scars.

This is a remarkably neat species, and not liable to be confounded with any other found in this vicinity. It resembles in the variation in the width of the ribs *S. contracta*, Brong., and *S. diploderma*, Corda, but differs from both in the form of the leaf-scars, which are trapeziform and angular in *S. diploderma*, and in *S. contracta* much elongated and placed in *contractions* of the rib. The vascular impressions are also different from those of these species.

Youngstown, Mahoning county.

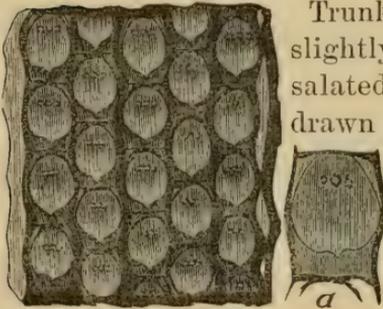


Fig 4.—*S. Dentata*.

Trunk ribbed, ribs narrow, alternately slightly expanded and contracted, tessalated by transverse lines, which are drawn across the ribs *along the upper border* of the leaf-scars. Leaf-scars closely approximated, ovoid, sometimes exhibiting lateral angles, terminating below in a small but distinct tooth.

Vascular impressions placed high up in the cicatrices, three, in line, nearly punctiform, central largest. Decorticated trunk, obscurely marked with the cicatrices of the exterior, and exhibiting traces of the vascular impressions. Fig. 4, *a*, represents a leaf-scar enlarged, to show its form more distinctly.

This species resembles, in many respects, *S. alveolaris* and *S. Knorrii*. Brong., and, if these species are to be considered identical, it should perhaps be regarded a variety of the same, but I have found the dentation of the leaf-scar a constant character in well marked specimens, and that, with the position of the transeverse line, have led me to consider it distinct. The leaf-scars are sometimes separated by an interval equal to their diameter. Strongly

compressed specimens exhibit leaf-scars of a more angular form than those in the figure.

Cuyahoga Falls.

X ANTHOLITHES PRISCUS.

This beautiful fossil affords us, perhaps, the first unquestionable evidence of the existence of plants with conspicuous flowers at the period of the deposition of the carboniferous strata. The abundance of fossilized coniferous wood in the coal bearing rocks, proves the existence of gymnospermous phaenogamous plants at that early era, and perhaps the plant of which this was the florescence, had no higher organization, but its graceful spike will be looked upon with peculiar interest, as proving that the gloom of the somber forests of the coal period was enlivened by the same objects that most adorn the field and forest of the present day.



Fig. 1.

And although the only air breathing animals of which the remains have been yet found in the carboniferous strata, are lizards, scorpions and cockroaches, we may be sure there were other eyes than theirs to mark its beauty of coloring and grace of form; at least it looks so much like our now-a-day flowers, that we cannot refrain from conjecturing that its petals were often brushed by the wings of the wandering bee as he came, attracted by its fragrance, to sip the honey it distilled.

Man. Beginning at this point and continuing to the end on p. 53. This is identical with the article in Annals of Science Vol. II. (1854) No. 1, p. 4. title "New Species of Fossil Plants"

When we take into consideration the unusual circumstances which must attend the fossilization in any thing like a perfect form, of any of the flowers of the present day, we need not be surprised that they are rarely found preserved in the rocks of the different geological epochs; and we have no reason to infer from the scarcity of the remains of objects so delicate and perishable, that the flora of the ancient world was barren and uninteresting.

Although preserved with great distinctness and beauty, it is quite impossible to determine, with certainty, the number and character of the floral envelopes in this unique fossil, or its precise place in the vegetable kingdom. At first sight it resembles one of the *Compositae*, with an imbricated involucre and a few ray florets, and such is especially the appearance of the flower when compressed so as to present a discoid expansion of its parts; but this resemblance is so vague and general that it affords no very strong ground for supposing that the order of the *Compositae* dated from so very remote an epoch. It resembles, perhaps, as much some of the *Yuccas* or *Bromelias*, and in their vicinity I should be disposed to place it.

I have found this fossil only in one locality in Mahoning county, associated with Figs. 2-3, and enveloped in great quantities of the leaves and stems of *Næggerathia*. So intimate and exclusive is the companionship of these fossils, that I have been led to suspect them to be but parts of the same plant. If this were true, we should have a stem resembling in its external markings the stem of the *Yuccas*, but with a different internal structure; leaves having somewhat the form, and almost precisely the nervation of the same family, to which would belong appropriate flowers; an *ensemble* which would be closely allied to the *Lilliaceæ* among living plants, and yet separated from this order by the anatomical structure of the stem.

Fig. 2 represents a portion of a spike of seed-vessels found associated with Fig. 1, and which may possibly have been the female flowers of the same plant; the detached capsules would be included in the genus *Cardiocarpon*.

Fig. 3. A different species of Fig. 2, or the same at a different stage of maturity. Its resemblance to *Antholithes Pitcairniae* (L. & H., Tab. 32,) will strike every one; indeed it only differs from the figure of Lindley & Hutton in the absence of the long awn-like appendages which form so striking a feature in *A. Pitcairniae*.

All these fossils are found associated with the lowest stratum of coal in the coal basin of Ohio.

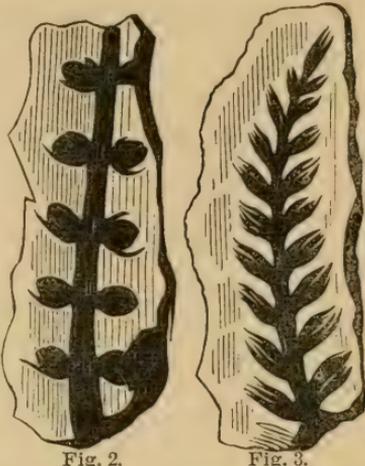


Fig. 2.

Fig. 3.

NEW LOCALITY OF LIMNEA MEGASOMA OF SAY.

BY PROF. J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, November 21, 1853.

By the kindness of J. A. Floom, M. D., of Stark county, Ohio, I am enabled to lay before the society a fine specimen of this rare shell, obtained by him "in lagoons along the Mahoning river, near Alliance," in the aforementioned county. This shell has never before been observed in this State, and has only been met with in some small lakes south of Lake Superior, and in a swamp near Burlington, Vermont.

[By an oversight, a part of the following record is out of its order as to date.]

CLEVELAND, February 6, 1853.

At an adjourned meeting of the members of the Academy of Natural Science, held at Dr. Kirtland's room, Medical College, February 6th, at 7 o'clock, P. M., the following gentlemen were present: J. P. Kirtland, William Case, Benjamin A. Stanard, J. S. Newberry, Samuel St. John, W. Beattie, J. J. Delamater, H. L. Smith, R. K. Winslow and R. C. Hopkins, Dr. J. P. Kirtland in the chair and William Case Secretary.

On motion of Dr. St. John it was resolved to ballot for officers for the ensuing year, whereupon the following gentlemen were duly elected:

President—JARED P. KIRTLAND, M. D.
First Vice President—WILLIAM CASE,
Second Vice President—J. J. DELAMATER,
Third Vice President—J. S. NEWBERRY.

Curators:

| | |
|--------------------------|----------------------|
| JARED P. KIRTLAND, M. D. | HAMILTON L. SMITH, |
| SAMUEL ST. JOHN, | RUFUS K. WINSLOW, |
| J. LANG CASSELS, | WILLIAM CASE, |
| J. S. NEWBERRY, | BERJAMIN A. STANARD. |

Corresponding Secretary—SAMUEL ST. JOHN.
Recording Secretary—RUFUS K. WINSLOW.
Treasurer—W. D. BEATTIE.

On motion, it was resolved that a committee of five, to be nominated by the chair, be appointed to arrange the Museum, whereupon Messrs. Winslow, St. John, Newberry, Stanard and Cassels were appointed said committee.

It was also resolved that the committee have discretionary power to dispose of the sofas and other unnecessary articles of the Museum.

Resolved, That an assessment of one dollar be made upon each resident member, for the purpose of preparing the cabinets, in anticipation of the visit of the Scientific Association to this city, in August next, also to procure suitable cases for the proposed donation from the Hon. William Case.

Resolved, That the Academy hold monthly meetings for the promotion of scientific subjects, said monthly meetings to be held on the first Wednesday of each month.

On motion the meeting adjourned to the first Wednesday in March, at 7 o'clock, P. M.

R. K. WINSLOW, *Sec'y*.

REGULAR MEETING, December 20, 1853.

A specimen of *Sorex*, supposed to be the *S. Parvus* of Say, was presented by Dr. Kirtland, and a committee appointed to report on the same.

A committee was appointed to collect facts respecting the oviparous generation of certain Lake Fishes.

Upon this topic an interesting discussion ensued, eliciting some facts which were quite novel, and deemed worthy of further investigation.

Dr. J. S. Newberry presented a new species of *Psaronius*, *P. Andrewsii*, from Ohio.

R. K. WINSLOW, *Sec'y*.

CLEVELAND, December 27, 1853.

The Society met in the lower lecture room of the Medical College, where a lecture was delivered by Prof. Kirtland on the *Migration of Birds*.

After the lecture the Society adjourned to Dr. Kirtland's room, for the purpose of holding the annual election of

officers, which resulted in the choice of the following gentlemen for the ensuing year.

President—Prof. J. P. KIRTLAND,
First Vice President—Dr. T. GARLICK,
Second Vice President—Dr. J. LANG CASSELS,
Third Vice President—RUFUS K. WINSLOW.

Curators:

| | |
|-----------------------|----------------------|
| Prof. J. P. KIRTLAND, | Prof. JEHU BRAINERD, |
| “ SAMUEL ST. JOHN, | R. K. WINSLOW, |
| “ J. LANG CASSELS, | Hon. WILLIAM CASE, |
| “ H. L. SMITH, | B. A. STANARD. |

Recording Secretary—Dr. J. S. NEWBERRY.
Corresponding Secretary—H. L. SMITH.

The Corresponding Secretary presented, in behalf of the author, a work on Tricology, by P. K. Brown, Esq., of Philadelphia, which was referred to a committee for examination.

An Achromatic Microscope, made by Mr. T. Wall, of Cleveland, was exhibited to the Academy, and a committee appointed to report thereon.

CLEVELAND, January 3, 1854.

The minutes of last meeting were read and approved. A verbal report was presented by Dr. Garlick on the viviparous habits of certain fishes. Dr. Ackley stated the rattlesnake to be viviparous, as well as the trout and muscalonge.

The following gentlemen were elected Corresponding Members of the Society:

| | |
|----------------------------|-------------------|
| Dr. J. W. Burnet, - - - - | Boston, Mass. |
| “ J. L. Leconte, - - - - | Philadelphia, Pa. |
| “ P. R. Hoy, - - - - | Racine, Wis. |
| “ R. W. Gibbes, - - - - | |
| “ John A. Warder, - - - - | Cincinnati, O. |
| Prof. S. F. Baird, - - - - | Washington, D. C. |
| “ J. L. Smith, - - - - | Louisville, Ky. |

Prof. Charles Girard, - - - Washington, D. C.

“ S. S. Haldeman, - - - - -

W. C. Redfield, Esq., - - - - - New York.

The Society adjourned to attend a Soiree Microscopique, given by Dr. Goadby.

REGULAR MEETING, January 17, 1854.

The committee on the *Sorex* reported that they had compared it with the description of *S. Parvus*, Say; and found no discrepancies between the specimen and description which would warrant them in referring it to a different species. They are therefore disposed to regard it as the *S. Parvus*, Say, with which there is reason to suspect *S. Cinereous*, Bach., to be identical.

Dr. Kirtland presented a new species of *Alburnus*, *A. Nitidus*, described below. Also the continuation of his Catalogue of the Diurnal Lepidoptera of Ohio.

Prof. Cassels presented a paper on three species of the genus *Hypnum*.

Dr. Garlick presented a short report on viviparous generation of Lake Fishes.

A lecture was delivered by Prof. Jehu Brainerd, on the *Ocean, its Origin and Phenomena*, of which a synopsis will be found below.

THE OCEAN—ITS ORIGIN AND PHENOMENA.

BY PROF. JEHU BRAINERD.

Synopsis of a Lecture before the Cleveland Academy of Natural Science.

The lecturer first noticed some of the theories respecting the original condition of our planet. The most plausible one, in his opinion, was that which presents the earth, in its original condition, before the formation of a solid crust, in a state of fusion or incandescence from heat; that it had been shown by Sir Isaac Newton, and others, that a fluid mass,

possessing the density of the earth, and having the same velocity of rotation upon its axis, would, according to the laws of gravity and motion, assume exactly the spheroidal figure that the earth is known to possess—that is, an equatorial diameter greater than the polar by about twenty-six miles.

He said that facts in geology strongly corroborated this position. The central nucleus of the crust of the earth is composed of igneous, unstratified rock, the evident result of the cooling of this molten mass of matter, of which the granite rock is composed.

The granite rock is of universal occurrence; there is no place on the surface of the globe where it could not be found by penetrating to a sufficient depth. This was not true of any other form of rock entering into the formation of the crust of the earth.

As a further evidence of the igneous character of the granite, it was stated that a piece of granite rock might be placed in a crucible and subjected to a degree of heat sufficient to render it fluid, and then suffered to cool under pressure, that its texture and general appearance would in no way be changed—it would still be granite, and possess all the characteristics of that rock. This could not be said of any of the stratified rocks—their whole structure and appearance would be entirely changed.

The legitimate inference to be drawn from this fact he considered to be, that there was a time in the history of our planet that no other rock existed but the granite, and that this was in a state of fusion, or in a liquid state, from heat, like melted iron.

This position is further shown from the present condition of our globe.

By the most careful investigation by Humboldt, and other eminent men, it has been ascertained that there is a line of equal and unvarying temperature, (49°F.,) in all

parts of the earth's crust, from the equator to the poles, ranging in depth from sixty feet to one hundred feet below the surface, which temperature remains constant, neither increasing or diminishing, from which fact it is inferred that there is no further *decrease* of temperature from radiation—nor *increase* from the influence of the solar rays.

If we pass below this line of unvarying temperature, an increase of heat is everywhere observed, amounting to about one degree of Fahrenheit for every forty-five feet of descent—and which, at this ratio, would reach the boiling point of water at about fourteen thousand feet, and at a depth of about thirty-four miles a degree of heat sufficient to melt the most refractory substances known upon the surface of this planet.

The conclusions naturally drawn from these facts, and many others, of similar character, which might be cited, is, that the earth, in cooling from a state of fusion, would present a very rough and broken surface of granite, and which would, for many thousand years, possess a temperature above the boiling point of water; and, consequently there would be no decomposing agencies, such as now exist, to reduce the immense elevation of the primitive granite mountains, or to fill up the vallies with the accumulating detritus.

The surface of the moon, at the present time, presents an appearance similar to what is supposed to have existed upon the earth previous to the formation of the Ocean.

These vast inequalities in the surface of the globe at first contained no water.

But how were they filled? How was the Ocean formed? He did not agree with the published theories that the Ocean was created a homogeneous mass of salt water. This view, he considered, was not in accordance with the operations of Nature, in other departments, where her creative energies were called into action by the great architect of the universe.

According to this view, how, then, was the Ocean formed? The elements of which water is composed, certainly must have existed at this epoch, either in their simplest forms, as Hydrogen and Oxygen, or in the condition of steam or vapor—which, in the latter case, would have surrounded the earth with a dense cloud, excluding even the light of the sun.

This, he believed, was the true state of the case. The continual condensation of this aqueous vapor, would cause an incessant fall of rain upon the heated surface of the granite rock. Decomposition would ensue, and the saline properties of the rocks would be held in solution in the accumulating waters.

Pure water, that which is formed by the condensation of vapor or steam, is eminently neutral in its qualities; it is neither saline, alkaline or acid—but is, nevertheless, the most universal and powerful solvent known.

Rain water, when unimpregnated with gases from the atmosphere, is of the purest quality; and, had it not been for its solvent properties, the waters of the Primitive Ocean would have been as pure as the purest spring that flows from its pebbly fountain.

Mr. Brainerd here alluded to the quantity of water that had accumulated upon the earth, covering, as it does, nearly three-fourths of its surface—and, if spread equally over the whole, would form a universal ocean not less than three thousand feet in depth.

In this connection, the inequalities of surface, both of the continents and the bed of the Ocean, were noticed, and the effect that evaporation has upon the saline properties of the waters of several inland seas and lakes.

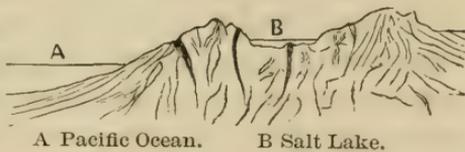
It has been ascertained that the surface of the water in the Dead Sea was more than *one thousand three hundred feet* below the level of the Atlantic. Mr. B. stated that the cause of this difference was due to an excess of evaporation,

and, as a natural consequence, these waters had become very highly charged with saline matter, containing about 26 per cent., whereas the waters of the Atlantic contain only about 4 per cent.

Should the annual fall of rain, in that region, exceed the evaporation, the area of the Dead Sea would be continually increased and the saltness of the water decreased, until finally they would become fresh and cover the whole of the country now below the Atlantic surface.

He stated that another example of a similar character was found in our own country, in the case of the Great Salt Lake. This extensive body of water is elevated about twelve hundred feet above the Pacific—surrounded on all sides by primitive mountains and having no outlet or communication with the Ocean. It is fed by numerous streams from the surrounding mountainous country, and still the waters, in the dry season, contain saline properties even to saturation, and is the strongest salt water known upon the globe. The cause of this is the excess of evaporation.

The accompanying diagram shows the relative situation of the Great Salt Lake with the surrounding country.



The Desert of Sahara presents the phenomena of the entire disappearance of an inland sea or lake, many parts of its surface being actually below the Atlantic, but still containing no water.

On the other hand, should the quantity of rain in the district of the great western lakes be, from any cause, diminished, so that the evaporation would exceed the supply, these vast bodies of fresh water would first become salt, and then finally disappear, leaving their dry beds many feet below the surface of the ocean.

Mr. B. here went into a definite statement relative to the area covered by Lakes Superior, Michigan, Huron and Erie, from which it appeared that those named covered an area of more than 87,000 square miles. That the hand of nature had, in this extent of country, afforded the means of measuring, with a good degree of accuracy, the amount of evaporation as compared with the annual fall of rain.

He stated that from numerous observations, continued through a series of years, in various parts of this district, the annual fall of rain had been carefully noted, and was shown to amount to about forty vertical inches. The position of the Falls of Niagara, the uniformity of the depth and velocity of the stream, afforded very reliable means for determining the quantity of water annually discharged, and which, from careful calculation, has been shown to be equal to fifteen vertical inches, spread over the whole area of 335,500 square miles of country drained, from which it would appear that nearly one half of the annual fall of rain is carried off by evaporation.

Mr. B. next took up the subject of the currents of the Ocean, and after briefly stating the causes as laid down in our popular works, took the position that the main cause is due to the law of inertia of matter. He illustrated his position by supposing the solid portions of the earth to present the perfect figure of a sphere, with no elevations or depressions, and covered with an equal depth of water upon all parts of its surface. In obedience to the law of inertia, this fluid covering would incline to remain in a state of rest, while the solid nucleus would turn within it, thus causing an apparent flow of water to the westward upon the equator. If land should occupy both the polar regions, this current would become more apparent, flowing westward with unobstructed and equal velocity along the shores of both continents. Should the land occupy the equatorial regions, we should then have two currents, one at the North and one at the South.

Should a barrier be interposed from pole to pole, dividing the earth into two hemispheres, there would be, from this cause alone, four oceanic currents, two in each hemisphere, two North of the equator and two South. The present configuration of land and ocean presents nearly such a barrier, and we have consequently four great oceanic currents, two South of the equator and two North, or the two great currents of the Atlantic and the two of the Pacific. Besides these we have a number of counter currents, or eddies, produced by local causes, and from which causes the main currents are somewhat modified.

It was shown that these main currents flowed westward upon the equator with equal uniform velocity, and that the return currents flowed eastward both North and South of this line.

He briefly alluded to the great Fucus Bank, or *Sargasso Sea*, in the North Atlantic, which covers an area of 260,000 square miles, and forms the center of this great whirlpool.

In the Pacific Ocean, the currents are somewhat impeded by the numerous islands that occupy the equatorial regions, and we hence find that the westward current spreads out over about 22° of North and South latitude, or about 3000 miles in width.

The effect of these currents upon the climate in various parts of the earth was noticed at some length, and in this connection what are termed the drift currents, that convey the icebergs from both the polar regions towards the equator.

The phenomena of difference in the level of the Atlantic and Pacific Oceans, in the Bay of Panama and on the East side of the Isthmus, were briefly considered.

There appears to be an apparent anomaly in nature in this case, for, according to the laws of inertia and motion,

the water in the Atlantic, upon the East side of the Isthmus, should be the highest, but the opposite is the fact, the Pacific being about twenty-seven feet above the former, but varying with the conditions of the wind and tide. Mr. Brainerd took the positions that the difference was due in part to the obstruction the islands in the Caribbean Sea offer to the flow of the water westward, and partly to the meeting of the North and South currents of the Pacific in the Bay of Panama, and the obstruction to their flow westward by the Gallipagos Islands.

ON THE VIVIPAROUS OR OVOVIVIPAROUS CHARACTER OF A SPECIES OF THE SALMONIDÆ.

BY THEODATUS GARLICK, M. D.

Read before the Cleveland Academy of Natural Science, January 17, 1854.

The recent discovery of viviparous fishes, as reported by Prof. Agassiz, has created such a lively interest in the minds of naturalists, that we may look for further discoveries of the same character at no distant period.

Very little is yet known of the process of reproduction in fishes, owing, perhaps, in a great measure, to the difficulties to be encountered in making observations, as the process is always accomplished under water, and by many species in deep water.

Before I read Prof. Agassiz's article, I had received information of so reliable a character as hardly to leave room for doubt on my mind, that we have viviparous fishes in Lake Superior.

I have made use of the term viviparous, but I would here remark that I am inclined to the opinion that they are ovoviviparous, and shall not be surprised to learn that the fishes described by Prof. Agassiz are of the same character.

The fishes to which I desire to direct the attention of the Academy belong to the Salmon family, but the species I am unable to designate.

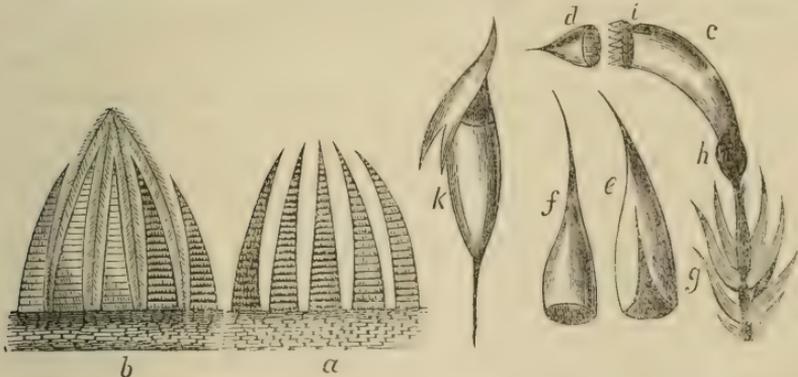
The Salmonidæ are generally believed to be oviparous, and this is certainly true of the *Salmo Salor*, the *Salmo Fontanalis*, and probably of most of the other species; it is equally true that many species of the Perch are also oviparous, and yet the fishes described by Prof. Agassiz belong to the Perch family.

It was too late in the season to procure a specimen when I received the information above, but I hope to be able to present some specimens before the close of the year, as I have ascertained their habitat, and the season of the year when the females are pregnant.

MOSESSE FOUND IN THE VICINITY OF CLEVELAND.

BY PROF. J. LANG CASSELS.

Read before the Cleveland Academy of Natural Science, January 17, 1853, and at Subsequent Meetings.



a Teeth of Single Peristome;—b Double Peristome;—c Capsule;—d Operculum
e Cucullate Calyptra;—f Mytreform Calyptra;—g Perichætil Leaves;—h Apophysis;—i Annulus of Capsule;—k Capsule with Calyptra attached.

I propose in this, and subsequent papers, to lay before the Academy a description, accompanied with figures, of the Mosses growing in the vicinity of Cleveland; avoiding

as much as possible technicalities, in order to facilitate the study of this interesting branch of botany, thereby rendering the investigation less repulsive and obscure in its detail.

In order the better to accomplish this object, it will be necessary to give a brief general description of some of the organs more intimately connected with their individuality, and explain some of the terms necessarily involved in their generic and specific descriptions.

The Mosses belong to that subdivision of botany called cryptogamic acrogenous plants, having a distinct axis of growth, and furnished with leaves of great regularity and beauty, more or less distinct and specific. In their habits of growth they are either erect or creeping, terrestrial or aquatic. They are destitute of a vascular system, being composed wholly of cellular tissue, with the coloring matter peculiar to vegetation, *chlorophyle*.

These low tufted plants are propagated by spores, or modified seeds, furnished by regular capsules or spore cases. These spores, in their development, partake more of the nature of buds than seeds proper, undergoing none of the chemical changes peculiar to the germination of seeds.

The reproductive organs of the Mosses, like those of the higher orders of plants, are of two kinds, termed *Antheridia*, or sterile flowers, and *Pistillidia*, or fertile flowers, and these may be either *monœcious* or *diœcious*.

The *Antheridia* consist of a number of small cylindrical or fusiform sacs, containing an infinite number of minute spheroidal bodies in a mucus-like fluid, which, at the proper time, are emitted from the apex of these sacs. Soon after this, their only office, they dry up and die.

The *Pistillidia*, or fertile flowers, consist of a number of urn-like bodies, growing at the end of pedicles, which, in their matured state, become the capsule or sporangium in which the spores are matured. Rarely more than one of

these pistillidia, in a single flower, arrives at maturity and becomes the ripened pistillidium or capsule.

The capsule, previous to its full development, is covered with a membranous-looking envelope called the *calyptra*. These capsules, each mounted on its pedicle as they emerge either from the axilla of a branch or as the termination of a stem, present the appearance of bristles, and are hence called *setæ*. The elongation of these, the reproductive cells, at their summits, expand into the capsule, while at the same time the calyptra, which previously enclosed it, is torn from its attachment at the base and pushed to the apex of the capsule, and there loosely rests like a hood or cap. When it separates entire, with no longitudinal rupture, it is said to be *mitreform*, or mitre shaped. When in its detachment from the capsule it becomes split a short distance on one side, it is said to be *cuculliform* or hood shaped.

This capsule generally opens by means of a lid called the *operculum*, in a few species, however, it opens by splitting into four valves. The operculum is connected with the capsule by a ring, more or less conspicuous, of elastic cells called the *annulus*. At maturity these cells detach the operculum from the capsule.

On the removal of the calyptra, the upper end of the capsule lid, or operculum, is exposed; this may be either convex, conical, or beaked, &c., and when ripe is readily removed from the capsule, fully exposing its mouth, which is beautifully fringed with a single or double circle of teeth-like processes called the *peristome*. The outer fringe consists of elongated processes called *teeth*, while the inner, when present, give the appearance of long filamentous *cilia*, or thread-like processes wove into net work. In some species the peristome is single, in others it stretches across the mouth of the capsule, while again in others the peristome is entirely absent.

The teeth of the outer peristome always occur in a regular geometrical ratio, being either four or some multiple of that figure; hence they are found to consist of four, sixteen, thirty-two or sixty-four. It is on this, with other peculiarities of the teeth, the generic distinctions of the Mosses are founded.

The center of the capsule is occupied by a continuation of the pedicle called an *axis* or *columella*, and the space between it and the sides of the capsule is filled with the spores, which, when fully ripe, are discharged into the atmosphere, floating with the vapor until they meet with a proper nidus, or nest, for their development and growth.

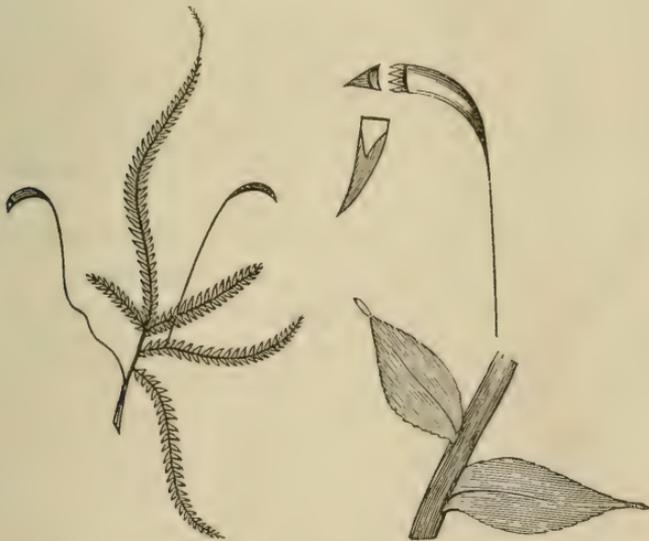
The office of the peristome seems to be the protection of the spores from the injurious effects of atmospheric changes, as it is exceedingly sensitive to hygrometric influences. When the air is dry and warm, with sunshine, the teeth may be seen standing out at right angles with the capsule, allowing the spores the full benefit of the sun's benign influence, at the same time displaying the beautiful and delicate texture of the inner peristome, but during cloudy or damp weather, the teeth close tightly over the mouth of the capsule so as to completely protect the spores from external injury.

Geographically the Mosses are diffused extensively, much more abundant, however, in the humid localities of the temperate and frigid zones.

The figures at the head of this article are illustrative of their botanical description.

In these descriptions I shall begin with the genus *Hypnum*, the species of which are both numerous and common. These plants are found in greatest abundance in damp and wet localities, attached to rotten logs, moist stones, roots of trees and occasionally on the ground in shaded places. They are all perennials, and are both monœcious and diœcious.

The genus *Hypnum* is a member of the natural order Hypnaciæ, and is characterized by its lateral fruit—i. e., growing from the side of the stem or branches—its smooth cuculiform calyptra, and its more or less nodding capsule. The capsule is *unequal*, being more convex on its upper side, thereby causing the mouth to be somewhat oblique. The peristome is double; the outer is composed of sixteen lanceolate reflexible teeth, the inner is a keeled membrane, the keels or ridges of which form sixteen processes, occupying the space between the outer teeth, and are connected with each other by this membrane, which forms intervening ciliolæ more or less capillary. The operculum or lid varies in form in different species from long beaked to hemispherical, constituting a valuable specific characteristic. The form of the cuculate calyptra corresponds with the operculum. The antheridia, or sterile flowers, are always axillary and generally in pairs.



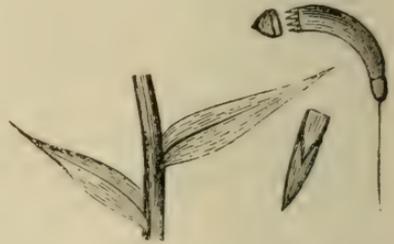
HYPNUM SYLVATICUM.

This plant grows in loose bright green mats, attached to grassy spots in swampy and springy localities, with flat,

tender stems and branches. Branches frondose, linear-lanceolate and tapering, with their points often rooting. The leaves are two ranked on the stem, ovoide-lanceolate and pointed, their points being slightly expanded, obscurely serrulate, and faintly nerved to near the middle, shining and slightly decurrent. Capsule oblong, erect-nodding, and striated, with a strong marked annulus. Lid long-conic and pointed; peristome white; teeth lanceolated; pedicles smooth, slender, and one and a half inches long, and often incurved, fruiting sparingly. Perigonial leaves ovate and obtusely pointed.



HYPNUM RIPARIUM.

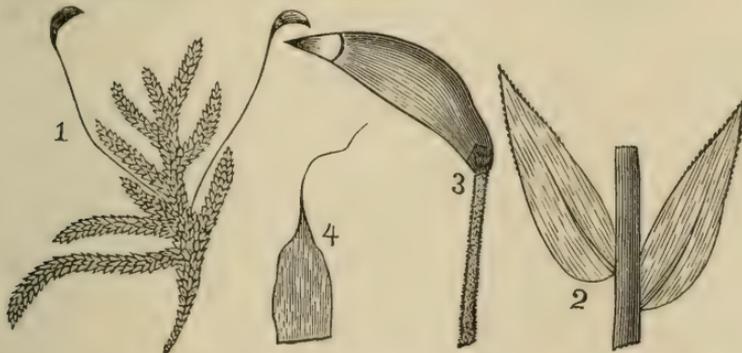


This species is found attached to rotten logs and loose stones in wet places, in loose, spreading patches, of a brownish green color. The plants are of very variable size; stems and branches generally large, irregular, open and subdivided. Leaves ovate-lanceolate, entire, long pointed, nerved half way and very transparent. They are distant from each other, and stand out nearly at right angles from the stem. Capsule nodding, oblong, with a distinct apophysis. Lid mammillate and obscurely conic. Pedicels smooth, slender and one inch long. Perichæatial leaves oblong, striate, entire, and apiculate; fruiting freely.



HYPNUM DEPLANATUM.

There are several points of resemblance between this species and the *sylvaticum*, but the stems are tougher, much more divided and rooting more freely, thereby furnishing a matting much closer, growing in dry shaded situations about the roots of trees. The whole plant has a shining yellowish green color. The stems and branches are flat, obtuse and short. The leaves are two-ranked and rather crowded, slightly decurrent, entire, nerveless, striate, ovate-lanceolate, obtusely pointed, with the point slightly turned to one side. Capsule short, scarcely nodding, being nearly horizontal. Lid short-conic and pointed; annulus small, and fruiting sparingly.



HYPNUM RUTABULUM.

1, Plant nat. size—2, Leaves—3, Capsule—4, Perichaetial Leaf.—Mag.

This beautiful, bright green, satin looking moss, is found growing on the ground, in wet springy localities. Its height is one and a half to two inches.

Stems and branches round, thickly covered with leaves. Branches irregular, both in length and position, having their extremities plumous and shining.

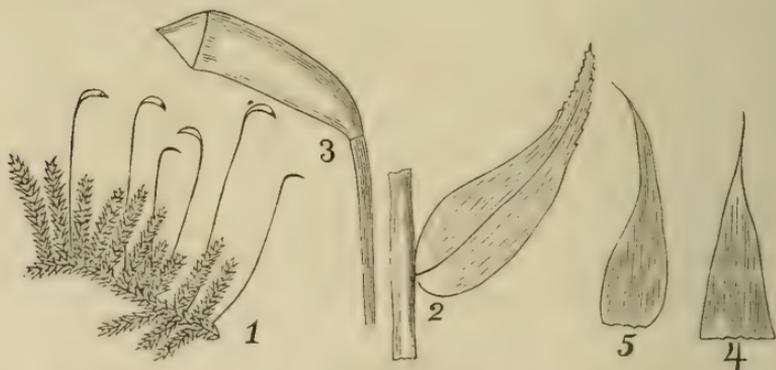
Leaves oblong-ovate, pointed, concave, nerved beyond the middle—the nerve strong near the base and slightly forked. The upper half serrulate. The whole leaf wavy-striate.

Capsule, ovoid and enlarged on the upper side, so as to present a gibbous form; slightly nodding; distinctly annulate, with a small apophysis. Lid long-conic and acute.

Pedicles one inch long, of a purple color, and granularly roughened their whole length.

Perichaetial leaves unevenly lance-awl, with the long, thread-like point obscurely toothed.

Fruiting freely.



HYPNUM SALEBROSUM.

1, Plant nat. size.—2, Leaf.—3, Capsule.—4, Perichaetial Leaf.—5, Perigonal Leaf.—Mag.

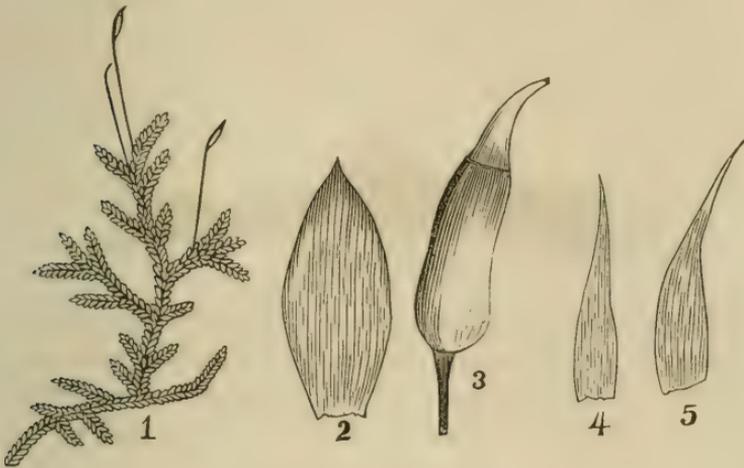
This is one of the most common and handsome species of the genus. It is a low, creeping plant, of a light, shining green color, attached generally to rotten logs, but often growing on the ground in wet places. The main stem is creeping, irregularly sending out short, ascending branches. The whole plant varies much in size in different localities. Generally the branches are very numerous, and about half an inch long, terete, plumose, and densely covered with leaves.

Leaves ovate, with a broad, somewhat concave base, long pointed, the point turned to one side; apex serrulate, nerved beyond the middle, with the margins sometimes slightly reflexed. Whole leaf shining, striate.

Capsule oblong, enlarged near the annulus, slightly nodding; annulus indistinct.

Pedicles one inch long, slender and smooth. Perichæatial leaves triangular, with a sharp apex. Perigonial leaves lanceolate, with a heart-shaped base.

Plant monœcious, and fruit very abundant.



HYPNUM CUSPIDATUM.

1, Plant nat. size—2, Leaf—3, Capsule—4, Perigonial Leaf—5, Perichæatial Leaf.—Mag.

This moss grows in wet, swampy situations, forming matings of a shining, bright green color on the surface, but brown and partially decayed below.

The main stem is somewhat creeping, and elongated by irregular innovations, forming angles at the junctions. These stems send off numerous short, flat, ascending, irregularly pinnate branches, the ends of which are slightly convolute and tapering.

Leaves appressed, ovate, short-pointed, entire, nerveless and striate.

Capsule nearly oblong, almost erect. Lid long-conic, bent, with a round, obtuse apex.

Pedicle half an inch long and smooth. Calyptra white, with a dark brown apex.

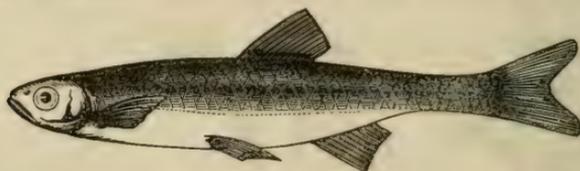
Perichæatial leaves lanceolate and long pointed. Peregonial leaves ovate lanceolate.

Plant monœcious, fruiting freely.

ALBURNUS NITIDUS.—(SILVERY MINNOW.)

BY PROF. J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, January 17, 1854.



FORM.—*Head*—Rounded; upper jaw obtuse; lower jaw the longer; mouth opens obliquely upward; eyes large, with the anterior margin extending forward above the angle of the mouth; nostrils double, the anterior orifice the larger.

BODY.—Elongate, compressed laterally. Tail rather acutely bilobate.

COLOR.—Upper surface of the head and back brown, thickly interspersed with an iridescence of golden green. Throat, abdomen and sides of the head and body a brilliant silvery luster, with a steel blue stripe extending from the base of the skull, above the pectoral fins, to the tail, where it expands before it terminates, and the lower margin of the stripe merges gradually into the silvery luster on the sides of the body.

Length 2 to $2\frac{1}{2}$ inches.

D. 9, P. 14, A. 11, C. $22\frac{2}{3}$.

Habitat, Rocky River, near Cleveland.

OBSERVATIONS.—On the 9th of October, and during the three succeeding days, of the last year, an immense shoal of this species of fish migrated from Lake Erie into the shallow and rapid water of the mouth of Rocky River. They crowded in compact masses along the margins of the stream, so as to occupy the water for at least eighteen inches from the shore. Several quarts could be taken by one sweep of the millinet butterfly catcher. The object of this movement was not apparent. Great numbers of Black Bass (*Grystes Faciatus*, Agass.,) collected about them and were actively engaged in capturing every individual who strayed from the main body into the deeper adjacent waters.

From the brief characters of the genus *Alburnus* of Heck., enumerated by Prof. Agassiz in his "Lake Superior," I am disposed to consider this as one of its species.

Before I had leisure to complete my descriptions, not only the color of the specimens was destroyed by the alcohol in which they were immersed, but the texture of the fins was broken down so much as to render the number of their rays, in some instances, uncertain.

CLEVELAND, January 31, 1854.

Dr. Garlick exhibited specimens of the ova of the Trout, artificially impregnated, in which the young fish were seen in various stages of development.

The Secretary presented a paper by H. K. Brown, Esq., which was referred to a special committee.

Dr. Ackley presented some further remarks in relation to the Rattlesnake.

Prof. St. John presented a letter from Mr. Morris Miller, on some Drift phenomena, which was referred to a special committee.

FEBRUARY 7, 1854.

The committee to which was referred the letter of Mr. Morris Miller recommended its publication.

Prof. Smith exhibited specimens of *Tænia*. The head was exhibited under the microscope, showing the four bothrya and the hooklets.

Prof. Kirtland read a revision of the species *Esox*, inhabiting Lake Erie and its tributaries, with descriptions of two new species, *E. umbrosus*, Kirt., from Rocky River, and *E. Ohioensis*, Kirt., from the Mahoning.

Dr. Garlick exhibited *casts* of two species of *Esox*, and gave the Society a description of his mode of taking casts of fishes.

Dr. Newberry exhibited specimens of a new *Sigillaria*, from Marietta, O.

Mr. George Smith exhibited specimens of *Cypris*, which had been sent from Cincinnati as a *Cyclas*. Referred to a special committee.

On motion of Dr. Kirtland it was

Resolved, That an annual tax of one dollar shall be levied on each resident member of the Society; that the Secretary employ some person to collect this tax. That all the members who refuse to pay this tax, when called on by the authorized agent of the Society, shall forfeit their membership, and their names be struck from the roll of the Society.

NOTE ON THE VEGETATION OF THE DRIFT.

BY J. S. NEWBERRY.

Read before the Cleveland Academy of Natural Science, February 7, 1854.

The fact mentioned in the following interesting letter of Mr. Miller, is but one of many instances which have come to my knowledge, of the discovery of vegetable matter in the Drift.

In the excavations which have been made for the Marine Hospital, and for other purposes in this city, and in wells dug in different parts of Northern Ohio, fragments of wood, of greater or less size, have frequently been brought to light.

Of these fragments, such as have been brought under my observation, have been nearly all of one character, being rolled and broken pieces of the trunks of trees, of moderate dimensions, and which usually exhibit, under the microscope, the structure of the wood of the *Coniferae*.

Occasionally, the entire trunk has been found, as in the case mentioned by Mr. Miller; but, in these cases, the branches and roots are always broken off, the trunk nearly or quite denuded of bark, and its whole appearance showing that the tree has been uprooted from its place of growth and born along by a current of water, associated with other hard substances, by which it was for a long time triturated and worn.

The most interesting of these remains of the Drift Vegetation, which I have seen, was presented to me by Col. Charles Whittlesey, who has so carefully studied the phenomena of the Drift in the Western States.

This is a *cone*, in which the general appearance and the internal structure are well preserved and distinctly visible. It was obtained from a drift deposit some thirty-five feet below the surface, near the mouth of Yellow Creek, Columbiana county, Ohio, (not far from the locality mentioned by Mr. Miller,) where it was associated with a large quantity of vegetable remains, and with the jaw of an extinct tapir-oid animal.

This cone is cylindrical, about four inches long, and evidently once belonged to a species of *Abies*, indeed, it closely resembles the cone of the Balsam Fir—*A. balsamea*—which now grows nowhere spontaneously in Ohio, being emphatically a Northern plant.

But I do not propose now to give a detailed description of the facts or specimens which I have collected relating to the vegetation of the Drift period. At another time I shall

hope to do this—but, at present, would only call the attention of collectors to the interest which attaches itself to these specimens, specimens which, if carefully preserved and properly studied, will probably greatly aid us in giving a satisfactory solution of the troublesome problem of the deposition of the Drift; for, although the mineral materials of the Drift may, in many instances, indicate the character of the *rocky basis* of the country swept by the Drift current, of its plants and animals, and hence of its topography and climate, we have, up to the present time, but the most limited knowledge.

My observations have led me to regard the accumulations of Drift materials, in circumstances similar to that described by Mr. Miller, to a Neptunian rather than to a Plutonic agency.

I have regarded them as collections of transported material—often transported from immense distances—which, swept along the ocean bottom, found appropriate resting places in the ravines and excavations made, either by the Drift current itself, or by ancient water courses, as I have failed to find satisfactory evidence of Plutonic disturbances of the coal strata of Ohio, in any of the localities which I have examined, except in a few rare instances, where the disturbances are very slight. Our vallies are almost universally vallies of denudation, and our ravines and gorges, perhaps without exception, due to the action of water. These erosions of the rocky strata are not unfrequently met with in the exploitation of coal mines, probably for the double reason that the coal, at its outcrop, would, from its softness, be so readily excavated by running water, and we penetrate and explore the sub-stratum of this region almost for nothing else than coal.

EXTRACT FROM MR. MILLER'S LETTER.

“A circumstance occurred in our neighborhood, about a month since, that called my attention particularly, and I have presumed to trouble thee with it.

“In opening a coal bank in this vicinity, the operator came to an abrupt terminus of the coal. Clay, coarse sand, and fragments of sandstone, edgewise and in every position, some sticks, and what appeared to be sections of grape vines, till finally, about four feet from the coal, a spruce pine log* was laid bare, lying horizontally about midway between the top and bottom of the coal, and at right angles with the advance. It was about nine inches in diameter, and appeared to have been water-worn. Its branches were a little projecting, but had been broken off before deposited in this its long resting place. The coal was found again about ten feet from where it terminated.

“No timber is now found of that kind in less than five miles of the place, and then in very dissimilar situations.

“The great question is, how came the pine log in that situation? I gave my friend C. Whittlesey a more particular description, with the topography of the ground and its locality in relation to the drift district, and requested him to give his views, if so disposed, and direct them to thee, and I would do the same with mine.

“My conclusions are that it could not have been placed there by any other circumstance than that of a chasm having been opened by an earthquake, and the log, with other materials fallen in. The nature of the ground precludes the probability that a slip or land slide could have occurred—and, to strengthen my position, this locality is in the immediate vicinity of the southern limit of the drift district, which leaves the marks of having been an ancient sea coast, which has been ruptured, in all probability, by earthquakes. I have found in those capacious water gaps the dislocation of strata and separation of rocks that could not have been effected by any other now known cause.

“Another circumstance: In the bluffs adjoining those water gaps, the coal is rarely worth mining, having been

* A portion of this log is now, 1874, in the Historical Museum, donated by Mr. Miller.

pulverized and exposed to the water from above it, hence our best coal is generally obtained up small streams that are more retired from these apparent scenes of disturbance.

"I have, in my cabinet, preserved good specimens of the piece, that can be seen at any time—or, if any one wishes, I could send them some, by being informed where to direct them.

"Very respectfully thine.

Hanover, Col. Co., O.

"MORRIS MILLER."

ANALYSIS OF OHIO COALS.

BY DR. J. S. NEWBERRY.

Read before the Cleveland Academy of Natural Science.

No. 1.—Mahoning Valley Coal.

Remarkably compact, coming from the mine in large tabular masses. Color, dull bluish black in the mass; freshly broken surface of a brilliant resinous lustre—fracture splintery and rough. Specific gravity, 1.2695.

| | | | |
|------------------------------|---|---|----------------|
| Chemical Composition—Carbon, | - | - | 61.244 |
| Bitumen, | - | - | 35.966 |
| Ashes, | - | - | 2.790 |
| Total, | - | - | <u>100.000</u> |

Economical Value.—This coal is unequalled in its adaptation to the manufacture of metals, and is successfully employed in the raw state to the reduction of ores by the hot blast.

Geological Position.—Lowest bed in the Ohio coal field, 50 to 75 feet above Conglomerate.

Specimens examined, from Youngstown and Mount Nebo, Mahoning county.

Thickness, 4 to 5 feet.

No. 2.—Tallmadge Coal.

Softer than the preceding variety, breaking into cubical fragments. Color, brilliant black, with some scales of silex and spangles of sulphuret of iron in the joints. Specific gravity, 1.264.

| | | | |
|------------------------------|---|---|----------------|
| Chemical Composition—Carbon, | - | - | 53.727 |
| Bitumen, | - | - | 43.713 |
| Ashes, | - | - | 2.560 |
| Total, | - | - | <u>100.000</u> |

Economical Value.—Adapted to the generation of steam, for household use and the production of gas. Extensively used, when coked, for the reduction and manufacture of metals.

Specimens taken from Upson's, Harris's and Newberry's mines, in Tallmadge, Summit county.

Geological position same as last.

Thickness, 4 to 5 feet.

No. 3.—Chippeway Coal.

Hardly to be distinguished in external character from the last, but more uniform in quality. Specific gravity, 1.265.

| | | | |
|------------------------------|---|---|----------------|
| Chemical Composition—Carbon, | - | - | 56.050 |
| Bitumen, | - | - | 40.890 |
| Ashes, | - | - | 3.060 |
| Total, | - | - | <u>100.000</u> |

Economical value, geological position and thickness same as last.

From Clinton, Stark county.

No. 4.—Bolivar Coal.

A bright, handsome variety, of a brilliant black, vitreous lustre, and cubical, sometimes conchoidal fracture. Hardness medium. Resembles best specimens Chippeway and

Tallmadge, but a little softer and more bituminous. Specific gravity, 1.283.

| | | | |
|------------------------------|---|---|----------------|
| Chemical Composition—Carbon, | - | - | 47.494 |
| Bitumen, | - | - | 49.776 |
| Ashes, | - | - | 2.730 |
| Total, | - | - | <u>100.000</u> |

Economical value, same as Tallmadge and Chippeway. From its highly bituminous character, it forms a peculiarly pleasant and cheerful fire in a grate, and with a careful exclusion of the sulphuret of iron which it contains, collected in easily separable masses, it would form a superior gas coal. The stratum from which it is derived is the third in the ascending series from the base of the productive coal measures.

From Dickinson's mine, Sandyville, on Sandy and Beaver Canal.

Thickness, 4 feet.

No. 5.—Fairview Coal.

Resembles the Mahoning Valley Coal in structure and purity, but softer and more brilliant, and having rarely scales of silex and sulphuret of iron in the joints. Specific gravity, 1.267.

| | | | |
|------------------------------|---|---|----------------|
| Chemical Composition—Carbon, | - | - | 57.341 |
| Bitumen, | - | - | 40.890 |
| Ashes, | - | - | 1.769 |
| Total, | - | - | <u>100.000</u> |

Economical Value.—A remarkably pure coal, and evidently well adapted to the manufacture of metals, as well as all other purposes for which mineral fuel is required.

Geological position the same as Chippeway and Tallmadge.

From the mine of Tod and Rhodes, Baughman township, Wayne county.

REVISION OF THE SPECIES BELONGING TO THE
 GENUS ESOX,
 INHABITING LAKE ERIE AND THE RIVER OHIO.

BY PROF. J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, February 7, 1854.

Much confusion prevails in regard to the species of this genus inhabiting the waters of the State of Ohio. As a portion of it has occurred from some of my publications it seems appropriate that I should attempt its correction.

Girard has divided this genus into two groups, which he thinks are distinguished by organic differences.

a. PIKES.—*Cheeks and opercular appendages smooth.*

b. PICKERELS.—*Cheeks and opercular appendages scaly.*

Our species at present definitely recognized are the following, to wit:

I. *ESOX NOBILIS.*—Thompson.

Thompson's Appendix to History of Vermont.

E. atro-maculata, Kirt., MSS.

E. estor, Kirt., description and figure, Vol. V., Boston Jour. Nat. Science.

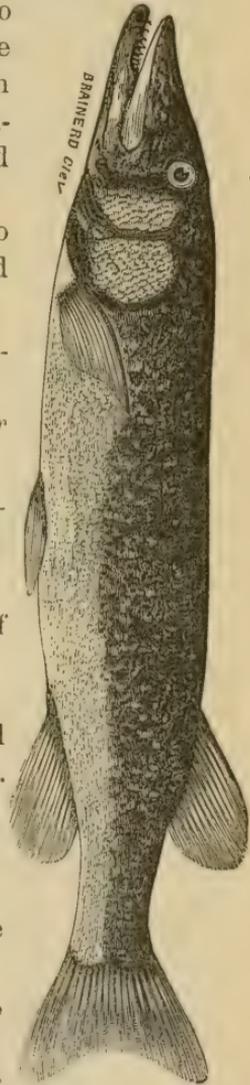
Muskallonge of the fishermen.

II. *ESOX ESTOR.*—Le Sueur.

Le Sueur, Jour. Acad. Nat. Science Phil., Vol. I.

E. reticulatus, Kirt., Boston Jour., Vol. IV., figure and description.

Muskallonge, Le Sueur and DeKay.
 Pike of the fishermen.



Esox Umbrosus.

I was led into a misapprehension in regard to the species intended to be embraced by Le Sueur under his name *Estor*, from his having applied to it the common name "*Muskallonge*," which no one else except Dr. DeKay ever employed in that connection. The *E. nobilis* is the *Muskallonge* and the *E. Estor* the *Pike* of our fishermen.

Having solved the mystery in reference to these points, and finding that Le Sueur's *E. reticulatus* was not an inhabitant of our waters, I prepared a description of the first named, under the specific appellation of "*atro-maculatus*," but subsequently learned that I had been anticipated by the Rev. Z. Thompson.

III. ESOX UMBROSUS.—Kirtland.

Form—Oval-elliptical, in its general contour.

Head—Obtuse.

Upper Jaw—Slightly concave between the tip and the forehead.

Lower Jaw—The longer, and prominent.

Body—Sub-cylindrical, slightly compressed on the sides, and full on the back.

Fins—Especially the caudal, short.

Color—Upper surface of the head brownish green, interspersed with lighter shades; sides of the body, lower jaw and gill covers, of a whitish ground color shaded with slight brown; fins dusky white, the caudal clouded with brown.

Length—Total, $11\frac{1}{4}$ inches; head $2\frac{7}{8}$.

Branchial rays 12, D. 13, P. 13, A. 12, V. 12, C. 13 5-6.

OBSERVATIONS.—This small species rarely attains a greater length than the specimen before us, which was taken in a small bayou of Rocky River, in Rockport. It belongs to Girard's group "*Pickerels*" of the esocidæ, the operculum and peroperculum being thickly set with minute scales. From DeKay's *E. fasciata* it differs in having no bands on its sides, as well as in the number of rays in the several fins. Like the *E. estor* it has a black vertical band extending from the pupil of the eye to the side of the lower jaw.

The three preceding species inhabit Lake Erie and some of its tributaries.

IV. *ESOX OHIOENSIS*.—Kirtland.

From a very perfect stucco cast and a dessicated head of a specimen taken in the Mahoning, a tributary of the Ohio river, it is evident that this species is distinct from any of the preceding. Its contour is more regular oval and elliptical than that of the *E. estor* and less regular than that of the *E. nobilis*. The head is rather small, fusiform and attenuated, and its vertical measurement through the eye proportionably less than in any other species. Caudal fin emarginate and falcate more acutely than the Estor. The color of the back, greenish brown; sides lighter, but shaded with brown; underneath white.

Total length 30 inches; head $7\frac{1}{2}$; vertical line through the eye, from frontal surface to bottom of lower jaw, $2\frac{3}{8}$ inches. This species sometimes attains $31\frac{1}{4}$ pounds weight.

CLEVELAND, February 14, 1854.

Society met and the minutes of the last meeting were read and approved.

Dr. Kirtland exhibited a specimen of the Oneida Mouse, *Arvicola Oneida*, DeKay, from Rockport. He also gave a description of a new species of Fox from Northern Ohio, which he called *Vulpes*.

Dr. Newberry exhibited specimens of *Cnemidophorus tigris*, B. & G., *Elgaria scincicorda*, B. & G., *Phrynosorna coronata*, Blainv., with some insects, minerals and tripoli from California.

Dr. Garlick read a paper on the Artificial Production of Fishes, which will be found below.

Robert L. Harris and Dr. J. H. Seymour were elected members of the society.

The Lecture was delivered by Prof. H. L. Smith, on the Microscope and its Revelations.

ON THE ARTIFICIAL REPRODUCTION OF FISHES.

BY THEODATUS GARLICK, M. D.

Read before the Cleveland Academy of Natural Science, February 14, 1854.

The successful experiments of Messrs. Remy and Gehin, of France, in the artificial reproduction of certain kinds of fishes, will, without doubt, be repeatedly made in this and other countries, and with the same satisfactory results.

The immense advantages resulting from this discovery, particularly in countries abounding with such a variety and extent of inland waters as our own, can hardly be estimated.

Early in the spring of last year, Prof. H. A. Ackley and myself determined to make the experiment of artificially breeding fishes. After some deliberation, we determined to select the speckled trout, (*Salmo fontinalis*,) for our first experiment. Accordingly, in the month of August last, I started for the Saut Ste. Marie, with the purpose of obtaining the parent fishes, while Prof. Ackley was preparing a suitable place for their reception, by building a dam across a very fine large spring of water on his farm, some two miles from this city.

There was no difficulty in capturing as many as I desired, but it was quite another kind of sport to transport them alive a distance of near six hundred miles. After various vexations, among which was the loss of the first shipment, we succeeded in getting down three lots, in all about one hundred and fifty, in fine condition, and lodged them safely in their new home, where they seemed as happy and as sportive as they were in the beautiful blue waters of Lake Superior.

In the month of September I made a trip to Port Stanley, Canada, for another lot, and succeeded in getting home about forty more specimens, constituting, certainly, a very fair beginning to our enterprise.

We did not, however, expect to rear any young fishes this season, for we supposed the vicissitudes they were

subjected to, such as their transportation, &c., would prevent them from depositing their eggs, but in this we were most agreeably disappointed, for on the 15th of November we discovered unmistakable evidences that they were about to engage in this interesting process.

Several male trout had proceeded up stream and commenced preparing the beds in which the eggs were to be deposited. This was done by removing all the sediment and sand from certain gravelly locations. These beds were about one foot in diameter, consisting of coarse and fine pebbles, the spaces or interstices between which were to be the future depository for the eggs. This peculiar construction of their beds, or nests, is highly essential to their preservation, as it protects them from being washed away by freshets, also from being devoured by small fishes, which are always prowling about seeking them for food.

The male trout, at this time, was very beautiful, being decked out in the most gaudy colors imaginable, and his actions showed clearly enough that he was quite vain of his personal appearance.

In the course of four or five days, the females made their appearance. They were not near so gaudy in their dress, but had a most staid and matronly look.

The next step was choosing their mates. After the usual amount of flattering attentions to the females, with which they seemed highly delighted, and some battles among the males, this important matter was settled apparently to the satisfaction of all parties. By what principles they were governed in making their selections I was unable to determine, but presume, in this respect, they are like men, governed more by fancy than judgment.

On the 20th of November they had fairly commenced operations, one pair of fish occupying each bed, the male manifesting the utmost jealousy, and if any suspicious interloper approached he was instantaneously attacked and driven off. On the 21st I captured a pair by means of a landing net and placed them in a bucket of water, and,

being provided with an earthen vessel, I made my first attempt at artificially spawning and impregnating the eggs. This was accomplished as follows:

I partially filled the earthen vessel with water, and taking the female in my left hand, and making gentle pressure on her abdomen with my right, the eggs were forced into the earthen vessel containing the water. The male was treated in precisely the same manner, forcing the spermatic fluid into the same vessel. The appearance of the eggs was almost immediately changed from their bright golden orange color to a pale transparent yellow. They were then placed in running water with the vessel containing them.

On the 9th of January one of the eggs was placed under one of Dr. Goadby's microscopes. (The Doctor was at that time giving a course of lectures in this city.) Its appearance delighted the company of scientific gentlemen present, as well as myself. The egg, which at first had been a simple cell, was now multiplied into a countless number of cells, of different sizes, with traces of blood vessels, the eyes also being perceptible.

On the 22d of January we examined them again, and to our joy we found a young fish which had just left its narrow place of confinement, to try its new mode of existence. It was very lively in its motions, but could not be considered an expert swimmer, owing to an appendage to its abdomen of nearly the size of the egg, which in fact it was, and contained the material for the further development of the yet very imperfect fish. This sack was filled with a multitude of minute cells, whose absorption keeps pace with the development of the fish. When the young fish leaves its egg, it measures about half an inch in length, neither the mouth, gills, nor any of the abdominal viscera are visible, all of which would be plainly discerned with the microscope, if they existed, owing to its almost perfect transparency. The heart, with the principal blood vessels, and even the corpuscles of blood, are beautifully shown

with a microscope of moderate power. Their external appearance is remarkable. The eyes are large and quite well developed; the pectoral fins are also in an advanced stage of development, and in constant and rapid motion, which, I think, in the more advanced stage of the fish, has something to do with its respiration, as they are placed near the opening of the gill covers. The other portions of the fish are quite rudimentary, no other fins being perceptible, but in their place there is an attenuated margin, or fin-like substance, as on the tail of the tadpole, commencing where the dorsal fin should be, and continuing uninterruptedly around the caudal and terminating with the anal fin, or rather where it should be.

This fin-like substance undergoes a constant change as the fish grows older. At fourteen days the dorsal, adipose, caudal and anal fins are plainly seen, but as yet none of them have rays, except the caudal, in which they are very distinct. The rays of the caudal fin are first apparent at the centre, although the general form of the rudimentary tail is very unsymmetrical, the superior lobe being the larger, and the outline not unlike that of the tails of many heterocercal fishes. At this age the fish has more than doubled its former length, the mouth, gills and abdominal viscera are visible, and it manifests a desire to take food by nibbling at the unhatched eggs and pieces of meat placed in the vessel containing them. Its color is now materially changed, being of darkish gray on its back and upper portions of its sides. The sack suspended from the abdomen at this time becomes smaller, and less globular in form, being more contracted anteriorly than posteriorly. The habits of the little creature are also much changed, as it now swims smartly and endeavors to hide whenever disturbed.

Owing to imperfections in our arrangements where we placed the eggs for hatching, accumulations of sediment buried them up, destroying them by hundreds. This accumulation was much more fatal when the embryo fish was

nearly ready to make its exit from the egg. To avoid their further destruction, on the 25th of January we brought the remaining eggs to our office, and placed them in a glass jar and supplied them and the young fish with fresh water daily. In this situation they have remained until the present time, the young fish making their appearance from day to day, the last one rupturing its oval envelope on the 10th day of February. I have seen as many as six make their appearance in as many minutes. The temperature of the water at the spring was 42° Fahrenheit. Since they were brought to the office the water in which they were kept has varied from 42° to 50°.

This experiment has afforded us one of the finest opportunities to be desired for the study of embryology, but professional duties have prevented us from making as minute observations as we could have wished. We have, however, repeatedly and distinctly seen the blood corpuscles in the returning veins enter the auricle of the heart and then pass into the ventricles, and from thence into the aorta. Altogether, it has afforded us one of the most pleasing and instructive lessons in the early stages of animal existence that we have ever had, and I hope that some person of more accurate powers of observation, and having more leisure, will avail himself of these facilities which are within the reach of every man, and give to the world a more extended statement of facts than I have been able to do.

Another fact, in which all are interested, has been clearly demonstrated. Every one who may be so fortunate as to possess a spring of water, of moderate size, can rear this charming fish in great numbers, and the streams that have been depopulated by the untiring zeal of the angler, can be replenished with a little trouble and at a small expense. Such streams as are not suitable to the trout, can be stocked with other choice varieties of fish with the same ease.

The number of eggs produced by a single female trout in one season, has been variously stated by different writers, but it is a moderate statement to say that it is many thou-

sands. A word to those who may wish to make the experiment and I have done.

The attempt should only be made when the eggs are mature. To be secure in this, it will be best for the beginner to take the parent fishes when they are engaged in depositing the eggs. After the eggs are forced into the vessel containing the water, they should be stirred about a little, the water poured off, and the vessel filled again before the spermatic fluid is added, after which the water should be a second time agitated, in order that it may come in contact with all the eggs; this is necessary to the impregnation of all of them. They should then be placed where they can have running water constantly passing over them. This may be done by having a series of boxes partly filled with coarse sand and gravel, each placed below the other in the form of a stairway, the water passing from the first box to the second and so on. It would also be well to have the bottoms of the boxes pierced with small holes in order to prevent the sediment from accumulating, which is very destructive to the eggs.

These general rules, if followed, will be sure to crown the effort with success.

CLEVELAND, February 21, 1854.

Society met and minutes of last meeting were read and approved.

Dr. Kirtland read an interesting letter from Agassiz on Fishes, and one from J. L. Comstock, of Lyme, Conn., on Birds.

Dr. Newberry read a letter from Prof. Baird on Viviparous Fishes, and exhibited cranium of common Beaver and *Castoroides Ohioensis*, also specimens of *Neuropteris* and *Cyclopteris* from the same plant.

J. S. NEWBERRY, *Sec'y.*

There not being a quorum present on February 28th or March 7th, the proceedings were necessarily laid over and the meetings adjourned.

REGULAR MEETING, March 14, 1854.

Dr. J. P. Kirtland in the chair.

Dr. Garlick read a letter from Mr. W. L. Brocker, of Celina, Mercer county, Ohio, respecting the disappearance and subsequent reappearance of "pike" in the Canal Reservoir of that county. Dr. Garlick was requested to make further inquiries on the subject and report to the Society.

Prof. Kirtland presented a letter from J. G. Anthony, Esq., of Cincinnati, requesting the Society to loan him certain species of *Melania* in the cabinet of the Society, to aid in completing a monograph of this genus. The Secretary was directed to forward them.

Prof. Brainerd made a verbal report to the Society relative to Mr. Renton's process of making wrought iron directly from the ore, and was requested to invite Mr. Renton to meet the Society at the next session.

Dr. Newberry presented a new species of *Cyclas*, from Drummond's Island, Lake Huron. Referred to a committee—Drs. Kirtland and Newberry and Prof. St. John.

The Secretary presented to the Society a number of fine specimens of *Limnea megasoma*, Say, contributed by Capt. B. A. Stanard. The thanks of the Society were returned to Capt. Stanard, and he was requested to attend the meetings of the Society.

The following gentlemen were elected Corresponding Members:

| | | | | |
|----------------------|---|---|---|--------------------|
| Prof. J. W. Foster, | - | - | - | Brimfield, Mass. |
| J. D. Whitney, Esq., | - | - | - | Northampton, Mass. |
| Prof. J. D. Dana, | - | - | - | New Haven, Conn. |
| J. G. Anthony, Esq., | - | - | - | Cincinnati, O. |
| C. A. Ely, Esq., | - | - | - | Elyria, O. |

| | | |
|-------------------------------|-------|--------------------|
| Rev. Charles Fox, | - - - | Trenton, Mich. |
| Prof. Benjamin Silliman, Jr., | - | New Haven, Conn. |
| C. Cobb, Esq., | - - - | Buffalo, N. Y. |
| Hon. E. Lane, | - - - | Sandusky City, O. |
| Dr. E. S. Lane, | - - - | Sandusky City, O. |
| Prof. James Hall, | - - - | Albany, N. Y. |
| Prof. E. B. Andrews, | - - - | Marietta, O. |
| L. V. Bierce, Esq., | - - - | Akron, O. |
| E. N. Sill, Esq., | - - - | Cuyahoga Falls, O. |
| Prof. J. M. Safford, | - - - | Lebanon, Tenn. |
| Dr. Henry King, | - - - | St. Louis, Mo. |
| Dr. George Engleman, | - - - | St. Louis, Mo. |
| Prof. Abraham Sager, | - - - | Ann Arbor, Mich. |
| Dr. C. L. Clark, | - - - | Flint, Mich. |
| Dr. J. G. Norwood, | - - - | New Harmony, Ind. |
| Matthew C. Reed, Esq., | - - - | Hudson, O. |

A committee of three, Messrs. Winslow, Smith and Garlick, were appointed to examine the cabinets and superintend certain necessary repairs.

Messrs. Newberry, Brainerd and Smith were appointed a committee to prepare a diploma.

CLEVELAND, March 21, 1854.

Prof. Kirtland reported the shell presented at a former meeting, sent from Cincinnati as a bivalve, to be the *Cypris Anodontoïdes*, Kirt., having been described from specimens obtained by himself and Dr. Garlick, in Mahoning county, O., some years since.

Mr. Joseph Renton presented a communication to the Society in reference to his process of obtaining wrought iron directly from the ore.

Dr. Kirtland presented specimens of *Percopsis*, from Rocky River, O.; also, specimens of the *Alburnus nitidus*; also a letter from I. A. Lapham, Esq., of Milwaukee, describing a new species of *Alburnus*, and one from Dr. T. W. Harris, of Cambridge, relative to the *Vanessa furcillata*, Say, of which we give an extract below.

Dr. Newberry presented the skull and certain bones and pottery of the mound builders, exhumed in Cleveland lately while grading near Pittsburgh street. A committee consisting of Dr. Newberry, Profs. Brainerd and Smith, were appointed to collect facts and report on the relics of the aboriginal race which have been found in the vicinity of Cleveland.

Dr. Newberry presented specimens of coal from West Virginia, remarkably compact and dense.

Prof. H. L. Smith presented a communication on the present arrangement of the days of the week, showing the coincidence of the Scandinavian, Grecian, Hindoo and Egyptian Mythology, and that the order was founded directly from observations on and in reference to the sidereal revolutions of the five planets, the moon and the sun.

The committee on diploma reported, and Messrs. Newberry, Brown and Atkinson were appointed a committee to procure the necessary engraving.

A committee, with instructions, was appointed to memorialize the Legislature, in reference to the bill now before them, for a Geological Survey.

Dr. A. S. Baldwin, of Shasta, California, was elected a Corresponding Member.

VANESSA FURCILLATA.

BY DR. THADDEUS W. HARRIS.

Extract of a Letter to Prof. Kirtland, Read before the Academy, and dated

CAMBRIDGE, March 15, 1854.

“I can supply you with information respecting the larva of *Vanessa furcillata*, Say, from my unpublished notes. First, let me observe that Dr. Leach misled me concerning the generical name of *Cynthia*, which he did not apply correctly. Fabricius gave it to a groupe containing our *Vanessa interrogationis* in one section, and the *cardui* in another section; but he restricted VANESSA to such species

as *Urtica*, *Atalanta*, &c. The name of CYNTHIA is now rejected, and the old Vanessians are divided into several genera, of which GRAPTA, Kirby, includes *interrogationis*, *C. album*, *coma*, *progne*, &c.; VANESSA includes *J. album*, *Milburti*, (*furcillata*, Say,) *Antiopa*; PYRAMEIS includes *Atalanta*, *Cardui*, and *Huntera*, and JUNONIA includes *Cænia*, &c.

“The *Vanessa furcillata* of Say is the *Milburti* previously described by Godart, in the *Encyclopedie Methodique*. The following remarks follow a specific description of it in my manuscript: ‘This showy butterfly is rare in the vicinity of Boston, but abundant in the northwestern part of Massachusetts and New Hampshire. It appears in May, and again in July and August. The caterpillars live together on the common nettle. They vary in color, some being much darker than others; generally, however, they are pale brown, minutely dotted with yellowish white, with a dark brown longitudinal line on the top of the back, a whitish one on each side just above the feet, and above this a row of brown spots. The head is small, black and rough, with little black and white tubercles. The spines on the body are blackish, short and with very small branches or lateral bristles. It measures, when fully grown, one inch and a quarter, or more, in length. The chrysalis is pale brown, with golden spots; the top of the head widely but not deeply notched, and the nose-like prominence very small.’

“I might have added to the foregoing that the caterpillars of *V. Milburti* do not conceal themselves each separately in a folded leaf like those of PYRAMEIS, *Atalanta*, *Cardui* and *Huntera*, but live exposed on the leaves and stems of the plant. Caterpillars of the first brood are found on the nettle in June and July; those of the second brood in August and September. The chrysalis state, from caterpillars of the second brood, seems to continue during the winter.

“In a collection of insects lately sent to Prof. Agassiz from Missouri, I saw fine specimens of your LYBITHA *Backmani*, and one or two each of APATURA *Clyton* and A.

Celtis. There were also several other insects that were new and interesting to me, among them a beautiful *CICINDELIA*, intermediate between the *marginata* and *blanda*, lately described under the name of *cuprascens*."

ALBURNUS ACUTUS—SHARP-TAILED MINNOW.

BY I. A. LAPHAM.

Read before the Cleveland Academy of Natural Science, March 21, 1854.

That part of the Milwaukee River extending to the first dam is usually filled with a small fish known by the universal name of minnow, and supposed by many to be the young of some larger species of fish. They are collected in large quantities and boiled for the sake of the abundant oil they afford, and sometimes they are used as food. They are found a few inches below the surface of the water, and always headed up the stream. Their number in this river can only be stated in millions.

This little fish belongs to the genus *Alburnus*, and I propose to call it *A. ACUTUS*, from the sharp pointed lobes of the caudal fin, by which, besides other important characteristics, it may be distinguished from *A. Rubellus*, Agassiz,* and from *A. nitidus*, Kirtland.† The general form and proportions of the fish are quite similar to those of the



two species referred to, but the head has a remarkable contraction above the upper lip, as

shown in the figure. Another peculiarity is the very numerous minute black dots scattered profusely over all the upper portions of the fish, being most numerous and crowded along the back, posterior to the dorsal fin.

Length $2\frac{3}{4}$ to $3\frac{3}{4}$ inches.

* Agass. Lake Superior, p. 364, pl. 3, figs. 1, 2 and 3.

† Annals of Science, vol. 2, p. 44.

REGULAR MEETING, March 28, 1854.

Prof. Kirtland in the chair.

The Committee on Geological Survey reported a memorial to the Legislature, which was accepted.

The committee to whom the *Cyclas* from Drummond's Island was referred reported it to be a new species.

A communication was read from L. Harper, Esq., of Mississippi, on the discovery of a new species of *Crioceras* in the Eocene strata of that State.

Prof. Kirtland presented three species of *Polygyra*.

A fine specimen of *Chlamyforus truncatus* was presented by Lieut. Phelps, through the Corresponding Secretary. A vote of thanks was returned to Lieut. Phelps for the gift.

Rev. Z. Thompson, of Vermont, was elected a Corresponding Member of the Academy.

APRIL 5, 1854.

Prof. Cassels in the Chair.

Prof. Brainerd presented the Academy a fine specimen of the Porcupine Fish, *Diodon hystrix*.

Prof. Smith gave a description of the process of taking photographic pictures by means of a collodion film, with specimens of the results of the process. Also, a new method of preparing paper, by which negatives may be made fully equal in effect to those taken on glass, and exhibited specimens of the same.

Dr. Newberry exhibited specimens of *Meerschbaum* from Illinois.

Mr. John Kirkpatrick was elected a member.

APRIL 12, 1854.

Dr. Garlick in the Chair.

A communication was made by Dr. Atkinson upon the want of a game law in the State, with an outline of a plan to protect our game and small birds from wanton destruction.

Dr. Garlick exhibited a cast of a *Muscalonge* which was taken in a seine near the Old River Bed. It is four feet and four inches in length, and thirty-four inches in circumference. The width of the flukes is eleven inches. It is a female, and the length of each oviduct is twenty-seven inches. A sucker, nearly digested, was found in its stomach, and the part remaining was thirteen inches long. The amount of eggs found weighed five pounds and eleven drachms. The number of eggs in a drachm is seven hundred and sixty-four, giving an average of nearly half a million of eggs.

Prof. Smith advanced a theory to account for the names of the days of the week, which certainly is very curious.

The Grecian, Hindoo and Scandinavian celebrate the same days of the week for the same Gods. Prof. Smith thought that the seven most important Gods had an hour devoted to each in succession. In the Teutonic mythology the seven most important are, the Sun; Friga, or Venus; Wodin, or Odin, the God of hunters; Moon; Saturn; Thor, or God of Thunder, and Tuis, or Mars, the God of War. Giving each an hour, beginning with the Sun, we find that the first hour of the second day would be devoted to the Moon, hence Monday would be the name of that day, and Tuis would have the first hour of the next day, &c., each day being named after the deity who presided over the first hour of it.

The committee on Diploma reported a form.

A committee of three was appointed to report a device for a Seal.

APRIL 17, 1854.

Dr. Newberry presented a specimen of the American Robin, *Turdus migratorius*, sent to the Academy by M. C. Reed, of Hudson, and which was nearly pure white in color.

Dr. Atkinson submitted a form of Memorial to the Legislature for the protection of game and small birds.

THE ALLEGHANY COAL FIELD.

BY COL. CHARLES WHITTLESEY.

Read before the Cleveland Academy of Natural Science, April 17, 1854.

The materials are not yet collected for exhibiting fully the *physical structure* of the great coal basin that occupies the western slopes of the Alleghany or Apalachian range of mountains.

The Geological Surveys, began in the four States of Ohio, Pennsylvania, Virginia and Kentucky, which embrace most of this field, have not been completed, but are all suspended or abandoned.

In regard to the number of its strata, their thickness and dip, the details are so numerous, that the labor of many men, many years, is yet necessary to complete them.

The published reports, made in those four States, give merely the results of first examinations or reconnoissances.

More is known of the dip, thickness and extent of the coal bearing rocks in Ohio than in the other States.

On a map, which is before me, the general outline of the basin is marked out with tolerable accuracy, from the reports alluded to.

The dip of the beds, local and general, is represented to the eye by arrows pointing inwards from the border, towards the centre of the basin, which is in Virginia, South of Wheeling. I intended to prepare from this a reduced map, and sections, so far as they can now be made, for publication in the *Annals of Science*. This is the best and only sufficient mode of representing rocky strata, but in this case it would require an expense not warranted, and I content myself with giving you such written descriptions as will show, in a dry way, the number of beds as now made public.

The coal bearing rocks lie in very thin beds, alternating frequently, as the sections here given will show, and there-

fore they are not easily traced from place to place, especially in the new and mountainous districts, where mines are not much worked.

I first present the measured and estimated *dip* of the rocks, beginning at the Pennsylvania line on the North, and proceeding East and South into Virginia. These are taken from the Pennsylvania and Virginia Reports.

Valley of the Alleghany River, (Tarentum,) S. S. West, 15 feet per mile.

Valley of the Monongahela, (Morgantown,) nearly West.

Valley of the Kanhawa, seven miles below the Falls, Northwest, 2° per mile.

This large dip on the Kanhawa does not hold good throughout the valley, being subject to deductions for local counter dip. Below Charlestown, Virginia, it is reversed, and rises towards the Northwest to the Western margin of the field, at the mouth of the little Scioto, in Ohio.

From thence I have obtained frequent measurements, by levels made along lines from one to ten miles in length, and in some cases forty miles, which give precise results. They are shown in the following table:

DIP OF THE COAL ROCKS IN OHIO, COMMENCING AT THE OHIO RIVER AND PROCEEDING NORTHWARD.

| | | |
|---------------------------------|----------------------------------|-------------|
| Coal Grove, - - - - | S. 57° East, 40 ft. per mile. | |
| Scioto Furnace, - - - - | S. 77° 30' East, | } Variable. |
| | 101 ft. per m. | |
| Scioto Furnace, - - - - | N. 62 $\frac{3}{4}$ ° East, 40 | } Variable. |
| | feet per mile. | |
| McConnellsville, Morgan, Co. O. | Southeast, 20 ft. per mile, | |
| | (Hildreth.) | |
| Zanesville, - - - - | S. 87° East, 47.8 ft. per m. | |
| New Philadelphia, - - - - | S. 86° " 9.9 " " | |
| Bolivar, - - - - | S. 72° " 25.2 " " | |
| Valley of Yellow Creek, - - | S. 49 $\frac{1}{4}$ ° " 39.7 " " | |

| | | | | |
|-----------------------------|---|------------------------------|--|--|
| Valley of Sandy Creek, - | } | S. 43° East, 36.1 ft. per m. | | |
| Sandyville to Rochester, - | | | | |
| Massillon, - - - - - | | S. 71° " 15.6 " " | | |
| Clinton, - - - - - | | S. 23½° " 9.10 " " | | |
| Summit County, - - - - | | S. 53½° " 8.5 " " | | |
| Valley of Mahoning River, - | | S. 12° " 20.6 " " | | |

This brings us to the Pennsylvania line, from which we set out, having traversed the entire horizon.

On the Alleghany River the plunge of the coal beds is South of Southwest. Farther South, from Laurel Hill to Morgantown, Va., the strata dip Westerly, and moving to the valley of the Kanhawa the line of dip veers round to the Northwest. Crossing the breadth of the field by passing down the Kanhawa, and down the Ohio River to near Portsmouth, Ohio, the rocks incline with regularity to the Southeast or East-Southeast.

Thence following the position of the places in the above table, Northerly and Easterly, the change in the dip to the South is uniform, till we reach the line of departure, where it approaches the meridian.

The Virginia geologists divided the coal rocks into the "upper and lower coal group, and upper and lower sandstone group."

After much study and examination, I am unable to take up those divisions where they are left on the Ohio River, in Virginia, and carry them through Ohio, so as to bring them together again in Pennsylvania and Virginia, on the East. This may be due to the want of *persistence* in the strata themselves. For instance: There is, on the Muskingum River, near its mouth, a heavy, "non-fossiliferous" mass of limestone, which appears to be the same group of calcareous beds that overlie the great Wheeling coal seam. There is, below the Muskingum beds, a seam of coal, but by no means as heavy as that at Wheeling. The Wheeling and Pittsburgh main beds are regarded as the same

stratum, and this is traced up the valley of the Monongahela to Brownsville.

Mr. Briggs, of the Virginia Survey, made a section of the rocks below this bed at Morgantown, to the base of the coal, the conglomerate of Laurel Hill. By comparing it, as given below, with the sections of the coal rocks in Ohio, opposite Wheeling, and below the same bed, to the conglomerate of the Western Reserve, the thickness of the mass, the number of coal seams, and the number of beds of limestone is entirely different.

This can only arise from a lack of persistence in the strata. In Ohio, the next prominent group of limestone strata, below the Wheeling mass, as it appears on the Muskingum, is called by Dr. Hildreth the "fossiliferous limestone." It crosses the Muskingum in Morgan county, just above McConnellsville. This has been traced nearly to the Ohio River, in Meigs county, and is beneath the Pomeroy coal seam.

Farther North, in Carroll and Columbiana counties, and in Pennsylvania, it has not been noticed—not so much, perhaps, because it does not exist, as because it has dwindled down to a thickness not distinguishable from the ordinary limestone beds of the coal series.

In Ohio, the silicious bed called Buhr Stone is very marked, and has been traced from the neighborhood of the river, in Gallia county, Northerly into Tuscarawas. A "Buhr," or black flint bed, is described by Prof. Rogers, in his sections on the Alleghany River, and by Mr. Briggs in his sections on the Kanhawa. Probably this siliceous stratum, or its equivalent, will be found to encircle the whole coal field; but at the points where it is cut by our present sections, the number and character of the beds just below it are by no means uniform.

Again, the sandstone mass, below the Pittsburgh seam, although it is recognizable where it crosses the Ohio, near Steubenville, and the Muskingum, below McConnellsville, is not recognized below the Pomeroy coal seam, where it

should be found if it maintained its separate existence and characters.

Every observation indicates a want of continuity in the coal bearing strata, the beds thinning out, and even disappearing, to be replaced by others, at different levels. This will be manifest, particularly in the coal beds themselves, as shown in the sections here given. They are placed in the same order as the statements of dip, but commence at the Ohio River, going Northward and Eastward into Pennsylvania, and thence Southerly into Virginia and to the Kanhawa valley. They are limited mainly to the "lower coal group."

No. I.

SECTION OF THE ROCKS FROM THE MOUTH OF LITTLE SCIOTO,
SOUTH 60° EAST, TO SYMMES' CREEK. DIP TWENTY FEET PER
MILE.

| | Feet. |
|---|-------|
| 1. Conglomerate, passing into sandstone. Its surface ninety feet above low water in the Ohio, and about the level of Lake Erie. | |
| 2. COAL, - - - - - | 2 |
| 3. Shale, - - - - - | 5 |
| 4. Coarse Grit, - - - - - | 50 |
| 5. Thin layers of <i>Iron Ore</i> and Coal, - - - - - | 1½ |
| 6. Coarse Grit, - - - - - | 80 |
| 7. <i>Limestone</i> —dark brown with fossils, - - - - - | 10 |
| 8. <i>Iron Ore</i> , ("Block Ore,") - - - - - | 1 |
| 9. Sandstone and Shales, embracing a thin seam of Coal and a bed of kidney ore, - - - - - | 90 |
| 10. <i>Limestone</i> —dark color, with fossils, - - - - - | 7 |
| 11. <i>Iron Ore</i> —calcareous, (thickness variable,) - - - - - | 2 |
| 12. Coarse Grit, - - - - - | 40 |
| 13. COAL, (thickness two to four feet,) - - - - - | 3 |
| 14. Grit, Shale and Pipe Clay, - - - - - | 40 |
| 15. COAL—six to twelve inches Shale in the middle, thickness variable, | 3½ |

| | Feet. |
|--|-------|
| 16. Grit—embracing twelve feet of Shale and kidneys of Iron Ore and a thin seam of Coal, - - - - | 90 |
| 17. <i>Iron Ore</i> —calcareous, - - - - | 1 |
| 18. Grit and Shales, embracing two layers of Iron Ore, also twenty inches of Coal at level of high water of the Ohio River, Symmes' Creek, 8 miles from mouth, | 120 |
| | 547 |

This appears to be near the base of the "lower Sandstone group," as defined on the opposite bank of the Ohio River, in Virginia, by Mr. Briggs.

No. II.

SECTION OF THE COAL ROCKS ON THE NATIONAL ROAD AND THE MUSKINGUM RIVER. FROM THE OHIO REPORTS.

| | Feet. |
|--|---------|
| 1. Conglomerate, surface at Brownsville, Ohio, two hundred feet above Lake Erie. | |
| 2. Sandstone and Shale, - - - - | 50 |
| 3. COAL—thickness variable, - - - - | 3 |
| 4. <i>Limestone</i> , - - - - | 2 |
| 5. Sandstone and Shale, - - - - | 130 |
| 6. <i>Limestone</i> , - - - - | 3 |
| 7. Sandstone, - - - - | 70 |
| 8. <i>Iron Ore</i> , thin, - - - - | } 5-263 |
| 9. Buhr Stone, two to six feet, - - - - | |
| 10. Grit, - - - - | 20 |
| 11. Shale, - - - - | 15 |
| 12. COAL, - - - - | 2 |
| 13. Sandstone—argillaceous, - - - - | 15 |
| 14. COAL, - - - - | 2 |
| 15. Shale, - - - - | 10 |
| 16. Grit, (Island Run, Muskingum River,) - - - - | 25 |
| 17. Shale, - - - - | 30 |
| 18. <i>Limestone</i> , with fossils, - - - - | 8 |
| 19. Black Shale, - - - - | 3 |
| 20. COAL, (Pomeroy bed,) - - - - | 5-398 |

| | Feet. |
|--|------------|
| 21. Iron Ore, - - - - - | 2 |
| 22. Coarse Grit, - - - - - | 50 |
| 23. Shales, red and calcareous, - - - - - | 50 |
| 24. Shales, blue, - - - - - | 8 |
| 25. Limestone, - - - - - | 6 |
| 26. Shale, compact, - - - - - | 3 |
| 27. COAL—McConnellsville, 250 feet above Muskingum River, probably the Wheeling coal seam, | 4-521 |
| 28. Bituminous Shale, - - - - - | 18 |
| 29. Lime rock—several members, - - - - - | 40 |
| 30. Calcareous Shales and Micaceous Sandstones, | 20 |
| 31. COAL, - - - - - | 1½ |
| 32. Coarse Grit, with carbonaceous matter and pebbles, - - - - - | -600 60 |
| 33. Sand rock, argillaceous, - - - - - | 20 |
| 34. Sandstone, fine grained, - - - - - | 25 |
| 35. Shale, ocherous, - - - - - | 4 |
| 36. Sandstone, micaceous, - - - - - | 40 |
| 37. Shale, red, - - - - - | 8 |
| 38. Sandstone, slaty—mouth of Muskingum River and level of Lake Erie, - - - - - | 80-837 |

The upper termination of my first section, at Symmes' Creek, is several hundred feet below the Pomeroy coal bed, which Dr. Hildreth traced to the Muskingum River, as No. 20 of this section.

At Pomeroy there is a bed of coal one hundred and twenty-three feet above that seam, which Dr. Hildreth traced across the Muskingum into Monroe county, and which is No. 31 of the above column, ninety-nine feet above the Pomeroy.

The Virginia Geologists found in the coal series two barren spaces of several hundred feet in thickness, destitute of coal seams, and composed principally of sandstone. These barren grounds constitute their "upper and lower Sandstone groups."

Between Steubenville and Wheeling lies the "lower Sandstone group," in that direction, and on the lower side

of the coal field, it comes to the Ohio between Big Sandy River and Pomeroy.

The strike of the strata, if we have it correctly, would carry this group below the Pomeroy bed. If we examine the section just given, measured by Dr. Hildreth and Mr. Foster, in the valley of the Muskingum, we find no prominent sandstone masses below the Pomeroy bed, on that river, nor between that and the McConnellsville seam. At Wheeling the great coal seam is *above* the "lower sandstone group," and is overlaid by heavy beds of limestone, and just above the McConnellsville coal seam we find, in Nos. 29 and 30, similar beds on the Muskingum. On these is a thin bed of coal. The coal of this space is meager, while at Wheeling it is very strong.

From this thin bed, No. 31, we have a space of two hundred and thirty-three feet in the upward section, extending to the Ohio River, and perhaps further, of *barren ground*, without limestone, iron ore or coal, and composed principally of sandstones. Is this the "upper sandstone group?" Where is the "lower sandstone group?" At Pittsburgh and Wheeling it is over three hundred feet thick. On the Muskingum the thickest bed is fifty feet. As there is no where else in the section a body of limestone at all resembling the Wheeling beds, above the main coal seam, we are almost compelled to call that the Wheeling seam.

On this supposition the lower sandstone group has diminished more than two-thirds in the distance of sixty miles, from Wheeling to the Muskingum. Moreover, there is not in any part of the last section a thickness of barren ground large enough to strike the attention, or such as to lead an explorer to found a sub-division, till we ascend *above* the great calcareous mass.

At Wheeling the calcareous beds are several hundred feet above the "lower sandstone group," and at Pomeroy this group is below the main coal seam. Can there be an arrangement into groups that will answer for the whole coal field?

No. III.

SECTION OF THE COAL ROCKS FROM THE CONGLOMERATE IN SUMMIT COUNTY, OHIO, ALONG THE OHIO CANAL, THE SANDY AND BEAVER CANAL, THE CLEVELAND & PITTSBURGH RAILROAD AND THE OHIO RIVER TO WHEELING, VIRGINIA.

| | Feet. |
|---|-------|
| 1. Conglomerate, Clinton, Ohio, surface four hundred feet above Lake Erie. | |
| 2. Bluish Shales and flaggy Sandstones, - - - - | 60 |
| 3. COAL, near Massillon, Ohio, - - - - | 4 |
| 4. Grits and Shales alternating, - - - - | 150 |
| 5. Blue Limestone, Bolivar and Zoar, - - - - | 3 |
| 6. Shale, brownish color. [At Shepley's, three miles North of Bolivar, is a bed of Coal in this Shale three feet thick, thirty-seven feet above the Limestone; two and a half miles South of Bolivar it is fifty eight feet above,] - - - - | 50 |
| 7. Grit, - - - - | 40 |
| 8. Brown Shale, embracing two thin beds of Coal, - | 100 |
| 9. Coarse Grit, - - - - | 50 |
| 10. COAL, - - - - | 4 |
| 11. <i>Limestone</i> , - - - - | 3 |
| 12. Brown Shale, - - - - | 30 |
| 13. COAL, Waynesburg, three hundred and eighty-six feet above Lake Erie, - - - - | 3 |
| 14. Grits and Shales, with thin and broken Coal seams, | 120 |
| 15. <i>Limestone</i> , Hanoverton, - - - - | 3 |
| 16. COAL, Rochester, five hundred and twenty-three feet above Lake Erie, - - - - | 5 |

[There is difficulty in recognizing this bed beyond the Yellow Creek summit, at Salineville, owing to a rise in the strata on the line of dip, for a short distance, in the direction of the Deep Cut. I assume the calcareous bed at the seventy-ninth mile post of the Cleveland & Pittsburgh Railroad, to be the same as that at the eighty-fifth mile, or very near it. At Salineville, the lowest visible bed of coal is

three hundred feet above Lake Erie. The bed, with its accompanying limestone, that appears to be the same as that between Rochester and Hanover station, is, at Rochester, five hundred and twenty-three feet above Lake Erie. Between Hanover station and Salineville there is much irregularity and change in the thickness, the plunge and the composition of the beds, that requires further examination.]

| | |
|--|----|
| 17. Slaty Sandstone and Brown Shale, - - - - | 60 |
| 18. COAL, - - - - - | 3 |
| 19. Sandstone and Shale, with limited beds of Limestone and Coal, - - - - - | 70 |
| 20. COAL, "Creek Vein," Jackman's, - - - - | 3 |
| 21. Sandstone and Shale, - - - - - | 28 |
| 22. COAL, - - - - - | 2 |
| 23. Sandstone and Shale, - - - - - | 53 |
| 24. COAL, "Rodgers' Vein," - - - - - | 3 |
| 25. Black Shale, - - - - - | 16 |
| 26. Brown Shale, - - - - - | 40 |
| 27. Black Shale, with kidneys of Iron Ore, . - - - | 14 |
| 28. Brown Shale and slaty Sandstone, - - - - | 27 |
| 29. Shales and Sandstone, - - - - - | 32 |
| 30. Water Lime bed, - - - - - | 1 |
| 31. Shale and Sandstone, - - - - - | 32 |
| 32. COAL, "Big Vein," same as Nisely's bed near mouth of Yellow Creek, - - - - - | 6 |

[Assuming this bed of coal to be the same as No. 11 of the section made by Mr. Briggs, on the Virginia shore of the river, opposite Yellow Creek, I continue the section to the base of the "lower Sandstone group," as given by that gentleman in the Virginia Report of 1841.]

| | |
|-------------------------------------|----|
| 33. Shale, - - - - - | 5 |
| 34. Sandstone, micaceous, - - - - - | 30 |
| 35. Shales, - - - - - | 15 |

| | Feet. |
|--|-------|
| 36. CoAL, - - - - - | 4 |
| 37. Grit and Shale, - - - - - | 40 |
| 38. CoAL, - - - - - | 2 |
| 39. Grit and Shales, hills eight miles above Steubenville, | 50 |

1121

At Jackman's three hundred and fifty feet above the "Big Vein," and, at the summit of the hills, six hundred and six feet above Lake Erie, is a bed of limestone ten feet thick, that is not identified on the Ohio River, so frequent are the changes in the composition of the beds.

It would be interesting to add more of this section, and extend it to the great seam of coal at Wheeling, but this article has already become lengthy, and I proceed to give sections of the "Lower Coal Series" in Pennsylvania.

No. IV.

SECTION OF COAL ROCKS IN THE VALLEY OF THE ALLEGHANY RIVER. GEOL. REP. PA. 1840.

| | Feet. |
|---|-------|
| 1. Conglomerate or White Sandstone, at the mouth of Clarion River, | |
| 2. Shale, with thin ore and coal, - - - - - | 12½ |
| 3. CoAL, - - - - - | 1½ |
| 4. Sandstone and Shale, - - - - - | 40 |
| 5. CoAL, - - - - - | 4 |
| 6. Shale, - - - - - | 20 |
| 7. Limestone, mouth of Kiskeminitas, - - - - - | 15 |
| 8. <i>Buhr Stone</i> and Iron Ore, - - - - - | 3 |
| 9. Shale, - - - - - | 25 |
| 10. Shale and Coal, - - - - - | 11 |
| 11. Grit, - - - - - | 70 |
| 12. CoAL, - - - - - | 2½ |
| 13. Sandstone and Shale, Freeport, - - - - - | 50 |
| 14. Limestone, - - - - - | 6 |
| 15. CoAL, one hundred and forty feet above the river at Freeport, - - - - - | 4 |

| | Feet. |
|--|-------|
| 16. Shale, - - - - - | 50 |
| 17. Sandstone and Shale, - - - - - | 75 |
| 18. COAL, - - - - - | 1 |
| 19. Shale, very thin, - - - - - | - |
| 20. Argillaceous Sandstone, level of low water at Pitts- burgh, one hundred and forty feet above Lake Erie, | 30 |
| 21. Shale, red and blue, - - - - - | 30 |
| 22. Coal, to base of "lower Sandstone group," - - - - - | 1½ |
| | 450 |

No. V.

SECTION OF COAL ROCKS FROM LAUREL HILL WEST TO THE
MONONGAHELA RIVER. BY MR. C. BRIGGS, GEOL. REP. OF VA.,
1841.

| | Feet. |
|--|-------|
| 1. Conglomerate, | - |
| 2. Shale, - - - - - | 10 |
| 3. Sandstone, - - - - - | 4 |
| 4. Shale and Iron Ore, very thin, - - - - - | - |
| 5. Sandstone, - - - - - | 30 |
| 6. Shale, - - - - - | 18 |
| 7. Coal, - - - - - | 2½ |
| 8. Flaggy Sandstone and Shale, - - - - - | 30 |
| 9. Coal, - - - - - | 1 |
| 10. Flaggy Sandstone and Shale, - - - - - | 40 |
| 11. Limestone, - - - - - | 4 |
| 12. Shale, - - - - - | 10 |
| 13. Sandstone, - - - - - | 5 |
| 14. Shale, - - - - - | 6 |
| 15. Coal, - - - - - | 1½ |
| 16. Shale, - - - - - | 12 |
| 17. Coal, - - - - - | 3½ |
| 18. Shale, - - - - - | 35 |
| 19. Coal, - - - - - | 5 |
| 20. Sandstone, Morgantown, base of "lower Sandstone group," - - - - - | 60 |
| | 277 |

Passing southerly along the eastern margin of the field, from the waters of the Monongahela to those of the Kenhawa River, we present another section, taken from the Virginia Reports.

This is made down the valley of the Kenhawa, nearly opposite the one first given, and dipping in a contrary direction.

No. VI.

SECTION OF COAL ROCKS ON THE KENHAWA RIVER, IN VIRGINIA.
GEOL. REP. 1840.

| | Feet. |
|--|-------|
| 1. Conglomerate, - - - - - | } |
| 2. Micaceous Sandstone, slaty, - - - - - | |
| 3. Gray Shales, - - - - - | |
| 4. Limestone, two feet eight inches, - - - - - | |
| 5. Yellow Shales, - - - - - | |
| 6. Coal, - - - - - | 3 |
| 7. Micaceous Yellow Sandstone, - - - - - | } |
| 8. Yellow Shales, - - - - - | |
| 9. Fire Clay, - - - - - | |
| 10. Coal, "Huddlestone Seam," with three bands of Shale, - - - - - | 7 |
| 11. Bluish drab Shale, with madrepores in septaria or nodules, (<i>Vineyard Hill</i>), - - - - - | 40 |
| 12. Coal, one foot eight inches, - - - - - | 2 |
| 13. Argillaceous Sandstone, - - - - - | 200 |
| 14. Coal, - - - - - | 3½ |
| 15. Sandstone—surface at river level, Charleston, Va., | 215 |
| 16. Coal, - - - - - | 4 |
| 17. <i>Hornstone</i> , blue and black, (Buhr?) - - - - - | 7 |
| 18. Iron Ore, - - - - - | 0½ |
| 19. Grit, coarse yellow, - - - - - | 140 |
| 20. Red and yellow Shales, - - - - - | - |
| | 752 |

In section No. 1 of this article, the counterpart of this, the Buhr or Hornstone bed was not noticed, and the same for

section No. 3, along the Sandy and Beaver Canal; but there, fragments of it were seen in the gravel. Neither is the Buhr mentioned in the Monongahela section.

The last section includes both the lower coal groups and the "lower sandstone groups" of the Virginia Reports, which do not appear to be here separated by a natural division. The "Hornstone" bed is near the top of the section, four hundred and seventy feet from the conglomerate; on the National Road, two hundred and sixty, and on the Alleghany one hundred and three feet. Is this everywhere the same bed encircling the field? In every case it is associated with the iron ore, in contact and always above it.

If the divisions into groups can be admitted, we discover the greatest disproportion in their thickness, as well as the number of beds that possess economical value, such as iron ore, coal and limestone.

The first section, certainly all of it below the lower sandstone group, is four hundred and forty-seven feet in thickness. On No. 2, at the National Road, to the Pomeroy Coal Seam, which is several hundred feet above the Symmes' Creek beds, is four hundred and eighty-seven feet. On No. 3, from Clinton to Yellow Creek, the thickness is one thousand one hundred and fifty-nine feet, all in the lower group, while in the Alleghany valley it is reduced to four hundred and fifty, and in the Monongahela to two hundred and seventy-four.

I give also, a recapitulation of the number of coal and limestone beds, in the various parts of the field, which will be seen to be quite different:

| Number of Sections, - - | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------------------------|-----|-----|------|-----|-----|---|
| Number of Coal Seams, - | 6 | 8 | 11 | 7 | 4 | 5 |
| Beds of Limestone, - - - | 2 | 5 | 5 | 2 | 1 | 1 |
| Iron Ore Strata, not all noted, | 8 | 5 | — | — | 2 | 1 |
| Thickness in feet, - - - | 547 | 837 | 1121 | 452 | 277 | — |

Such is a representation, generally, of the lower portion of the Alleghany Coal Field in its Northern half. The depths to which shafts must be sunk any where in Ohio to cut all the beds, is not great--by no means equal to the depth of coal mines in Great Britain.

In the district of Tyne and Ware, South Staffordshire, the deepest pit is five hundred and ninety-eight yards, or seventeen hundred and ninety four feet.

At the mouth of Yellow Creek a shaft less than one thousand feet would pass all the subordinate beds that crop out in Ohio.

The English Coal Fields, in different parts, present the same irregularity in the thickness and in the number of beds as our own.

A section of the Manchester Coal Basin in one part shows eighty-five (85) seams more than a foot in thickness--in another only thirty-six (36.)

The entire thickness of the Alleghany Coal Series is not yet well determined, nor the entire number of beds. It is to be hoped that the Legislatures of the four States that possess such vast riches in coal, as Ohio, Kentucky, Virginia and Pennsylvania, will eventually feel the necessity of having more detailed examinations made in concert throughout this field.¶

The proceedings of the Academy, from this time until 1859 or 1860, were published in the *Ohio Farmer*, Messrs. Thomas Brown, John Kirkpatrick and John H. Klippart, all active members of the Academy at that time, being connected with that paper. It is from the files of the *Ohio Farmer*, kindly furnished for the purpose, by the present owner, that most of the following proceedings and papers which were read before the Academy have been copied.

During the summer months the meetings of the Academy had never been very regular, but there appears no record of a meeting from April 17, 1854, until February 13, 1855, a period of almost a year.

CLEVELAND, February 13, 1855.

The Academy met in Prof. Kirtland's room, and, after being organized, adjourned to the Lecture Room of the Medical College, where a lecture was delivered by Prof. Jehu Brainerd, on the "*Influence of the Study of the Natural Sciences on the Young.*"

After the lecture, again adjourning to Prof. Kirtland's room, the meeting was reorganized and proceeded to the election of officers for the ensuing year. The following gentlemen were elected:

President—Prof. J. P. KIRTLAND.

First Vice President—Dr. T. GARLICK,

Second Vice President—Dr. J. LANG CASSELS,

Third Vice President—RUFUS K. WINSLOW.

Curators.

| | |
|-----------------------|--------------------|
| Prof. J. P. KIRTLAND, | Hon. WILLIAM CASE, |
| “ J. LANG CASSELS, | R. K. WINSLOW, |
| “ SAMUEL ST. JOHN, | B. A. STANARD, |
| “ JEHU BRAINERD, | J. KIRKPATRICK. |

Recording Secretary—Dr. J. S. NEWBERRY.

Corresponding Secretary—SAMUEL ST. JOHN.

A very valuable collection of East India curiosities was presented by Mr. P. R. Hunt, Argentiferous Galena by W. W. Leeland, Esq., and a fine fossil fish by W. C. Turner, Esq., to all of whom thanks were voted by the Academy.

The committee to whom was referred Mr. Olmstead's paper on the genus *Coregonus* reported in favor of its publication.

Mr. Thomas Brown was requested to publish the proceedings of the Academy in the *Ohio Farmer*.

Mr. M. C. Read submitted a Black Eagle, killed in Hudson, Ohio, to the Academy for examination, which was referred to a committee consisting of Prof. Kirtland, R. K. Winslow and Dr. Newberry.

Committee on Diploma and Seal presented both completed to the Academy. The report was accepted and the committee discharged.

Messrs. P. R. Hunt, Madras, India, S. S. Cox, Columbus, Ohio, G. R. Stuntz, Fon du Lac, Michigan, and Dr. R. P. Stevens, New York, were elected Corresponding Members, and Dr. William M. Prentiss, Timothy Reardon and John H. Klippart Resident Members of the Academy.

Academy adjourned to meet on Tuesday evening next, February 20th.

J. S. NEWBERRY, *Sec'y*.

REGULAR MEETING, February 20, 1855.

President Kirtland in the chair.

In the absence of Dr. Newberry, Secretary, J. Brainerd was appointed Secretary *pro tem*.

Dr. Garlick read a paper upon the *Grystes Megastoma*, a new species of Black Bass, from the Newberry Lake, in Geauga county, Ohio. A very accurate drawing had been executed of it by Prof. Brainerd. The paper with its accompanying illustration was referred to a committee and ordered for publication.

Prof. Kirtland introduced the subject of the decay of the Plum, and attributed it chiefly to the ravages of a species of the *Torula*, sustained in its growth from the development of the saccharine matter of the Plum. Messrs. John Kirkpatrick, Thomas Brown and others participated in the discussion, which was laid over for further consideration.

The subject of the construction and heating of Green Houses was freely discussed, in which Messrs. Kirtland, Brown, Kirkpatrick and others participated.

Prof. Kirtland presented two specimens of the May Millèr, (*Saturnia Muri*,) a very rare insect, forwarded by Robert Kennicott, from Illinois.

Mr. Hunt, from Madras, presented to the Academy a number of interesting specimens from the East Indies, among which were three printed books in the Hindoo language; also, leaves from the writing palm and a writing point. Various articles of art, shells and other specimens of natural history were included. The thanks of the Association were tendered to Mr. Hunt for his fine collection.

Prof. Brainerd nominated the Hon. John Crowell for election as a member of this Association.

Prof. Kirtland nominated William Bushnell, M. D., for membership. All were unanimously elected.

Academy adjourned for one week.

JEHU BRAINERD, *Sec'y pro tem.*

Here occurs another interval of eight months in which there is no record.

CLEVELAND, November 14, 1856.

On Friday evening members of the Academy met in Dr. Kirtland's room, in the Cleveland Medical College. In the absence of Dr. Kirtland, President of the Society, the chair was occupied by Dr. T. Garlick, Vice President. John H. Klippart was elected Secretary, to supply the vacancy caused by the appointment of Dr. J. S. Newberry to a Professorship in Washington, D. C.

Dr. Garlick presented, for examination, several specimens of fish, well preserved, from the Sault Ste. Marie. One of these proved to be a very fine specimen of *Percopsis*

Guttatus, described by Agassiz, in his "Lake Superior," pp. 286, 289.

Mr. Palmer, of the United States Exploring Expedition, communicated some very interesting facts in regard to the Guava, a tropical fruit growing in great abundance in Paraguay. Prof. Kirtland, through his skill as an horticulturist, has succeeded in growing and ripening the Guava, a ripe specimen of which was presented to the Editor of this paper, (*Ohio Farmer*,) one day last week, and which is noticed at length by Prof. Kirtland in another column.

After spending an hour in social conversation and the discussion of scientific topics, the meeting adjourned till Friday evening, the 21st inst.

THE GUAVA—*PSIDIUM CATTLYANUM*.

BY PROF. J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, November 14, 1856.

This fruit, (*Psidium*,) a sample of which I herewith send you, was produced in my green-house, treated with the ordinary care of the tenants of that establishment. As an edible fruit, it is palatable, somewhat resembling our paw-paws, flavored with the strawberry. For ornament it is equal to the orange and lemon, and for both these purposes it is worthy the attention of the amateur horticulturist. It is the fruit from which the Guava Jelly is manufactured. My tree, about three feet in height, has matured, this autumn, thirteen specimens of the size and perfection of the one before you.

In the transactions of the Horticultural Society of London, Vol. IV., page 316, is contained a beautiful colored plate of the *Psidium Cattlyanum*, the name under which I procured mine; but as the fruit of the one is of a deep

livid purple, and the other a rich lemon yellow, the latter must be either a different species or variety. The former is said to be the only species which will ripen its fruit in a green-house—hence I infer that my specimen is a mere variety.

CLEVELAND, November 21, 1856.

The Academy met pursuant to adjournment, and in the absence of President Kirtland, Dr. Atkinson occupied the chair.

Mr. Palmer exhibited a collection of Saurians, including specimens of the egg, young and teeth of the adult Cayman or South American Alligator. Also, a large collection of fishes—among them, a specimen of the Dorado, with jaws and teeth of the adult. This animal feeds principally upon the flying fish, so abundant in the tropical seas. There were also two species of cartilaginous fishes, allied to the sturgeon, (*Acipenser*,) having large plate-like scales, spined at the extremity, the head covered with a solid plate, extending beyond the pectoral fins, the latter armed with a thick and heavy bony spine, articulated at its base; the first spine of the dorsal fin being similarly armed. The animals have a strong general resemblance to the *Ptericythys* of the old red sandstone, but are, of course, widely separated from them. Mr. Palmer read a very interesting paper upon the habits of several of these lizards and fishes, and their distribution in Paraguay.

After observations by several members, the meeting adjourned until Friday evening, December 12.

JOHN KIRKPATRICK, *Sec'y pro tem.*

CLEVELAND, November 28, 1856.

On Friday evening, 28th inst., a very interesting meeting of the Academy of Science was held in the Cleveland Medical College, Dr. T. Garlick occupying the chair.

Dr. Garlick exhibited to the meeting, under an excellent microscope, an egg of the *Salmo Fontinalis*, spawned, artificially, on the 22d of October last. The form of the egg was no longer spherical, but was that of an oblate spheroid, the shorter diameter of which was about one and a half lines, whilst the larger measured about two lines. The appearance of the egg, under the microscope, was very interesting—the eyes of the embryo *salmo* could readily be discovered with the naked eye; the heart and its action as well as the arteries and veins, could be seen through the microscope.

Dr. Garlick placed under the microscope, for the benefit of the members present, a beautiful preparation of the human epidermis, a portion of the mucous coating of the human intestine, a portion of the human kidney properly and beautifully injected, and a well preserved specimen of *Sarcoptes Scabiei* and *Acarus Sacchari*.

Mr. Palmer exhibited a number of different species of ants, (*Formica*.) from Paraguay, with portions of their hills or nests, terrestrial and arboreal; also several specimens of a waxy secretion, upon twigs and branches of the guava and other shrubs. Mr. Palmer stated that it was the commonly received opinion, among the natives of that country, that this waxy matter was the product of the various species of ants then exhibited. He also gave a very interesting account of the habits of some of this family of insects, exhibiting a section of an endogenous tree, the hollow stem of which is inhabited by one of these insects. Considerable discussion ensued upon the nature of this secretion, Mr. Kirkpatrick arguing that it was, in general, the product of *coccidæ*, and in some cases was apparently produced by the exudation of the sap of the plant, from the punctures of insects of the latter family. One of the specimens exhibited was evidently a parasitic fungi, exhibiting, under the microscope, an organic structure. The wax, when magnified, presented a crystalline texture, and, embedded in some specimens of it, were a number of dark

brown, oval and hollow bodies, with a strong resemblance to the pupa skins of insects, or rather to the gravid bodies of many of the female *coccidæ*.

Mr. Kirkpatrick stated that he had, one year ago, procured from Lorain county, Ohio, a female specimen of the rare black water snake, (*Nerodia niger*.) Four days after his coming into possession of the snake, she gave birth to a number of young. For twenty-four hours after birth, the young were weak and languid, but after that period rapidly gained strength. This snake may now be added to our Ohio Fauna.

Mr. Klippart presented a new species of *Spirifer*, from Kelly's Island. It somewhat resembles the *Spirifer trigonalis*, figured in Trimmer, Lyell and Mantell, with this difference, in all those figured and described in the works above referred to, the upper valve is *ventricose* from the medial carina to the *pleural* margin; in the one presented it is direct—the medial carina forming a summit from which the two sides of the upper valve slope at an angle of forty-five degrees, presenting the appearance, when resting on the lower valve, of the gable end of a house. The length of the fossil is eighteen lines; width, twenty-seven lines; thickness, eighteen lines; distance from medial carina to pleural seam, twenty-two lines; distance from hinge to ventral margin, measured along the carina on the upper valve, twenty-four lines; distance from hinge to ventral margin, measured along the sinus of lower valve, thirty-three lines. That portion of the ventral margin along the sinus of the lower valve, for the space of twelve lines towards the hinge, forms a right angle with the medial carina of the upper valve. This sinus, in its widest part, is twelve lines in width, and four in depth. The shell is striated longitudinally—not so deep, however, as the *S. Lynæ*, and the seam is slightly crenulated.

Col. Whittlesey, of the recent Geological Corps of Ohio, was at first of opinion that the shell was distorted, but Mr.

Klippart produced half a dozen specimens, all having the same conformation.

On motion adjourned until Friday evening, December 5th, 1856.

JOHN H. KLIPPART, *Sec'y.*

CLEVELAND, December 5, 1856.

The regular meeting of the Academy of Natural Science was held on Friday evening last, Dr. Garlick, Vice President in the chair. The minutes of the previous meeting were read and approved.

Dr. Garlick presented a collection of fossils believed to be from the eastern slope of the Rocky Mountains. They were referred to a committee consisting of Col. Whittlesey, J. H. Klippart and Prof. Brainerd.

Col. Whittlesey exhibited a series of Charts of Sections of the Drift Formation, from the North and South shores of Lake Erie to the Lake of the Woods, embracing a great extent of Ohio, Canada West and Michigan, the shores of Lakes Huron, Michigan and Superior.

Underlying the Drift was shown that peculiar fresh water deposit, called, in the neighborhood of Cleveland, the blue clay, but which is in reality a very fine sandy marl, containing vegetable matter. The Colonel gave a very interesting description of these rocks and their peculiarities of structure and position, and exhibited a large root and a portion of a stem of a tree found imbedded in the latter deposit. The vegetable remains found in this stratum are not petrified, and but slightly decayed.

Mr. E. Palmer exhibited a number of insects and crustaceans from South America, among them some interesting and novel specimens.

Dr. Garlick again exhibited microscopic views of the anatomical structure of the embryo *Salmo Fontinalis*.

These specimens were spawned on the 4th of November. The blood corpuscles were distinctly visible and well defined. The light used was direct and not reflected as in the former instance.

After some discussion, the Academy adjourned to meet in Dr. Garlick's room, Hoffman's Block, on the Public Square, next Friday evening, at 7 o'clock.

JOHN KIRKPATRICK, *Sec'y pro tem.*

CLEVELAND, December 12, 1856.

The Academy met, according to adjournment, in the room of Dr. Garlick, the Doctor in the chair.

The Academy resumed the examination of the young of *Salmo Fontinalis*. Living specimens, only twelve hours hatched, were placed under the microscope. The circulation of the blood, both arterial and venous, was observed to the extremities of ramification; the pulsations of the heart, and the passage of the blood corpuscles through the cavities of the ventricle and auricle, the arterial and the return current through the great dorsal vessels, with the peculiar cellular structure of the egg yolk that still remained attached to the animal, were all distinctly visible in consequence of the transparency of the young fish. Dr. Garlick had invented a small glass chamber sufficient to contain the specimen in water, and yet deprive it sufficiently of the power of motion to retain it in focus. These exhibitions of Dr. Garlick's have been extremely interesting and valuable to the members.

Mr. Palmer exhibited specimens of *Jatropha manihot*, and its product, cassava flour. A drawing of a species of lotus, *Nymphaea*, the seed of which is used for food; a sample of *Aqua ardiente*, the ardent spirit used by the natives of Central and South America; dried specimens of the Paraguay Tea, *Ilex paraguayensis*, and the utensils made use of in manufacturing the infusion. Mr. Palmer

read a paper containing observations on these and other plants, with their economic uses.

Several of the members remarked that they had seen flocks of the Bohemian Chatterer, *Bombycella garrulla*, in and around the city. The Secretary stated that he had observed them feeding upon the fruit of the European Hawthorn, *Crataegus oxyantha*. It was the general impression that this bird was a regular winter visitant.

The Academy adjourned to meet at Dr. Garlick's room, next Friday evening at 7 o'clock.

JOHN KIRKPATRICK, *Sec'y pro tem.*

CLEVELAND, December 19, 1856.

The Academy met pursuant to adjournment, Dr. Garlick, Vice President, in the chair.

Dr. Garlick exhibited some microscopic drawings of the changes undergone by the egg and the embryo of *Salmo Fontinalis*.

Mr. Palmer exhibited a collection of the products of Paraguay, consisting of tobacco, soap, indigo, two varieties of cotton, three varieties India Rubber, *Liphonia elastica*, the milk and in the crude inspissated state; cochineal, the insect; a bright vermilion paint produced from the seed of a tree, probably a species of arnatto, *Bixa orellana*; a yellow powder, used by the natives to color grease, with a portion of the root from which the powder is prepared. Wood and seed pods of a tree, the pods of which yield a fine white fibre like cotton, which is capable of being manufactured into paper.

A vote of thanks was then given to Mr. Palmer for the interesting exhibition of articles from South America.

Next Friday evening, December 26, 1856, the annual meeting for the election of officers will be held at the regular place of meeting, Dr. Kirtland's rooms, in the Medical College.

JOHN H. KLIPPART, *Sec'y.*

CLEVELAND, December 26, 1856.

Academy met in Dr. Kirtland's room, Medical College, Hon. John Crowell in the chair.

After the reading of the minutes, the meeting proceeded to the election of officers for the ensuing year, which resulted in the selection, by a unanimous vote, of the following gentlemen:

President—Prof. JARED P. KIRTLAND.

First Vice President—T. GARLICK, M. D.

Second Vice President—Hon. JOHN CROWELL.

Recording Secretary—JOHN KIRKPATRICK.

Corresponding Secretary—Dr. W. H. ATKINSON.

The Board of Curators for last year was re-elected.

Prof. Brainerd was invited to lecture before the Academy, at their regular place of meeting, on Friday evening, January 16, 1857, and Hon. John Crowell to lecture at the same place on the evening of January 30.

Prof. Brainerd announced that his subject would be *Vegetable Stimulants*.

Mr. Palmer exhibited a collection of South American minerals.

The following gentlemen were then elected members of the Academy: Prof. N. S. Townshend, Prof. James Dascomb, Prof. J. H. Fairchild and Mr. E. Palmer.

The meeting then adjourned for one week.

JOHN KIRKPATRICK, *Sec'y*.

CLEVELAND, January 2, 1857.

The Academy met on Friday evening at Prof. Kirtland's room, Medical College, and organized with Dr. N. S. Townshend in the chair.

A letter from Dr. Newberry was read.

On motion, the Officers of the Academy were instructed to prepare a memorial to Congress, asking that an appro-

priation be made to defray the expense of publishing the Report of the North Pacific Exploring Expedition, to be signed by the Officers of the Academy.

Mr. J. W. Smith exhibited a *Gyroscope*. Prof. Fairchild made a few remarks on the instrument.

Mr. Palmer exhibited a collection of different species of wood from South America.

Col. Whittlesey exhibited drawings, and specimens of tools found in the ancient copper mines of Lake Superior, and explained the position and condition in which they were found, and their supposed uses.

The method the ancient miners had apparently taken to separate portions from the large blocks of copper, was to beat off the angles or projecting corners, with large stone mauls or hammers, having previously softened the copper by the action of fire. The Colonel stated that there was no evidence that these people knew anything about melting the ore, all the tools found having been beat out with hammers when cold. This is the more remarkable, as portions of the old copper masses, operated on by them, were evidently heated nearly to fusion. The tools had no other temper than the increased density which the cold hammer would give them, and none presented any appearance of alloy.

No graves, or human remains, have been found in the neighborhood of the mines that can be identified as belonging to this ancient people. Their mining was, in all probability, performed during the summer months, and in the autumn they returned to their homes in the Mississippi valley, the region of the ancient mounds.

Mr. G. R. Tuttle having been proposed for membership, was elected.

The meeting then adjourned until next Friday evening, when Prof. Brainerd will deliver a lecture on *Vegetable Stimulants*, which the public are invited to attend.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, January 9, 1857.

On Friday evening the Academy of Natural Science met, Hon. John Crowell, Vice President, in the chair.

The delivery of Prof. Brainerd's lecture on *Vegetable Stimulants* was dispensed with until next meeting.

Prof. Brainerd gave his views on the functions of the leaves of plants—that they were excretory and not absorbent organs; and that it is his opinion, that the views entertained by botanical physiologists, in regard to leaves absorbing carbonic acid gas, are incorrect. Prof. Brainerd explained his views on this subject in detail. He was followed by other members of the Academy, and the question was discussed during the evening.

The following gentlemen were elected members of the Academy, viz: Dr. A. B. Halliwell, W. H. Burrige and J. W. Smith.

The meeting then adjourned until next Friday evening, January 16, 1867.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, January 16, 1857.

In the absence of Prof. Kirtland, R. K. Winslow, Esq., occupied the chair.

The minutes of the previous meeting were read and approved.

An interesting discussion took place on the action of vegetable poisons on the animal system.

The meeting then adjourned until next Friday evening, at 7 o'clock.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, January 30, 1857.

Academy met in Dr. Kirtland's room, R. K. Winslow, Esq., in the chair.

Mr. John Kirkpatrick, in behalf of Mr. J. M. Brainerd, of Parma, in this county, presented a recent specimen of a Ring Tailed Bassaris—*Bassaris astuta*, Lichenstein.

Mr. Kirkpatrick stated that the facts regarding its capture were, that Mr. Brainerd observed tracks in the snow, in the early part of this month, with which he was not familiar, although he had been engaged in hunting a considerable portion of his life. These tracks led to a large white oak tree. At that time he was unwilling to cut down the tree, and let it remain without further examination.

On visiting the place a few days after, he found that the animal had left the tree and taken shelter in the crevices of some rocks. Three days after this time the animal was discovered to have returned to its old abode in the tree. Mr. Brainerd then cut down the tree, and his dog killed the animal.

No one in the township of Parma knowing anything of the creature, he brought it to this city. The furriers here were equally ignorant, no skin of the sort having ever been seen by them. He then brought it to the office of the *Ohio Farmer*, and presented it to the Secretary of the Academy for preservation and deposit in the museum.

The specimen is a female, evidently mature, but not aged. Her measurement is rather less than that of a male, given in Audubon and Bachman's *Quadrupeds of North America*, Vol. II., page, 314, plate 98. Otherwise the description is accurate.

Mr. Kirkpatrick stated that since he procured this specimen he had found a mutilated skin belonging to this species, in the possession of a saloon keeper in this city, who obtained the live animal nearly two years ago, and kept it a long time as a pet. Its owner said that it was very familiar and social, climbing on his shoulder and gamboling around the room. At one time its owner placed a mink—*Putorius vison*—in the same cage with it. For a long time the two animals remained motionless at opposite ends of the cage, with their eyes fixed intently upon each other, until the *Bassaris*, evidently overcome by the gaze of the Mink, suddenly sprung up in terror, making frantic efforts to escape,

and dashed its head against the cage with such violence as to produce death.

Mr. R. K. Winslow stated that he received information of an animal answering this description, a year or two ago near Rocky river, ten miles from Cleveland. There can, therefore, be little doubt that this animal is very sparingly scattered over this portion of Ohio, and may now be added to its Fauna. Whether it exists in the States between this and Texas, there is no evidence to show.

On motion, the thanks of the Academy were given to Mr. J. M. Brainerd for his very valuable donation, and the specimen placed in the hands of Mr. Winslow for preservation and mounting.

[In the winter of 1872-3 another fine specimen of this animal was killed in Fairfield county, Ohio, which is in the possession of Joseph Sullivant, Esq., of Columbus, Ohio, well mounted. There is also a fine specimen, mounted, in the museum of the Kirtland Society of Natural Sciences, Cleveland, Ohio.]

Col. Whittlesey presented specimens of steel, manufactured directly from pure iron oxide, by a new process patented by Dr. G. Hand Smith, of Rochester, New York, at the Sharon Iron Works, Mercer county, Pennsylvania. This steel presented a finer fracture than that of blister steel, and coarser than that of the cast steel in general use for tools. Col. Whittlesey stated that the patentee says that this article could be made at an equally low price with common wrought iron, or nearly so.

Col. Whittlesey also exhibited tables and diagrams of the rise and fall of water in Lake Erie, from the year 1796 to 1852, the maximum being in 1838, the minimum in 1819 and 20, the variation being 4.55 feet. Rain guages were kept for various periods, at different places in the lake region. He also stated, that, by a long course of observation, he had discovered the existence of a short pulsating wave, in this chain of lakes, and entirely independent of winds or cur-

rents. Its altitude does, in no case, exceed eighteen inches—more commonly four or five. Its periods of vibration are short.

Mr. Winslow stated that during the past severe weather his men had found great numbers of moles among the straw and litter used as a mulch around the apple trees in his orchard, and that many of the trees were entirely girdled. He thought that this was, in all likelihood, the work of mice, as gnawing bark was not the habit of the mole, unless the extreme cold weather had deprived them of the power to obtain other food.

The meeting then adjourned for one week.

JOHN KIRKPATRICK, *Sec'y.*

A RARE REPTILE.

Letter read before the Cleveland Academy of Natural Science, and dated

LAPORT, IND., August 27, 1857.

The late Rev. Charles Fox, of Michigan, exhibited to the naturalists, present at the meeting of the Scientific Association at Cleveland, several years since, a specimen of an undescribed and unique species of snake. It was subsequently placed in the hands of Prof. Baird, of the Smithsonian Institution, who described it, but as I can not here refer to his papers, or remember the generic and specific names, I must designate it as the *Red Bellied Snake*.*

That specimen was, perhaps, three feet and a half long, resembling in shape the common water snake, known among older naturalists as the *Coluber sipadon*. The

* This snake proves to be the *TROPIDONOTUS ERYTHROGASTER* of Shaw, vid. Holbrook's Herpetology, Vol. IV., p. 33, pl. VII.

I have traced this species continuously from Elmore Station, Ottawa county, Ohio, to the State of Texas, by aid of the late Robert Kennicott. It had been considered as an inhabitant of only the extreme Southern States.

J. P. KIRTLAND.

upper surfaces of the body, neck and head were black, while the throat and belly were bright brick, or red lead color. These colors were still bright, though the specimen had been preserved for some time in alcohol. It was discovered near New Buffalo, in Michigan.

Since that period I have been endeavoring to obtain other specimens of this species, as well as a knowledge of its habits, through the medium mainly of my medical brethren residing in that vicinity. Though not successful for a long time, in the first design, I learned from good authority that it inhabited a belt of country between the South end of Lake Michigan and Toledo, and embracing a range North and South of about two tiers of counties in the States of Michigan, Indiana and Ohio. Within these limits it has been occasionally seen, though it is considered as very rare by the inhabitants who have resided here from the time of the earliest settlements.

A day or two before my arrival a fine living specimen was secured for me, through the polite attention of Mr. Charles Quantrell and Dr. H. B. Wilcox, of Galena, Laporte county, Ind. It was captured by the last named gentleman, near the locality where that of Mr. Fox must have been obtained.

The color of this living specimen is a jet coal black on all the upper surfaces of the head, body and tail, while beneath it is of a bright brick hue, affording a striking contrast, calculated to attract the attention even of the most careless observer.

It measures thirty-four inches in length. In its habits, at present, it is mild and docile, though Dr. Wilcox assures me that it was extremely active and pugnacious at the time it was captured.

Its aquatic habit is indicated by the carinated structure of its scales, on the upper surface of its body, as is also its non-venomous character, by the double series of scales beneath its tail. Notwithstanding this latter evidence,

and absence of fangs and glands for the secretion of poison in its mouth, both popular opinion and Indian tradition assign to it the most deadly powers.

The Indians designate it by a term in their language meaning *The Blood Snake*, and considered its bite as suddenly fatal, unless the wounded limb was instantly amputated. From its anatomy and habits, I infer that very few of the *aborigines* ever suffered much from resorting to this remedy. So strongly impressed on the minds of the public are such fabulous notions, that the better dictates of knowledge and science are generally disregarded. The handling of this snake, by me, excited almost as much emotion among the good people of this vicinity, as did the attack of the venomous reptile on the Man of Tarsus of old.

Dr. Wilcox, who has been intimately acquainted with this section of country for more than twenty years, informs me that he has met with this species of snake only in four instances—one of which was at Toledo, Ohio.

J. P. KIRTLAND.

LETTER FROM PROF. KIRTLAND.

Extract of a Letter read before the Cleveland Academy of Science, dated

GALENA, LAPORTE COUNTY, IND.,

August 28, 1857.

I am now enjoying myself in a region of country which is in a transition state between a wilderness and high cultivation. It still abounds in objects highly interesting to the naturalist. Yesterday, while out on a botanical excursion, a fine deer arose just before me, and escaped away into the forest. The mill ponds in the vicinity are

swarming with flocks of mallard and summer ducks, evidently reared near by, and the blue herons are striding along the shores with an unconcern I never before witnessed. Large numbers of the passenger pigeon are hovering about the grain fields and stacks in the neighborhood.

The entomologist finds here a rich field, especially among the Lepidoptera. As there is no very apparent difference in the flora of this vicinity and of Cleveland, it would be inferred that insect life would be about the same in the two localities—yet such is not the fact, especially with the butterflies. Yesterday, during a few hours of bright and warm sunshine, I saw, by thousands, the *Papilio Marcellus* and *Ajax* about the clover heads in an extensive field. Their abundance here is to be imputed to the universal prevalence of the paw-paw bush, on which the larvæ of these beautiful butterflies feed. At Cleveland both this tree and these insects are less common. The rare *Vanessa furcata* I have occasionally seen here, usually alighting on the flowers of the may-weed.

In the clear and cool spring runs, which are so abundant, immense numbers of small fish are found—principally chubs and minnows—yet the number of species seem to be limited. Almost every farm affords fountains and runs of pure cold water, which could be profitably and pleasantly employed in the cultivation of the trout. The settlements, however, are not sufficiently mature to allow the people to attend to pursuits of that kind.

* * * * *

To-day I observed the Turkey Buzzard performing his lofty gyrations over this locality. This bird, formerly common in Northern Ohio, is now rarely or never seen there, yet it seems to continue its visits to this more western locality in the same latitude.

Yours, J. P. KIRTLAND.

A RARE BIRD.

BY PROF. J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, November, 1857.

A few days since, Messrs. Wright and Williams, residing near the mouth of Rocky River, observed a large bird attacking a flock of hens and chickens. These gentlemen secured the depredator without injury, and to their politeness I am indebted for the specimen in a living state. It proves to belong to the gull family, and probably the *Lestris Richardsonii*, or Richardson's Jager. There is, however, some doubt as to its species. In most particulars it resembles the young of that species figured by Audubon. I have it now in confinement, and hope to keep it till its more mature moultings shall disclose with certainty its true specific character.

This is the first instance in which I had decisive evidence that any of the Jagers visited Ohio, though I had occasionally observed large and active birds, that I supposed to be of this genus, flying over the lake, and generally persuing the several species of gulls common here in the spring and autumn.

According to Nuttall the Jagers are bold and predacious birds, inhabiting the antarctic as well as the arctic seas, and migrating only short distances towards warmer climates at the approach of winter.

CLEVELAND, November 27, 1857.

The annual meeting for the election of officers took place on Friday evening, at Dr. Kirtland's rooms, in the Medical College, Dr. T. Garlick, Vice President, in the chair. The minutes of the last meeting were read and approved.

Messrs. G. A. Hyde and J. B. Trembley were elected members.

On motion of Col. Whittlesey the Academy proceeded with the election of officers, with the following result:

President—Prof. J. P. KIRTLAND.

First Vice President—Prof. JEHU BRAINERD,

Second Vice President—Col. CHAS. WHITTLESEY,

Third Vice President—Dr. THEODATUS GARLICK,

Curators.

| | |
|-----------------------|---------------------|
| Prof. J. P. KIRTLAND, | R. K. WINSLOW, Esq. |
| Dr. T. GARLICK, | HON. JOHN CROWELL, |
| Dr. W. H. ATKINSON, | GEO. R. TUTTLE, |
| Prof. JEHU BRAINERD, | J. B. TREMBLEY. |

Corresponding Secretary—Dr. W. H. ATKINSON,

Recording Secretary & Treasurer—J. KIRKPATRICK.

On motion of J. Kirkpatrick, a committee of three was appointed by the Chair to devise ways and means to promote the formation of a library in connection with the Academy. J. Kirkpatrick, Col. Whittlesey and Prof. Jehu Brainerd, committee.

The meeting then adjourned until Friday evening, December 11, 1857.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, December 11, 1857.

The Academy of Natural Science met in the rooms of Dr. Kirtland, Medical College, Col. Charles Whittlesey in the chair.

Dr. Theodatus Garlick presented a bottle containing Lizard, Scorpion, Belostema, &c., which was received and ordered to be placed in the museum.

Col. Whittlesey presented some specimens of ferruginous quartz from veins in the slates of the Menominee river, which he procured there in 1850, and remarked that although they had not been tested chemically, nor showed particles of gold under a common magnifier, the geological

relations were those of gold bearing veins. He forwarded to the chief of the survey specimens of this vein matter, to be examined at the time, but does not know that it was done. He did not affirm that if it existed there, the discovery would prove of economical value. The quartz veins, of a character that contain gold, were seen by him over a large tract of country at the Northwest, but in general they were not as heavy, or as regular as those of California, although their geological connections are similar. It is not only possible, but highly probable, that specimens have been found, and that more will be; but gold bearing veins are always lean, and unless they prove to be wide and extended, furnish but poor results in a commercial point of view.

These veins carry sulphuret of iron and quartz, with an enclosing wall rock of talcose, or magnesian slates. The true gold bearing rocks were seen by him not only on the Menominee River, but on the head waters of the St. Louis River. Very promising specimens were procured at the Vermillion Lake, which is on the waters of Rainy Lake River; but hitherto no proof exists, from analysis or assay, that the specimens contain gold. The tendency of our population to become excited in reference to that metal, rendered it prudent not to insert anything in the official reports concerning it. Soon after Dr. Houghton's death, a specimen was found in his cabinet, which, being assayed by a jeweller of Detroit, was reputed to be rich in gold. It was supposed to have been procured between Marquette and the Huron mountains.

Mr. S. W. Hill of Eagle Harbor, Lake Superior, who was one of Dr. Houghton's party, while he was exploring that district, stated that Dr. Houghton came into camp one night and said he had seen gold that day, but no specimens were exhibited.

It would not be singular, but, on the contrary, it would be in accordance with the surface indications, to find it in

the ferruginous quartz veins of the talcous rocks that stretch with little interruption from Marquette westward, along the height of land to the West end of the lake, and thence northerly to the dividing ridge between the waters of Lake Superior and Lake Winnipeg; but to say that these veins will be productive, as mining operations, would not be warranted at present. In countries where the veins are heavy and productive, the stream gold of the valleys, which results from the decay of the vein matter, does not always repay the expense of washing.

To be able successfully to mine and crush quartz rock, the width of the vein, distance from navigation, convenience of timber, presence of water and water power, and the price of labor, are as much a part of the results as the richness of the vein.

Mr. George R. Tuttle exhibited specimens of polished iron ore from Lake Superior, resembling the Slickensides of the Germans.

On motion Dr. R. F. Strickland was elected a member of the Academy.

Adjourned for two weeks.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, January 8, 1858.

The Academy met with Prof. J. P. Kirtland in the chair. The minutes of last meeting were read and approved.

Mr. G. A. Hyde presented specimens of ferruginous and calcareous concretions from the blue marl of this vicinity.

Certain lower jaw bones and teeth were referred to a committee for identification. Committee, Messrs. Tuttle, Allen and Dr. Atkinson.

Mr. E. Stair, by Dr. Atkinson, exhibited specimens of *Ornithorhynchus* from Australia.

Prof. Jehu Brainerd read a paper on the Analysis of the Berea Sandstones.

On motion, a committee consisting of Prof. Brainerd and Col. Whittlesey were appointed to draft a by-law or resolution closing the museum to the public.

Articles of Agreement and giving a full statement of the relation between the Faculty of the College and the Academy, were presented by Col. Charles Whittlesey, which were ordered to be engrossed among the minutes of this Academy.

JOHN KIRKPATRICK, *Sec'y.*

MEMORANDUM OF LEASE.

The annexed is a true copy of the agreement between the Faculty of the Cleveland Medical College on the one hand, and the Curators and Trustees of the Cleveland Academy of Natural Science on the other, and which agreement refers to the title held by the said Academy to the Museum, at present in the College Building, corner of St. Clair and Erie streets.

Whereas, In the year A. D. 1845 a Literary Society was organized at Cleveland, Ohio, called the *Cleveland Academy of Natural Science*, and the Constitution of said Association being adopted as a Charter, and recorded pursuant to the Act of March 11, 1845, in the Book of Records of Cuyahoga county, Ohio, for Religious Societies, page 2, as required by said Act of the Legislature of Ohio, and thus became a corporation for the purpose therein specified for the term of thirty years,

And Whereas, The said Cleveland Academy, by its members, and the aid of the citizens of Cleveland, expended a sum of about one thousand dollars, (\$1,000,) towards furnishing a room in the building of the Cleveland Medical College, (corner of St. Clair and Erie streets, Cleveland,) and towards furnishing and fitting up said room for a Museum, or collection of specimens in Mineralogy, Geology, Botany, Zoology, Natural History, and Natural Science

in general; in which, and in the cases so prepared, valuable specimens were deposited by the said Society, and by individuals, some an absolute donation and others as a loan, upon conditions which are expressed in another paper between said Academy and said depositors, of even date herewith.

And Whereas, It was also agreed and understood at the time, by the Trustees of the Western Reserve College, at Hudson, Ohio, a corporate body, with power to establish branches, and which by legal steps had constituted and established the said Cleveland Medical College as one of its branches, and caused the said building to be erected, that in consideration of the expenditures of the said Academy of Natural Science, and of the Museum, and of specimens thus collected, the said room being on the second floor, of said building, should be and remain in the control of said Academy and its legal agents, free of rent, so long as it should be occupied for the purpose aforesaid, and other purposes connected with the objects of said Literary Association; on the conditions that the Faculty, Professors, Students and officers of said Medical College, and of the said Western Reserve College, should have access, under proper regulations, to said room and specimens, for the purpose of study and examination.

And Whereas, So far as it now appears to the officers and agents of said Academy of Natural Science and of the said Western Reserve College, acting by the Trustees of the said Medical College, no Memorandum or Record of the understanding or agreement aforesaid was made in writing, although the said verbal agreement has been constantly acknowledged and acted upon, by both parties, and possession had from the fall of the year 1845 to this time, this Memorandum is hereby made between the parties, acknowledging and confirming said agreement and understanding, made and entered into as specified, which is to operate as a

lease, from year to year, from the said Western Reserve College to the said Cleveland Academy of Natural Science, its successors and assigns, so long as the said Museum Room shall be occupied as above agreed, and that the said premises are to be held free of rent during said period.

Witness our hands, Cleveland, January 4, 1858.

The Western Reserve College by

J. P. KIRTLAND,
J. LANG CASSELS,

Trustees and Agents of the Faculty.

The Cleveland Academy of Natural Science by

CHARLES WHITTLESEY,
JOHN CROWELL,
J. B. TREMBLEY,
W. H. ATKINSON,
JEHU BRAINERD,
GEO. R. TUTTLE,
R. K. WINSLOW,
T. GARLICK.

Trustees and Curators.

MEMORANDA RESPECTING THE PROPERTY
CONTAINED IN THE MUSEUM OF THE CLEVELAND ACADEMY OF
NATURAL SCIENCE.

The minerals, fossils, specimens of insects, birds, reptiles, animals, shells, relics, curiosities, coins, and the articles generally, that are now in the cases and drawers at the rooms, known as the Museum of the Cleveland Academy of Natural Science, in the building of the Medical College,

at Cleveland, corner of Erie and St. Clair streets, were presented and deposited as follows:

The four cases of prepared birds, animals, &c., standing along the west side of the room, are the property of Prof. J. P. Kirtland and R. K. Winslow, Esq., on deposit, both specimens and cases. The three northerly ones and contents belonging to said Winslow, and the southerly one and contents to said Kirtland, to remain during the pleasure of said parties, and to be removed at their discretion.

The series of horizontal cases, standing across the northerly side of the room, containing shells, are deposited by Prof. J. P. Kirtland, for the benefit of the Medical College, to remain so long as the Museum of the Academy remains in the present room and building of the College.

The minerals in horizontal cases, numbered 1, 2 and 7, standing on the westerly side, next the main entrance, were deposited by Dr. Franklin B. Hough, and afterwards purchased by the Faculty of the College, and deposited on the same conditions as the shells above named.

In the two middle cases, on the southerly side of the room, are minerals, curiosities, relics and other specimens that were in part deposited by Dr. F. B. Hough and Prof. J. Lang Cassels, for the College, on the same terms as those of Prof. Kirtland, and in part by Col. Charles Whittlesey and others, either as private deposits or absolute gifts to the Academy.

The minerals in the east half of the horizontal cases, No. 4, (being one of the above,) and in case No. 5, next to it, on the east, were deposited by Dr. Hough and Prof. Cassels, for the use of the College, as above stated.

The prepared egg shells in the two short horizontal cases, on the east side, opposite the entrance, and the prepared

turtles in those cases, are deposited with the Academy by R. K. Winslow, Esq.

There are two empty horizontal cases, standing between the pillars that belong to the College.

Of the five upright cases standing along the easterly side of the room, filled with prepared specimens of birds, animals, &c., the one at the northeast corner was filled and fitted up by Prof. J. P. Kirtland, for the use of the College, the same as the shells above mentioned.

The upright cases at the southeast corner of the room, containing prepared animals and other articles, are the deposit of various individuals whose names are not known, on conditions which are not known.

The birds and other specimens in the three remaining upright cases, were presented in part by Lieut. Phelps, of the United States Navy, and other individuals not known, and in part by Prof. J. P. Kirtland, on the same terms as his other specimens, but it is now difficult to separate those donated to the Academy from those deposited by Prof. Kirtland.

There were several small cases of insects and butterflies hung up around the room, a part of which are labelled as the gift of Mrs. George Hoadley, collected in China by her son, Mr. William Scarborough, and a part deposited by Prof. Kirtland, as aforesaid.

Besides these, there are other articles in different parts of the room, such as antlers, fossils, autographs, photographs and paintings, the terms of deposit of which are not now known.

There are five suspended lamps for lighting the room, but no chairs, tables, settees, or apparatus for heating it.

The upright and horizontal cases, with the exception of those above mentioned as belonging to the College and to Messrs. Kirtland and Winslow, belong to the Academy.

There are also some volumes of Congressional Debates, donated by Judge Andrews.

JARED P. KIRTLAND,
J. LANG CASSELS,

Life Trustees and Curators under Act of Incorporation.

CHARLES WHITTLESEY,
JOHN CROWELL,
W. H. ATKINSON,
J. B. TREMBLEY,
JEHU BRAINERD,
GEO. R. TUTTLE,
R. K. WINSLOW,
T. GARLICK,

Curators of the Academy of Natural Science.

ANALYSIS OF BEREA SANDSTONES.

BY PROF. JEHU BRAINERD.

Read before the Cleveland Academy of Natural Science, January 8, 1858.

Having had occasion to examine, by Chemical Analysis, some specimens of sandstone from the quarries at Berea, Ohio, in reference to their qualities for Building purposes, I deem the result of sufficient interest to form the basis of a communication for the consideration of the members of this Academy.

The geological series to which this quarry belongs has quite an extensive outcrop along the northern boundary of the Western Reserve. Its position is some two or three hundred feet below the great range of sandstone conglomerate that underlies the coal fields of Ohio. The general dip of this rock is southeast, but in many places very nearly horizontal. In other localities the dip obtains an altitude of 30° or 40° , owing, probably, to local upheavals. In such cases the direction of the dip is not uniform. The drift rests upon this series, and, wherever exposed to the action of the transporting agency, the rock is grooved and polished, the striæ generally having a direction South from 10° to 30° East.

The rock is formed in beds or layers, ranging from thin lamina to a thickness of eight or nine feet, and generally exhibit ripple marks upon the surface. The color varies from a bluish gray to a light drab, and often slightly tinged with the per-oxide of iron.

A microscopic examination of the best specimens show that the grains, generally, present well defined crystalline faces, probably formed from an aqueous solution of silica. The massiveness of such beds, and the absence of fossils, seem to indicate that the deposition took place in deep and

tranquil waters. Where the beds exhibit partings, the ripple marks show conclusively the action of running water. The fossils are, generally, characteristic of the Old Red Sandstone.

The laminated quarries are generally extensively used for the manufacture of *Grindstones*, for the good quality of which Berea has become famous.

The specimens tested, in regard to their quality as building stone, had been dried at a temperature of 75° F. They were obtained from what are known as the upper and lower beds, having a difference in elevation of about thirty feet. The color of the stone was bluish gray, of uniform texture, very well stratified, and of suitable firmness for grindstones.

The lower bed contained—

| | |
|--|----------------|
| Alumina, (clay,) - - - - - | 3.16 per cent. |
| Sulphuret of Iron, (Iron Pyrites,) - - - | 4.36 “ “ |
| Silica, (sand,) - - - - - | 90.05 “ “ |
| Water, - - - - - | 2.4 “ “ |
| Mica and oxide of iron, - - - - - | a trace. |

The saturating capacity of the rock, when dried at 212°, was found to be 9.4 per cent.

The upper bed contained—

| | |
|--|----------------|
| Alumina, (clay,) - - - - - | 3.78 per cent. |
| Sulphuret of Iron, (Iron Pyrites,) - - - | 5.2 “ “ |
| Silica, (sand,) - - - - - | 78.50 “ “ |
| Water, - - - - - | 12.5 “ “ |
| Mica, - - - - - | a trace. |

The saturating capacity, when dried at 212°, was found to be 39.5 per cent.*

For reasons that I will presently state, I consider both these specimens unfit for building purposes. The cementing material appears to be chiefly the sulphuret of iron.

* These specimens were offered for and used in the construction of the Cuyahoga County Jail. Its present appearance justifies Prof. Brainerd's predictions

This mineral, when exposed to the action of air and moisture, is decomposed, forming the sulphuret of iron, (green vitriol,) which is soluble in water, producing thereby a destruction of the stone. In consequence of the property of the stone to absorb water, freezing also causes its disintegration. When stone containing iron pyrites is laid in a wall with lime mortar, it soon becomes stained with the per-oxide of iron. The cause of this, probably, is that the sulphur of the sulphuret of iron is converted into sulphuric acid; this, united with the lime of the mortar, forming the sulphate of lime, the iron is converted into the per-oxide, thus causing the stain upon the surface of the stone. Those quarries, belonging to this formation, that contain no sulphuret of iron, of which the Custom House at Sandusky, and the United States Court House and Post Office in this city are being built, are beautiful in appearance and durable in quality.

CLEVELAND, January 22, 1858.

The Academy met at the Medical College, Prof. Jared P. Kirtland, President, in the chair. The minutes of the previous meeting were read and approved.

The President presented an Indian pipe, dug up on the farm of Dr. Tousey, Pleasant Gap, Bates county, Missouri.

Dr. Garlick presented a columella of the *Pyruia per-versa*, found about seven feet beneath the surface, near Port Clinton, Ottawa county, Ohio. It had evidently been used as an ornament by the aborigines.

Col. Whittlesey read a paper on the Age of Trees, indicated by their layers or rings.

In the discussion which followed the reading of Col. Whittlesey's paper, Prof. Cassels remarked that there

would be a ring deposited for every terminal bud formed. If a tree made two growths in a season, two rings would be the result; but as most trees made one growth each year only, a single or annual ring would be all that would be formed in a single season.

On motion. Mr. George R. Tuttle was elected Librarian of the Academy.

The meeting then adjourned for two weeks.

JOHN KIRKPATRICK, *Sec'y.*

CHRONOLOGY OF TREES—COMPARISON OF LAYERS OF GROWTH.

BY COL. CHARLES WHITTLESEY.

Read before the Cleveland Academy of Natural Science, January 22, 1858.

I have given a very critical examination to this subject. Although the works on Botany lay it down as an axiom that there is a layer or ring of growth produced each year, in a healthy and thriving exogenous tree, and one only—(see Ruschenberger's *Outlines of Botany*, page 590,)—this being also the common or popular belief, arising, no doubt, from general observation, yet I have never seen a statement of specific examinations upon trees whose ages were known.

In 1838, an illiterate man, who could not read, brought to the Register of the Land Office, at Chillicothe, a block from a Witness Tree of the Public Surveys in that district, in order to show the number of the section in which he wished to purchase. The Register informed me that the

figures put on the tree about thirty years previous, were distinctly visible, and that the rings of growth corresponded to the date of the survey, as the Returns in his office showed.

Mr. Wiltze, of the Surveyor General's office, at Dubuque, once informed me that the same thing had been observed in that office, and that he once saw the marks of a survey in New York, made fifty-four years previous to the time when the tree was cut, and the annual layers agreed with that date. We know that there are trees of great age that are known in history, and that the growth must be very slow.

There is an orange tree at Versailles that is known to be four hundred years old. Another, planted at St. Sabin, by St. Dominic, is reputed to be more than six hundred years of age, and was living in the year 1845. Also at Sancure, there is a chestnut, which was planted full six hundred years since. A botanist, named Alexander, saw a tree in Senegal, called Basbob, on which he found the marks of a traveler made three hundred years previous, and the layers of wood outside the date corresponded to that period. From the size of this tree, it may have been five thousand years of age. We know that the Charter Oak, in Hartford, Connecticut, was an old tree in 1687, and only died a few years since.

The Old Elm, in Boston Common, was a full grown tree in the year 1725—more than an hundred years since. There is reported to be in Mexico a living tree, to which the tradition of the people gives an age of three thousand years, and, although there are such things as popular errors in matters of this sort, there are also popular truths, and a general belief is some evidence of truth on most subjects, whether scientific or practical.

This mode of reckoning trees has been applied to the ancient mining operations of Lake Superior, over which, in one case, I counted on a hemlock stump, recently cut,

(1849,) two hundred and ninety layers of growth. Mr. S. O. Knapp saw another tree with three hundred and ninety, and another gentleman one of four hundred rings or layers standing in one of the ancient pits. On the mounds and earthworks of Ohio, the timber is as large as it is in the surrounding forest.

Mr. Tomlinson, the owner of the Grave Creek Mound, twelve miles below Wheeling, on the Virginia side of the Ohio, cut down an old oak which stood upon it, having been, in 1838, about fifteen years dead. It had about five hundred layers of growth. This place was visited as early as 1734, and the trees were then old. If, therefore, we can rely upon this mode of reckoning time, in cases where history and all other records are silent, something will be gained to chronology.

The instances I have here prepared, show that the rule is not absolute, but that circumstances modify the regularity of the accretion of wood or annular coatings, and that, as a general rule, *only one* is formed in a season. There are cases of very thrifty young shoots that make more than one course in a year, but they are rare exceptions to the above rule. Trees that are transplanted, frequently lose a season's growth, and this is shown by the table, for the reputed ages of the trees which are noticed there is *greater* than the number of the rings. A severe drought may produce the same result. It is not easy always to count them exactly, because the divisions are frequently obscure, and it makes a difference as to the height above the ground the stump is cut. A small sugar tree, which I cut near the ground, had from ten to twelve rings of growth where it was 1.70 inches diameter, and again, at five feet from the ground, with a diameter of 1.40 inches, it had but *seven*.

There may be, in this mode of determining the age of trees, a liability to error from these causes of a few years but the error is likely to be one of diminution.

A TABLE OF COMPARISON BETWEEN THE REPUTED AGE OF TREES AND THE NUMBER OF LAYERS OF GROWTH.

| No. | Where Situated. | Kind of Timber. | Height of Stump. | | Di- am- et'r of Tree. | Rept'd Age of Tree. | No. of Rings. | Average thickness of rings. | REMARKS. |
|-----|---|-----------------|------------------|-----|-----------------------|---------------------|---------------|-----------------------------|---|
| | | | ft. | in. | | | | | |
| 1 | Corner Seneca and St. Clair sts., Cleveland. | Willow. | 6 | 12 | 19 to 20 | 17 to 19 | 19-30 | 100ths | Layers of growth indistinct near the centre of the stump. |
| 2 | Corner Lake & Water streets, Cleveland. | Locust. | 4 | 16 | 26 to 28 | 27 to 28 | 29-100ths | | Specimen was somewhat rotten, and indistinct at heart. |
| 3 | Corner Lake & Water streets, Cleveland. | Locust. | 4 | 13 | 26 to 28 | 24 | 26-100ths | | Annual rings or layers of growth distinctly visible to the centre of the stump. |
| 4 | Corner Lake & Water streets, Cleveland. | Locust. | 4 | 14 | 26 to 28 | 23 | 30-100ths | | Annual rings or layers of growth distinctly visible to the centre of the stump. |
| 5 | Corner Lake & Water streets, Cleveland. | Locust. | 4 | 14 | 26 to 28 | 25 | 28-100ths | | Annual rings or layers of growth distinctly visible to the centre of the stump. |
| 6 | Public Square, Cleveland. | Elm. | 6 | 16 | 26 to 27 | 23 | 30-100ths | | Sound to the centre, and annual layers tolerably distinct. |
| 7 | St. Clair street, Cleveland. | Locust. | 4 | 12 | 26 to 27 | 21 to 23 | 29-100ths | | This tree, when cut, was found to be rotten at the heart. |
| 8 | St. Clair street, Cleveland. | Locust. | 4 | 10 | 24 to 26 | 19 | 26-100ths | | The annual rings in this specimen were distinct to centre. |
| 9 | Custom House Lot, Cleveland. | Sugar. | 7 | 8½ | 39 to 40 | 30 | 17-100ths | | Planted in 1827 by Leonard Case—1½ to 2 in. diameter. Cut in full health Oct. 13, 1857. Rings distinct, 24 in number outside of 1 inch red heart wood, where they are not distinct, numbering 4 to 6. Both trees alike in all respects. |
| 10 | Custom House Lot, Cleveland. | Sugar. | 7 | 10 | 36 to 38 | 30 | 21-100ths | | This tree was blazed by Surveyors in Nov. 1806; died about 1853. Somewhat rotten and rings not distinct in all cases. |
| 11 | North & South Road, Tallmadge, Summit Co., Cleveland. | Linn. | 3 | 6 | 47 to 48 | 43 to 47 | | | Rotten at heart and not a good example for this purpose. |
| 12 | Custom House Lot, Cleveland. | White Maple. | 6 | 16 | 37 to 39 | 36 to 38 | | | The time when this tree was cut down is not well fixed. |
| 13 | 4 Corners, ¼ miles W. of Tallmadge Centre | Oak. | 2 | 6 | 35 to 37 | 36 to 38 | | | Tree sound, but the annular rings not distinct. Planted February 1827, by Leonard Case. |
| 14 | Superior st., Custom House, Cleveland. | White Maple. | 6 | 12 | 36 to 39 | 40 | 15-100ths | | Planted by Wm. Case, 7 years last spring, (1857, Nov. 17,) in the seed—dead 1 year—layers distinct. |
| 15 | William Case's Nursery, Lake street. | Poplar. | 1 | 6 | 6 | 5 | 41-100ths | | Planted by Wm. Case, 10 years last spring, (Nov. 17, '57,) layers distinct except one at pith—died one year since. |
| 16 | William Case's Nursery, Lake street. | White Wood. | 1 | 2½ | 9 | 6 | | | Planted by Wm. Case in 1845—3 years old—13 layers distinct—may be 14 years old—dead 2 years. |
| 17 | William Case's Nursery, Lake street. | Peach. | 2 | 8 | 17 | 13 | 65-100ths | | |

A TABLE OF COMPARISON BETWEEN THE REPUTED AGE OF TREES AND THE NUMBER OF LAYERS OF GROWTH.—CONTINUED.

| No. | Where Situated. | Kind of Timber. | Height of Stump. | | Di- am- et'r. | Rept'd Age of Tree. | No. of Rings. | Average thickn's of rings. | REMARKS. |
|-----|--------------------------------------|-----------------|------------------|-----|---------------|---------------------|---------------|----------------------------|---|
| | | | ft. | in. | | | | | |
| 18 | William Case's Nursery, Lake street. | Peach. | 2 | 8 | | 15 to 17 | 13 | | Planted by Wm. Case in 1845—3 years old—13 layers distinct—may be 14 years old—dead 2 years. |
| 19 | William Case's Nursery, Lake street. | Peach. | 2 | 2½ | | 11 from stone. | 8 | | Planted by Wm. Case's gardener—tree sound and layers distinct, except at pith—may be 9 rings. |
| 20 | William Case's Nursery, Lake street. | Peach. | 2 | .. | | 15 | 12 | | Planted by Wm. Case in 1845—3 years old—sound, and layers distinct. |
| 21 | William Case's Nursery, Lake street. | Peach. | 2 | 10 | | 13 | 11 | | Planted by Wm. Case in 1845—3 years old—sound, and layers distinct—dead 2 years. |
| 22 | William Case's Nursery, Lake street. | Cherry. | 2 | 8 | | 10 | 11 | | Planted seedling spring of 1847—sound, and layers distinct living tree. |
| 23 | William Case's Nursery, Lake street. | Cucumber. | 2 | 1 | | 7 | 5 | | Planted seedling spring of 1850—sound, and layers distinct living tree. |
| 24 | William Case's Nursery, Lake street. | Peach. | 2 | ½ | | 1 | 2 | | One year from the stone—the rings distinct—living tree. |
| 25 | William Case's Nursery, Lake street. | Peach. | 2 | ½ | | 1 | 0 | | One year from the stone—no rings visible—living tree. |
| 26 | William Case's Nursery, Lake street. | Peach. | 2 | ¾ | | 2 | 2 | | Living tree—layers distinct. |
| 27 | William Case's Nursery, Lake street. | Peach. | 2 | ¾ | | 2 | 2 | | Living tree—layers distinct. |

*These are the ring outside the marks in most cases.

CLEVELAND, February 5, 1858.

The Academy met at their rooms in the Medical College, Col. Charles Whittlesey in the chair.

A specimen of a copper tool, supposed to have been used as an axe, was received from Prof. Kirtland. It was discovered in a mound, at Columbus, along with several others, and resembled tools of the same kind that are occasionally exhumed in digging into the ancient works of the mound builders.

Col. Whittlesey remarked that all the specimens he had ever seen appear to be identical in origin, and that the copper is evidently that of Lake Superior. It has the small spots of native silver, so peculiar to the copper of that region. This also proves that the ancient people were ignorant of the fusibility of that metal, for had it been melted, the silver would have formed an alloy with the copper. These tools were therefore cut and hammered out of pieces of native copper that were near the size and form required.

Prof. Jehu Brainerd made some observations on the expansibility of gases, based upon the supposed condition of their atoms.

On motion, Hudson Tuttle, of Berlin, Erie county, Ohio, was elected a member.

The meeting then adjourned for two weeks.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, February 19, 1858.

The Academy met pursuant to adjournment, Col. Charles Whittlesey, Vice President, in the chair.

Mr. G. A. Hyde read a paper on Meterology and the great storms that pass over the United States.

At the close of the reading of Mr. Hyde's paper, the

subject of storms and the temperature of different seasons was discussed for some time by several of the members of the Academy.

The meeting then adjourned for two weeks.

W. H. ATKINSON, *Cor. Sec'y.*

METEOROLOGY—GREAT STORMS.

BY G. A. HYDE.

Read before the Cleveland Academy of Natural Science, February 19, 1858.

Under this head I propose to present a general view of the great storms that pass over our country, and, in connection therewith, show the use of the barometer and thermometer, in indicating the approach of said storms, and, to a certain degree, determine what will be their character.

From an examination of Prof. Espy's Report on Meteorology, from a study of his Storm Charts, and from personal observation, I present the following as characteristics of these great storms.

They generally commence in the "Far West," and travel towards the East, and at a velocity of about thirty-six miles per hour, or, they are usually about twenty-four hours traveling from the Mississippi River to the Connecticut River.

They are accompanied with a depression of the barometer near the central line of the storm, and are preceded and followed by a rise of the barometer. Thus, at a sudden fall of the barometer in the Western part of New England, it will rise in the valley of the Mississippi and also at St. Johns, Newfoundland.

The central line of minimum pressure is generally of great length from North to South, sometimes reaching beyond the Gulf of Mexico and the Northern Lakes, while the East and West diameter is comparatively small.

When a storm commences in the United States—as it does sometimes,—the line of the minimum pressure does not come from the “Far West,” but commences with the storm and travels with it towards the East.

In great storms, the wind, for several hundred miles on both sides of the line of minimum pressure, blows towards that line directly or obliquely; and at the line of minimum pressure there is generally a lull of wind, and sometimes a calm. On the approach of the line of minimum pressure, the wind is Easterly, and immediately after it has passed it changes to the West, and the barometer begins to rise.

The force of the wind is generally in proportion to the suddenness and greatness of the depression of the barometer. At the time of great and sudden depression, there is usually much rain or snow, and generally in sudden great rains or snows, there is a great depression of the barometer near the centre of the storm.

During the high barometer, on the night preceding a storm, it is frequently clear and calm, with a low temperature, accompanied with frost, and during the day preceding a storm, it is generally clear and mild in temperature.

After the passage of the centre of great storms, it is generally very windy, and the temperature falls suddenly, so that when the centre of a storm is in the middle of the United States, the lowest temperature of the month will occur in the West on the same day of the highest temperature in the East.

Having shown the characteristics of these storms, I will proceed to illustrate the practical use of the barometer and thermometer for indicating their approach.

In the use of the barometer it is usually the *fall* which gives the warning, but sometimes the *rise* indicates the approach of a storm. For example: Suppose that in this city the barometer has for a short period indicated a state of apparent rest in the atmospheric pressure. Now, say it begins to rise above its average height, there *must* be a low barometer at the West. After a few hours the barometer begins to fall; the centre of the storm, or line of minimum pressure, is approaching; the wind blows gently from the Eastward; the barometer continues to fall, and the wind increases in force until nearly the time that the centre of the storm passes over the observer, then there is a lull of the wind for a short time. After the centre of the storm has passed, the wind changes and blows strong from the Westward, and the barometer begins to rise, and continues rising until it passes above, and then falls again to about its average height. The wind in the mean time dies away to nearly a calm, to be affected by local causes, until another storm is started.

In this instance the storm would be indicated first by the the *rise* of the barometer. Should one storm immediately follow another, the rise after the passage of the first storm might occur at the same time that the rise should occur on the approach of the second storm. In that event, the approach of the second storm would only be made apparent by the fall of the barometer below its general average height.

Should the barometer fall suddenly, and to a low point, very strong winds would be expected, and probably a great amount of rain or snow.

The occurrence of a low temperature, accompanied by frost, at a time other than immediately after the passage of a storm, would be a very sure indication of the approach of a storm.

The foregoing is submitted for examination and consideration, with the hope that many will interest themselves

in this important branch of science, and that the day may not be far distant when the movement of these great storms will be thoroughly understood, and, by the aid of the telegraph, their course and extent will be anticipated, resulting in incalculable benefit to the mariner and the farmer.

CLEVELAND, March 5, 1858.

The Academy met at the Medical College, Col. Charles Whittlesey, Vice President, in the chair.

The minutes of the previous meeting were read and approved.

Col. Whittlesey exhibited maps of several of the Eastern and Western States, on which were sketched the limits of the drift and the direction of the striæ, supposed to be cut by glacial action. The Colonel stated that these striæ are to be found beneath the level of the Lake, and on the tops of the highest hills. On hard trap rocks they are very fine and sharply cut, while in the softer strata they are sometimes from two to eight inches in depth. Several specimens from the limestone rock, at Sandusky, were shown, and on these the lines were quite distinct, and exhibited the phenomena of two glacial currents crossing at nearly right angles with each other, and giving the stone a checkered appearance.

After considerable discussion, the meeting adjourned for two weeks.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, November 12, 1858.

The Academy met at the Medical College, Prof. Jehu Brainerd in the chair.

The President, Prof. J. P. Kirtland, exhibited two species of *Echina cactus*, sent by Dr. J. S. Newberry, who obtained

them during his visit to the Pacific coast, as a member of the Pacific Railroad Exploring Expedition, from the Sacramento to the Columbia river.

Prof. Kirtland also stated that while the thermometer stood at 36° of Fahrenheit, at Charleston, S. C., on the 11th inst., at his residence, at Rockport, it ranged from 37° to 40°, and, although a heavy frost had swept the State of Georgia, no frost had yet been felt in his garden; tomatoes, lima beans and tender green house plants being yet vigorous and healthy in the open air. The Professor exhibited a very fine, large bouquet, many of the flowers in it being tender plants, that was gathered on his grounds during that day.

Mr. Kirkpatrick stated that the frost had killed his dahlias, and had formed ice, in open vessels, an eighth of an inch in thickness, within the city limits. His garden is not exposed but rather sheltered.

Mr. Kirkpatrick exhibited some insects, received from Mrs. Mary Dean, of New Orleans,—one of them is a very large *Mantis*.

An interesting debate took place on the histology of the vegetable cell, and the motion of sap and its circulation through the vegetable tissue, in which Dr. Atkinson, Prof. Brainerd and Mr. John Kirkpatrick took part.

The meeting then adjourned for two weeks.

JOHN KIRKPATRICK, *Sec'y*.

CLEVELAND, January 21, 1859.

The Academy met at the Medical College, the President, Prof. J. P. Kirtland, in the chair.

The Secretary read a copy of a Bill for authorizing a Geological Survey of the State of Ohio, presented to the Legislature by Mr. Canfield, Senator from Medina and Lorain counties, remarking that the subject of a Geological Survey

was of great interest to the State, and should enlist the attention of every scientific man.

He presented the following resolution:

Resolved, That a committee of three be appointed to draft a petition to the Legislature, praying for the passage of the Bill presented in the Senate of Ohio, by Mr. Canfield, authorizing a Geological Survey of the State, and that said petition be signed in the name of the Academy by its officers, and sent to our Senator or Representative for presentation.

On being seconded, the President said:

That it gave him great pleasure to give this resolution his support, and would say that after a careful perusal of the Bill, he was convinced that it was by far the best drafted Bill ever presented to our Legislature for the purpose specified. As a member of the corps that undertook the survey of the State under the old Bill, passed many years ago, he understood the difficulties and objectionable features of the old Bill, and all others presented since that time; but, by the arrangement proposed in Mr. Canfield's Bill, these objections are entirely obviated. There can be no time more auspicious for the organization of a Geological Survey than the present. It would develop the hidden resources of our State, by bringing to light deposits of iron, coal and other minerals, which would be of incalculable benefit to the community in supplying labor to our population and increasing the aggregate income of the State. The analyzation of soils would supply the farmer with that knowledge so desirable in agriculture, the application of the proper manures to particular soils, and enable him to raise good crops on land now almost or entirely barren. The discovery of marl beds, in different parts of the State, and which such a survey would doubtless bring to light, would supply the material from which to raise wheat crops in many sections now unable to raise this most useful of the cereals in sufficient quantity to meet the home demand.

Insects destroy, annually, in Ohio several million dollars worth of produce. Take the wheat midge, for instance. If, after a thorough examination of the habits of this insect, and its pursuits, a *cure* should be discovered, the gain to our State would be greater in one year than the cost of the whole Geological Survey. This would be the business of a State Entomologist. Private parties may examine into the natural history of insects, and may, or may not, give to the public the results of their investigations; but it is the duty of the State to do this work for herself.

The same arguments may be used in favor of the botanical and general zoological departments. But it is not in a mere dollar view of the matter that we should look at this subject; the interests of *Science* are at stake, and these are the interests of the race. With the advance of science goes the advance of general knowledge and intelligence, and the increase of the aggregate of human happiness.

The resolution was carried unanimously, and John Kirkpatrick, Dr. T. Garlick and Dr. W. H. Atkinson appointed said committee.

Dr. Garlick stated that *Pinus Banksia* was very plentiful at Eagle Harbor, Lake Superior, and presented great difference in general habit, some being very pendulous, and others erect and rigid.

A discussion took place on the natural history of the Bee, and the facilities afforded the Apiarian by the use of Longstroth's Hive, to inspect the condition of his swarms, and study their natural history, viewing this application, also, in an economic light,—Prof. Kirtland, Dr. Garlick and John Kirkpatrick taking part.

Dr. Hartman read a paper on the recent discoveries in Spain and France of the cause and cure of mange, itch and scab in domestic animals, with observations on the various *Acarii* that produce those diseases. This, on motion, was

referred to the Recording Secretary for publication in the *Ohio Farmer*, and a committee, consisting of Drs. Hartman, Garlick and Atkinson, appointed to examine into the nature and habits of the *Acarii* inhabiting the skins of domestic animals.

Nothing further being presented before the meeting, adjourned for two weeks.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, November 18, 1859.

The Academy met at the Medical College, the President, J. P. Kirtland, in the chair.

Col. Charles Whittlesey made an interesting statement regarding the increased yield of iron at the various furnaces in the counties of Trumbull and Mahoning. In old times three tons was considered a good day's work, four being unusual, but at the present time the furnace at Niles turns out thirty-two tons of superior metal in a single day, using the hot blast. Bog iron ore is found abundantly along both sides of the Lake shore, and is used as a flux for the rich ores of Lake Superior. The workmen say that it takes the red, or hot short out of the latter, and thus improves it. The quality of the iron is unsurpassed. It is extremely tough and fibrous when wrought or hammered. Thick bars can be doubled over cold, with the sledge, without showing any trace of fracture, and, in this respect, is quite equal to the best specimens of Swedish. The advantages of Cleveland, as an iron manufacturing point, are at least equal to any other in the United States, or even in the world, and wrought iron is produced here at lower rates than an equally good article can be imported from Europe. Limestone for a flux can be delivered here at a dollar a ton.

Col. Whittlesey stated that gas springs were quite numerous throughout our State, arising from the black shale—the

Marcellus and Genessee slates of New York. Several of these exist in the Lake, one of them about a quarter of a mile East of the end of the pier at Cleveland, one in the bed of the Cuyahoga River near the mouth of Big Creek, Brooklyn, another not far East of the mouth of Chagrin River, in the Lake, and also one in Grand River, between Painesville and Fairport.

Prof. Kirtland stated that there is one in Rocky River, at Col. Mastick's Mill Dam, and another out in the Lake, about two miles, nearly opposite East Rockport. The former is double, part being on the land.

H. F. Smead stated that there is one in Willoughby, on Col. Hastings' farm, on the banks of Chagrin River. The gas escapes by numerous small holes in the rock and burns readily when set on fire.

All these, Col. Whittlesey stated, occurred in the same formation as that at Fredonia, N. Y., by which the town is lighted.

Prof. Kirtland stated that the Hickory Shad—*Chatæssus ellipticus*—is now very plentiful in the Lake. A few years ago it was unknown in these waters, but has doubtless reached the Lake through the Ohio Canal. It is not many years since the first specimen of this fish appeared in the upper portion of the Ohio River.

At the present time, in the fish pounds, near Cleveland, are captured great numbers of White Fish—*Coregonus albus* Lesueur—and Lake Herring—*C. Artedi*, or *clupeiformis*. All were captured coming from the West, their run being East, and nearly all of the females have deposited their spawn. Our summer fishes are now scarce, having doubtless left for the deeper waters of the Lake.

Mr. Kirkpatrick remarked that he had never been able to obtain a specimen agreeing with the characters of *Core-*

gonus albus as given by Agassiz, in his "Lake Superior." He believed that that fish did not exist in Lake Erie. Leseur obtained his specimen of *albus* from our lake, and although his description is meagre, there is no reason for doubting to what fish he referred. In Mr. Kirkpatrick's opinion there was something mixed up in the description of *Salmo namacush*. The Lake Superior and Huron fish differed from the Lake Erie ones in several points, and this species and *S. amythestinus*, may yet prove distinct.

Several of the members stated that it was the common opinion among the lake fishermen, that the White Fish fed on small molluscs, and that it used its mouth somewhat in the manner of the suckers—*Catostomus*. Its lips bear considerable resemblance to those of the latter fishes, and as nothing is ever found in its stomach but mucus-like matter, that bears some resemblance to partly digested shell-fish, this idea may be the correct one.

Adjourned until Friday evening, December 2, 1859, at 7 o'clock.

JOHN KIRKPATRICK, *Sec'y.*

CLEVELAND, December 2, 1859.

The Academy met in the Medical College, the President, J. P. Kirtland, in the chair.

Dr. J. S. Newberry gave a short account of his travels in New Mexico, on both sides of the Rocky Mountains. West of this range the rocks are cretaceous, with one small patch of tertiary in the Navajo country. High among the mountains the country is beautiful, with abundance of flowers. Agricultural progress, as a general thing, rather poor. The only species of native wild grape seen by the Doctor resembled our winter grape, *V. riparia*, but European grapes are extensively cultivated, and do very well. El Paso is the best wine region, but the culture of the vine

extends from Santa Fe to the mouth of the Rio Grande. The color of the grape is nearly that of the Catawba. At El Paso excellent raisins are made from these, superior in fact to the Malagas. Around El Paso fruits do well. Apricots are of inferior quality. Peaches abundant. Pears fine. Oregon, however, beats the world in fruits. The common varieties in Ohio grow to double the size there, and the colors are brilliant. A show of fruit in Oregon exhibits every variety of shade and hue, and resembles a fine parterre of flowers.

In the Doctor's opinion, the Mississippi Valley is superior to every other section of our country West. In some places West there are spots of great fertility and beauty, but the general character of the country is inferior. Washington Territory is inferior to Oregon. In New Mexico, the mountains contain a large amount of mineral riches—gold, silver, copper and lead—the two latter being, in the present condition of things, useless, from the cost of transportation to a market.

The weather was very wet during a great portion of the time while the survey was in the field, and the consequence was, that nearly all the specimens in Natural History were more or less spoiled. Many of the birds were badly injured from the damp. Many specimens of the large grey wolves were seen, and abundance of the smaller kinds. The buffalo range, at present, is one hundred miles nearer the whites, on the East, than it was some years ago, and it is somewhat doubtful if their decrease in numbers is so great as supposed. The white hunters do not kill as many as the Indians, and the various tribes must have destroyed more of these animals for subsistence, when their numbers were greater than they are now. The Indian is disappearing faster than the buffalo.

One of the principal objects of the expedition was the exploration of the San Juan River, a large stream, equal in size to the Rio Grande, at its junction. Its banks are

entirely uninhabited, but it is capable of supporting a population of several hundred thousand. What is remarkable about this river is, that at one time its banks were covered with a dense mass of inhabitants, who were a nation of masons. The ruined houses are everywhere, perched up among the rocks and on the fertile bottoms. Wherever a piece of land was capable of cultivation by irrigation, there was a dwelling of stone. Many of these dwellings yet contained the cedar wood work, and were in a good state of preservation, while others, more ancient, were but a heap of ruins. Many of these buildings exhibit skill in their construction. The stones were squared and hewn, and the outside of the walls must have been rubbed down smooth after building, and this would cost a great deal of labor. The time of the desertion of the Valley of the San Juan is traditional. One intelligent Indian said that the people left to go to the succor of the armies of Montezuma, but this is doubtful, and it might with more reason be ascribed to the constant inroads of the warlike and hostile neighboring tribes.

All over that land there is evidence of decay. Much of it is the result of the gradual drying up of the country. The rains fall at the wrong time, and the waters that, in the early parts of its history, probably thousands of years ago, were distributed over the table lands, are now confined to the canons, at the bottom of which there is a narrow strip of verdure. These canons are great chasms, hundreds of feet beneath the land level, through which the rivers pour, and that drain the land excessively. The country is spoiled through overdrainage, and is left a waterless wilderness, on which no useful plant can grow.

The honey bee was lost sight of on the prairies, and does not exist in New Mexico. The country, however, in many places, is favorable to the production of honey.

Prof. Kirtland exhibited the skull and bones of the head

of a specimen of *Catostomus*, the throat containing a series of teeth attached to strong bones, resembling maxillæ. Last year there were several of these teeth-bearing bones exhibited, and doubts expressed as to the animal from which they were taken.

Adjourned for one week.

JOHN KIRKPATRICK, *Sec'y.*

PECULIARITIES OF CLIMATE, FLORA AND FAUNA
OF THE SOUTH SHORE OF LAKE ERIE, IN
THE VICINITY OF CLEVELAND, OHIO.*

BY J. P. KIRTLAND.

Read before the Cleveland Academy of Natural Science, December, 1851.

Very erroneous opinions are entertained, by even intelligent people, respecting this section of country, so far as its climate and the species of the animal and vegetable kingdoms are concerned. A series of observations, embracing a period of ten years, have disclosed some interesting facts upon these points.

The locality where these observations were made is situated five miles West of Cleveland, half a mile from the lake, one hundred and fifty feet above its surface and fully exposed to its influence. During the ten years the temperature has not often fallen below zero; while at Columbus, Marietta and Cincinnati, situated from 120 to 150 miles South, it has frequently sunk to 5°, and has occasionally fallen to 10°, at some of those places. Their latitudes are as follows, to wit:

* Published in the American Journal of Science and Arts, Vol. XIII, No. 38, Second Series, March, 1852.

Points of observation:

| | | | | |
|----------------------------|---|---|---|------------|
| Cleveland, North Latitude, | - | - | - | 41° 31' |
| Columbus, | " | " | - | 39° 57' |
| Marietta, | " | " | - | 39° |
| Cincinnati, | " | " | - | 39° 5' 54" |

The more tender vegetation is usually cut down in all Northern Ohio—a few localities excepted—within five days of the 25th of September. The lake Shore is an exception. Dahlias, maize and sweet potatoes are generally killed here and at Cincinnati—never before the 25th of October, and sometimes not until late in November. In one instance, at least, the lake shore escaped two weeks later than did Cincinnati.

At the present moment, October 25th, vegetation is as verdant and thrifty as it has been at any time during autumn, though it was cut down throughout the West generally several weeks since.

The foliage of the fruit and forest trees, having subserved its purposes, is falling without the intervention of frost, and the wood of the more tender trees, such as the peach and cherry, has attained a maturity that will render it sufficiently hardy to withstand the impressions of cold during winter. This occurring annually, gives to those trees a degree of vigor, health and productiveness not to be met with in localities where their growth is suddenly arrested by frost at a period when they are immature.

In the middle and southern sections of Ohio, Spring sets in during the month of March—perhaps earlier. The warm winds blowing up the valleys of the Mississippi and Ohio, in conjunction with other causes, bring forth vegetation earlier, but cold weather and disastrous frosts too often follow.

While these changes are progressing in those parts of the State, Winter will remain steadfast at this point. Little

advancement will be made by Spring, so long as any considerable bodies of ice float upon the lake, even as low down as Buffalo. No sooner do they disappear than Spring sets in with a reality, and vegetation puts forth with a *sub-Arctic* activity.

The Lake, rapidly imbibing the heat at this season, becomes a safeguard against any subsequent vernal frost. Its influence was manifested in a satisfactory manner early in the present season. On the first of May, Spring seemed to be fully established; fruit trees had blossomed, and in some localities young fruits had formed. The morning was cold, and the temperature declined during the day and evening. At 2 o'clock, P. M., it was 48° Fahrenheit; at 7, 34°, and at 9, 32°. The atmosphere was calm and clear, indicating to an inexperienced observer the approach of a destructive frost. At 10 o'clock, P. M., it had risen to 40°; a heavy cloud of haze hung about twenty degrees above the Lake, and soon overspread the whole horizon. The morning of the following day was warm and misty; by 12 o'clock, A. M., it was clear and Spring-like. Not a fruit germ was injured on the Lake shore. A different state of things occurred throughout the West and Southwest, where no local influences interposed. The temperature steadily declined, without intermission, during the day and night, down to about 26°. The day following was cold and blighting, and fruits were generally destroyed.

The modes by which the Lake exerts its influence on such occasions do not appear to be uniformly the same at different times.

On the approach of a cold night, as in the instance above noticed, the warm emanations condensing may give off caloric, and obscure the atmosphere with haze, mist, or clouds, when no frost will occur.

Under circumstances apparently similar, on the approach of a cold night, neither haze, mist nor clouds may form,

but a stiff breeze springs up, and the stars become unusually brilliant. The thermometer vacillates between 32° and 38° , rising with the gusts of wind, and falling with the intervals of calm. *Then* no frost will appear.

Again, none of those modifying causes may intervene, but the temperature may fall below the freezing point, ice form on the surface of water, and the expanded fruit, leaves and blossoms congeal. Under such circumstances, the first rays of the rising sun, the next morning, will be arrested by a haze, which will soon thicken, and before noon a warm rain will probably fall. The frost will be abstracted so gradually from the frozen vegetation as not to impair its vitality.

These contingencies have all occurred within the period of our observations. The year 1834 proved an exception. The general cold prevailed over the local warmth of the Lake. Freezing weather continued two or three days, and fruits were cut off, even on the shore of the Lake.

In Autumn this great body of water begins to part with its warmth to the colder incumbent atmosphere, and the process continues during the Winter. While its progress is most rapid, strong southerly winds prevail at the earth's surface, while volumes of clouds, at a high elevation, may, at the same time, be moving rapidly in an opposite direction.

These counter currents have sometimes given origin to a phenomenon in the city of Cleveland, not well understood by all of its good citizens. The vane of the lofty spire of the Baptist church, standing on a high ridge of ground, may point steadily to the North, while that on the low cupola of the First Presbyterian church, situated on a less elevated plateau, may be directed to an opposite point of the compass, with a stiff southerly breeze at the same time.

Cool North winds begin to prevail about the middle of October. The emanations from the Lake then begin to condense and pass off to the South, in the form of thick clouds, without discharging, at first, much rain. About the 20th of October the cold from the North seems to gain the ascendancy; squalls of rain, hail and rounded snow appear alternately, with intervals of clear and warm weather. These squalls always precede the autumnal frosts. Our gardeners feel no apprehension for their tender vegetables till these premonitions have appeared.

Common observations, as well as the more sure test, the rain gauge, show that larger amounts of vapor from the Lake are carried South, condensed in the form of rain and snow than fall in this vicinity.

During Winter comparatively little snow falls, and still less accumulates here, though it may be abundant on the higher grounds, thirty or forty miles in the interior.

This region is also not so frequently favored with showers in Summer as the central portion of the State. Long and severe drouths often prevail, but they are in part counteracted by moisture in the atmosphere. This quality sustains vegetation, and also imparts a blandness and freshness to the atmosphere during the hottest days of Summer, very observable on approaching the Lake from the interior. During that Season it is peculiarly pleasant and invigorating to invalids, and equally harrassing to them during the Spring season.

The indigenous vegetation of this vicinity is of rather a Southern type—shown by the absence, in a great measure, of evergreens, and the occurrence of more Southern genera, as the *Cercis*, *Ilex*, *Æsculus*, *Nelumbium*, *Gleditschia*, *Magnolia*, &c. Elliott's Botany of South Carolina and Georgia has been found to be a convenient hand-book for investigating our flora. On the other hand, strange hyperborean plants are frequently found, which have been washed down

from the Northwest, through the long chain of the Great Lakes.

Many of our birds are species whose most Northern ranges of migration have been assigned, by ornithologists, many degrees South of this. The Hooded, Kentucky, Yellow Throated Wood, Cerulean and Prairie Warblers annually rear their young in this vicinity. Trail's Fly Catcher and the Piping Plover have been repeatedly seen here, and the Purple Ibis is an occasional visitor. The list might be greatly extended.

Great numbers of the *Sylvicolæ* semi-annually congregate here, during their migrations, and seem to make it a resting place, both before and after passing the Lake. More Northern species occasionally resort here during Winter for the purpose of obtaining food, or are driven here by storms; such are the Pine Grosbeak and the White Owl. The Bohemian Wax-Wing visits us almost every Winter, and sometimes in large flocks. The Pine Finch is described, by some ornithologists, as resorting to the United States only at long intervals, and during Winter. It visits our gardens and grounds in numerous flocks, every season, early in July, and remains here till the ensuing Spring. The young, at their first appearance, still retain much down about their plumage, and cannot have been long absent from their nests. The food of these birds is Aphides during Summer, and at other times small seeds of grapes and other vegetables.

The insect tribe show, still more strikingly, Southern affinities. The *Papilio Cresphontes*, figured and described by Boisduval and Le Conte as the *Papilio Thoas*, has been repeatedly taken here, though it has been considered as exclusively Southern in its resorts. In the South the larva feeds on the orange and lemon. Here, Major Le Conte informs me, it lives on the Hercules Club.*

* I have since discovered that the favorite food of the larva, in Ohio, is the *Fraxinella*, cultivated in our gardens.

The Papillio Ajax and P. Marcellus have also been described as Southern insects, and the late Mr. Doubleday located the former exclusively in Florida, and fixed the most Northern limit of the latter in Virginia. Still they are common at this point, and subsist, in the larva state, on the pawpaw. An undescribed species of Libythea has been taken in Northern Ohio. It has been found, also, in South Carolina, and is without doubt legitimately a Southern species.*

The Chærocampa tersa, an elegant miller, was taken in our garden, in the month of May last. Dr. Harris describes it as a native of South Carolina, where it feeds on a species of plant that does not grow at the North.† The food it finds as a substitute has not been ascertained.

DESCRIPTION OF A NEW SPECIES OF LIBYTHEA AND OF MACROGLOSSA.‡

BY J. P. KIRTLAND

Read before the Cleveland Academy of Natural Science, 1852.

LYBITHEA BACHMANII.

Generic Character.—Inferior palpi projecting in the form of a beak.

Specific Character.—Body dark brown, upper surface of the superior wings brownish, with three white spots placed in the triangle, near the tip of the fore wings—the superior

* See the figure and description in No. 76 of the Family Visitor.

† See Dr. Harris's very valuable Catalogue of American Sphinges, in Vol. XXXVI American Journal of Science and Arts. The student of Entomology will there find the history of this intricate family made plain by the labors of Dr. Harris.

‡ Vid. Figures of these two insects in Journal of Science and Arts, Vol. XIII, No. 39, May, 1852.

and interior spot oblong and irregular, the exterior the smallest and oval, the inferior quadrangular. An ochery-yellow band is situated on the humerus and a second upon the posterior margin, but does not reach the tip of the wing. A similar band extends across the lower half of the inferior wings.

Under surface of superior wings similar to the upper—of the inferior, reticulated with brown. The alar extent $1\frac{5}{8}$ inch, while that of *L. motya* is more than 2 inches. The form and size of the white spots on the superior wings differ in the two. The absence of a large quadrangular spot and a different arrangement of the yellow bars mark this as a new species.

A specimen was captured in Northern Ohio several years since—probably the only one ever observed in this section of the country. The Rev. J. Bachman, on examining this specimen in my cabinet, informed me that he once took a similar one in his garden in Charleston, S. C., and sent a description with a drawing of it to Germany, but is not aware of its having been published.

The propriety of designating it by the above specific name, is apparent to every naturalist.

MACROGLOSSA BALTEATA.

Generic Characters.—Antennæ gradually thickening nearly to the apex, which is scarcely attenuated; simple in the females. Talpi contiguous above the maxillæ, thickly clothed with scales; maxillæ as long as the body; body elongate, clothed with scales, tufted on the sides towards the apex and at the tip; wings elongate lanceolate, opaque. Larva elongate, slightly attenuated in front; caudal horn straight; pupa elongate, head case produced.

Specific Characters.—Anterior wings reddish brown, with two irregular, oblique white bands, one across the

middle, the other half way between it and the tip, composed of lunate segments intervening between the nervures—the inner band somewhat geminate. Posterior wings darker brown, anterior edges margined with a few whitish scales. Head and abdomen brown, except the fifth segment, which is silvery white. Thorax greenish yellow. Tail yellowish, margined with brown. Antennæ brown, attenuated, terminal hook small and acute. Legs, under surface of the head and thorax white. Under surface of the abdomen steel gray, and of the tail yellowish green. Length 1 1-10 inch. Alar expansion 2 6-10 inches.

Several specimens were taken at Poland, Mahoning county, Ohio, eighteen years since; one only has been preserved in my cabinet, and is somewhat impaired by fading and mutilation, still it is sufficiently perfect to allow of correct description.

The perfect insects were observed flying at midday, and resembled in their habits the lady birds, (*Sesia*), from which they differ in having opaque wings.

Dr. Harris did not embrace this species in his valuable descriptive list of Sphinges of the United States, in the 36th volume of the *Journal of Science*, and he informs us that it has not been described, but resembles somewhat the *M. zonata* of the West Indies, but is larger and differently marked, especially on the anterior wings. It will occupy a place in his arrangement immediately before the genus *Sesia* under the family *Macroglossiadae*.

BIOGRAPHICAL NOTICE OF JOHN KIRKPATRICK,
LATE SECRETARY OF THE
CLEVELAND ACADEMY OF NATURAL SCIENCE,
DIED, CLEVELAND, DECEMBER 4, 1869, AGED 50 YEARS.

BY COL. CHARLES WHITTLESEY.

The brief notice of the decease of Mr. Kirkpatrick, in the *Herald* of December 9th, was meager and unsatisfactory. We now take more space and amplify his personal history, believing that such a character deserved a prominent place in the memory of our citizens.

Like most remarkable men, his lot fell, in early life, among the scenes of toil. He was the only child of a machinist, born at Glasgow, in Scotland. His father was a laborer and an invalid. There are as good schools in Glasgow as any where in Great Britain, where John had the usual opportunities until he was thirteen years of age, having been born in 1819. The necessities of the family then required that he should go into the shop with his father, where, as a healthy and cheerful boy, he did whatever was required of him.

A rich grain merchant, of Glasgow, after a time took a fancy to the young machinist, and took him into the counting room for about a year. This rich patron offered to adopt the lad as his heir, but the parents could not give him up. He was again returned to the shop, but employed all his leisure time in poring over books on Natural History. From the age of sixteen to eighteen he was doing the work and receiving the wages of a hand in the shops. His person was now robust, and his leisure hours were wholly devoted to study. He had partially mastered Natural Philosophy

and Chemistry, and managed to enter a college or some high educational institution at Glasgow.

At the same time, 1837, he espoused the cause of the Chartists, entering into this organized opposition to the Government with all the zeal of an earnest nature. There was a public meeting held in which the Secretary, who was in the interest of the Government, declined to present a paper which the Chartists had prepared. Of course most of the boys in John's shop were furious Chartists. Having suspicions that their petition would not receive fair dealing, they came to the meeting in force, and took possession of the back seats. When it was about to adjourn Kirkpatrick rose and enquired of the Secretary whether all the papers had been presented. He replied that they had. He was plainly told that he lied. Heading the boys, Mr. Kirkpatrick made a rush for the stand and seized the papers. A new organization was immediately effected, the petition discussed and adopted with a rush. Some of his young Chartist friends were secured and condemned, and some left the country, but he, eluding the officers, found means to destroy his correspondence and was not arrested.

In 1841 the invalid father died. Relieved from assisting him, Mr. Kirkpatrick married Margaret Crawford, of Glasgow, and in 1842 they set their faces towards Canada. There they commenced farming in one of those new Scotch settlements on the North shore of Lake Erie, near Port Stanley, but this rude wilderness country does not appear to have met their expectations.

In 1843 the late Capt. Barrows, who for so many years run a schooner and finally a steamer between Port Stanley and Cleveland, induced the young couple to come here on his vessel.

John sprang ashore as soon as she touched the dock, to look for work. In half an hour he reappeared on the dock, full of hope and satisfaction, calling to his wife: "Margaret, I've got a job."

This was a place as machinist in the works of the Cuyahoga Steam Furnace Company, at the Center street Bridge. He worked there until 1856, studying all the time with the enthusiasm of a Naturalist on the Entomology of this region, and of Ohio. When he heard of a valuable book, which he had not the means to purchase, he discarded some luxury, perhaps some personal necessary, till the work could be purchased. Our local Botany also came in for a share of his attention, and afterwards General Geology and Comparative Anatomy, but his special happiness was among the insects.

On these subjects he has published but little. His collection of specimens and books on Entomology takes the lead of any in Ohio, and was by him donated to the Kirtland Society of Natural Science of Cleveland. Their united values must be about \$5,000.

While the Cleveland Academy of Natural Science continued to live, he was generally its Secretary and one of its most prompt and valuable members. Among them were Prof. J. P. Kirtland, Dr. T. Garlick, Prof. Hamilton Smith, Prof. Samuel St. John, Dr. J. S. Newberry and Prof. J. Lang Cassels.

He left the machine shop to join the late Thomas Brown in the editorship of the *Ohio Farmer*. It is in this paper, from 1856 to 1859, that most of his pen work is to be found. Mr. Kirkpatrick had all the scientific ardor of his brother Scotchman, Hugh Miller, but had less ambition for fame and less ability as a writer.

When the *Ohio Farmer* was temporarily discontinued, he returned to manual labor as a machinist, first with Blish & Garlick, and then to his old haunt, the Cuyahoga shops.

In 1864 he was in the act of buckling on his accoutrements, as one of the hundred days men, to defend Washington City, when an appointment arrived as Commissioner of the Draft. This was a most embarrassing position, and had not been asked for by himself or his friends. The Provost Marshal

who had the drafting in charge was unpopular, and so was the draft itself. Our member of Congress, Judge Spalding, made the selection on his own responsibility, under the belief that the provisions of the law would be executed with fairness to the people and fidelity to the Government. No man could frighten him from his sense of duty, and no personal abuse could move him from his ideas of justice.

Soon after the close of the war he was appointed Superintendent of the City Infirmary. Here were the worst of paupers and vagrants, placed in his charge, requiring firmness and oftentimes severity. There were also idiots and lunatics temporarily in the same institution, requiring the opposite treatment. In this work he engaged as in all others, with an absorbing zeal. His physical constitution was above the average of mankind, and his mental vigor was capable of as much strain as his personal. With a tall figure, he was neither spare nor full, but compact, active and powerful. His will for hard work was also fully equal to his powers.

It has often been observed that persons of such bodily vigor are not those of the longest life. They are apt to consider themselves too rugged to require care in regard to labor and exposure. He was inexorable upon himself. When a manual day's work for other men was accomplished, he would commence a mental day's work equal to that of any professor.

Not much more than a year since laringitis began to affect his speech and his ability to swallow food. This neither alarmed him nor procured a change in his habits of activity and labor. It was only two months since the contraction of the larynx began to tell upon his general health. A general debility followed rapidly. He sank from mere exhaustion.

On the morning before his death his wife became much alarmed, but he does not appear to have had any serious apprehensions. Last Saturday morning Dr. J. F. Arm-

strong, who is the husband of his only child, was at his side very early, and said: "Good morning, father." The reply was: "It is not a good morning for me." His power of articulating here failed, and at 9 A. M., he quietly ceased to breathe.

In the history of Dumfries, Scotland, is a genealogy of the Kirkpatricks. It appears that the grandfather of the Empress Eugenie was of this family, and that it is of note in Scotland.

Mr. Kirkpatrick was appointed as Entomologist to the Ohio Geological Survey during the present year. On this subject he was so well posted that a report could have been instantly made, if required, covering the whole ground.

His proclivity seems to have been for societies and associations. He was in the County Agricultural Society, Horticultural Societies and a zealous Free Mason. The Masons of Cleveland, at his own request, took charge of his funeral and committed his remains to the grave with imposing ceremonies.

It behooves some of the numerous associations with which he was connected to procure a full biography of so valuable and remarkable a person.

LETTERS READ BEFORE THE ACADEMY.

Letters addressed to the President of the Academy, relating to Natural History or Science, were read at the meetings. Some of them have been furnished by Prof. Kirtland, which are here inserted. Those of Prof. Agassiz are particularly interesting.

CAMBRIDGE, July 22, 1851.

MY DEAR SIR:

I need hardly apologise for my long silence. I feel too much sympathy for you and your character not to suppose that there must be some resemblance between us, and that you may have admitted, as I would have done, that my not answering your very kind letter was probably owing to the circumstance that I had either little to say, or too much to do. Had I not had the pleasure of a few days personal intercourse, I would no doubt have answered immediately, for no man could receive such obliging an offer as you have made to me without being highly gratified and feeling greatly obliged.

I value the opportunity you offer me of obtaining specimens from your locality very much, and would at once request you to put aside for me the following objects, for which I feel at present a special interest, my attention being directed to them with the view of making monographs, I am anxious, therefore, to obtain specimens from all parts of the country.

In the first place, of fishes: All your representatives of the genera *Hydrargyra*, *Gasterosteus*, *Lepidosteus* and *Amia*. I have had the last two for a long time under consideration, but having satisfied myself, lately, that *Amia* is the living representative of all those monsters of the Old Red, which have furnished to Hugh Miller so many puzzles in his *Footprints*, I should like to finish it up, as well as a review of the *Gasterosteus* of the United States, which I began when writing the *Lake Superior Book*. Several new species, found in Florida, have also led me to take up, in the same manner, the *Hydrargyras*, *Fundulus*, *Lebiar*, &c.

Next, I would beg for your Unios and Anodontas, males and females, in alcohol, if possible in the season preceding the laying of the eggs into the gills, and also with the eggs in the gills, and some dry specimens of all the species of the Lake.

You may be surprised, but I am not quite satisfied that the Lakes and the rivers emptying into them nourish identically the same species as the Ohio. I should be thankful for ampler opportunities of comparing them.

After all this, permit me to mention also the genus *Astacus*, of which I have about half a dozen new species from the fresh waters of different parts of the country, which, upon direct comparison, have been found different from those already described. This makes me desirous to compare the Crawfishes from as many localities as possible.

Do you also collect Insects? That you observe and study them I see from the *Family Visitor*. If so, do you want some from this vicinity, and what may I offer you that would be acceptable? If you will give me a chance to send you something, I would ask for many other things in which I am not particularly working now, but which I should like to secure for my Museum.

Should you hear of a vacancy in some College for the professorship of Natural Philosophy, I could recommend you an acceptable gentleman.

Remember me to our colleagues in Cleveland, particularly to Prof. St. John, Dr. Newberry and Prof. Brainerd. I hope to see you and them in Albany.

I am sorry to be tied for the whole summer in Cambridge, but I have been wandering long enough in the early part of the year, and must now make up for the time spent in the field by work in the closet. Unfortunately, I have reversed the seasons.

With high regard,

Sincerely Yours,

L. AGASSIZ.

Prof. KIRTLAND.

CAMBRIDGE, February 1, 1853.

MY DEAR SIR:

I would be thankful for a copy of your Catalogue of 1838, or for the Geological Report containing it. I have never been able to secure either, although I have had it for examination two years ago.

I am very much interested in what you say about your *Lucisperca*. North of us, we have also two species in this part of the country, very easily mistaken one for the other. Your *Etheostoma maculata* is one of the fishes I wanted most particularly to see. I have something similar from Missouri.

Nothing could have prevented me from missing the meeting in Cleveland except absolute inability; and even now, though I am perfectly satisfied that your advice is the only wise one respecting my health, I cannot leave Cambridge.

I shall patiently await your convenience about your fishes, though they are very much needed to compare with the extensive collections I have brought home from the further West, and which I cannot determine before I have original specimens of the species of the Ohio, which have been described by you and Rafinesque.

With great regard and in a hurry,

Yours, Very Truly,

L. AGASSIZ.

Dr. KIRTLAND.

CHARLESTON, S. C., February 14, 1853.

MY DEAR SIR:

About a year ago I received the most friendly letter from you, beginning almost in these words: "Put, for a moment, aside all your books and writings, and let me know what you want of fishes, &c., from me." I did leave everything, and thanked you in the best manner I could for your kindness, and accepted your offer with eagerness. During the past Summer I have repeatedly been on the lookout for a collection, which I knew would be invaluable to me, but in vain.

Will you allow a convalescent from typhus fever, who, after being laid up for nearly two months, is now upon his legs again, but unable to work or even to write for himself, to remind you that his collections from the West are still very deficient, and that he still hopes that some of these defects may be made good by your liberality.

At all events, let me hope that I still have a place in your recollection.

With great regard and sincere friendship,

Truly Yours,

L. AGASSIZ.

Dr. KIRTLAND.

CAMBRIDGE, June 15, 1853.

MY DEAR SIR:

On my return to Cambridge, a fortnight ago, after an absence of more than six months, I was delighted to find a memorandum from you, and the very interesting specimens of young *Unio*, (*Crassus*,) you have had the kindness to send to me.

There can be no doubt that the byssus which protrudes from these shells is of the same nature as that of our common *Muscle*, *Mytilus edulus*, and other species that attach themselves. It is an important link more between the different families of Bivalves, and shows again how many features, which seem to differ in the adults, may be found to agree between the young. This fact at once assigns a higher position, in their respective families, to the species that have no byssus over those that are provided with it.

Though I have been dangerously sick for two months last Winter, I have spent a very interesting time at the South and West this Spring. I collected over sixty new species of fishes, mostly from the rivers emptying into the Gulf. I have also paid particular attention to the genus *Lepidosteus*, of which I have obtained several new species.

It is so long since I have heard from you directly, that I am doubtful whether you received my two last letters, one written from Cambridge, about a year ago, the other from Charleston last March, and that I can hardly venture upon trespassing upon your time to request you again to let me have that collection of fishes from Lake Erie and your Rivers, which you so liberally offered to me spontaneously long ago.

I am particularly desirous of obtaining a good many specimens of the different species of *Lepidosteus*, to ascertain the range of their variations. But I know so well how difficult it is for a physician to find time for anything besides his business, that I beg you will consider my request as made with the full consciousness that it may be

very inconvenient for you to think of it, when I beg also you will let it alone until perfectly convenient and agreeable.

Hoping to hear from you before long, I remain, with high regard,

Yours, Very Truly,

L. AGASSIZ.

Dr. KIRTLAND, Cleveland.

CAMBRIDGE, July 8, 1853.

MY DEAR SIR:

I have received so many marks of your kindness that I must suppose my letters to you were misdirected, since I have received no answer, and, indeed, on looking up your last, I find it dated East Rockport instead of Cleveland, to which latter place I have directed mine. I write therefore again.

During the past Winter I wrote you from Charleston, immediately after the severe sickness under the influence of which I labor to this day; then again, soon after my return, from Cambridge, in the beginning of June, to thank you for the very interesting young specimens of *Unio Crassus*, with their byssus.

The object of my first was particularly to beg of you a collection of your fishes. I find such differences between those I have brought home from Cincinnati and the specimens collected about St. Louis, that a renewed comparison of all the fishes found between the Missouri and the Atlantic States is of the utmost importance, to trace the geographical range of each of them, and to identify those that have a wide distribution, upon a careful comparison.

I would gladly go to any expense to procure collections from all the intermediate stations and from the different river basins. Could you let me have as complete a collection as can be made from Lake Erie? and mention such gentlemen in other parts of the State of Ohio to whom I could apply for the fishes of the Muskingum, Scioto, Miami, Maumee and Sandusky Rivers, besides the main course of the Ohio, and also from the headwaters of that river in Pennsylvania, and its tributaries from Virginia, Kentucky and Indiana?

You would confer a great favor upon me in aiding me in this investigation, and since the state of my health prevents me from harder work, I should like to devote myself to such studies while I can.

With great regard,

Yours Very Truly,

L. AGASSIZ.

Dr. JARED P. KIRTLAND.

CAMBRIDGE, August 19, 1853.

MY DEAR SIR:

Your letter, dated Detroit 14th, gave me the greatest pleasure, for I could not account for your long silence and was apprehensive that you did not care to let me hear from you again.

I am very sorry that the barrel of *Mackerel** has been

* A barrel of fishes, preserved in alcohol, embracing most of the species found within the waters of the State of Ohio, collected with great labor and expense by Dr. Kirtland for Prof. Agassiz, was opened by a blundering person, directed to open a kit of Mackerel, who, supposing the contents to be spoiled fish, promptly wheeled them to the barn yard and buried them under a compost heap, and reported the MACKEREL as entirely ruined. A week or more passed before his mistake was discovered, and not until every specimen was completely destroyed.

J. P. K.

so wantonly lost, since I can hardly hope that you may take again the trouble of collecting another set of your fishes for me. I hardly dare to ask for it, unless you will allow me to repay to you the expenses you have already incurred in my behalf. I must, however, say that I would value highly such a collection, without which it will remain impossible for me to compare your fishes with those I have collected further West with the degree of precision such comparisons require.

I would gladly avail myself of your very kind invitation to go to Cleveland now, and ransack, with you, your rivers and brooks, if I was in a condition to endure even the excitement of such work. I must remain absolutely quiet for a good while if I want to recover from the severe shock my health has sustained last Winter.

I have lately made some comparisons which have satisfied me that *Pomotis gulosus*, *Centrarchus gulosus*, Val., is generically distinct from either *Pomotis* and *Centrarchus*, and must be referred to Rafinesque's genus *Calivirus*, of which I know now half a dozen species. I have also satisfied myself that his genus *Ambloplitis* is good, and that *Centrarchus Æneus*, Owens, belongs to it; and further that his genus *Pomotis* must be retained also. Your *Centrarchus hexicanthus*, which belongs to it, differs from the Southern one. I have made a direct comparison, which leaves no doubt upon this point. The question is now only which specimen name ought to be preserved for both. To settle this point I want badly to know the date of the publication of your *Report*, where your *Cichla Stoveria* is first described, if I remember rightly.

We have thus three more genera of Rafinesque restored to their right. The same must be done with his genus *Ambladon*, which differs essentially from *Porina*. I have had ample opportunities last Winter to compare the oste-

ology and dentition of the two genera. They differ as much as *Perca-Lucioperca* do. I have sent a short notice upon this subject to Dana, for *Silliman's Journal*.

Hoping to hear from you soon again, I remain, with high regard,

Yours, Very Truly,

L. AGASSIZ.

Dr. KIRTLAND.

CAMBRIDGE, February 15, 1854.

MY DEAR SIR:

On my return from a trip in Western New York, I was delighted to find your kind letter upon my table.

I regretted very much, when in Buffalo, to be utterly unable to spare the short time it would have cost me to run over to Cleveland to see you, but I intend doing so next summer. Meanwhile let me say that any fish you can send me will be a godsend, with a label from you, and I would thank you to let me have at once what you can now, and to forward later the result of the Spring fishing.

In the next number of *Silliman's Journal* you will find an article of mine, in which I have been able to identify some more species of Rafinesque. With reference to *Centrarchus Æneus* of Ohio, I presume it will turn out to be the same as that from the Tennessee, or a new one; at all events the Tennessee species differs from the Eastern one. Maybe yours is Rafinesque's and mine from Tennessee are new species. From the want of Ohio specimens I could not decide.

I should be delighted, after you have looked through my

article, to talk over with you all these critical species. I have myself two undescribed ones from the lakes, one from Chicago and Milwaukee, the other from Buffalo, and several others from Southern New York, &c. *Leuciscus elongatus*, seems to me from the description, also to belong to the genus. I expect that your *Leuciscus Stoverianus* will belong to a new genus I have lately established for a species from Tennessee. I am therefore particularly anxious for that species, as indeed for everything you have touched upon.

Will you be able to let me have some specimens of your *Pocilichtys erythrogaster* and your new *Alburnius* also, and do you want any of the new species and genera I have established.

With great regard,

Yours Very Truly,

L. AGASSIZ.

Dr. J. P. KIRTLAND.

MY DEAR SIR:

I lost no time in making a careful comparison of your figure and description of *Esox Estor* and my *Boreus*. I am sorry to say I have no specimen of your *Estor*, so that I could not make a more direct comparison. However, I am satisfied they are not identical. My *Boreus* has a less forked tail, and the lobes not acute. The spots upon the sides of the body are totally different. *Boreus* has few evanescent white spots, especially backwards, whilst your *Estor* is spotted all over, and, as you say, the spots are brownish. Moreover, the dorsal of *Boreus* is markedly larger than the anal and like this spotted, the spots assuming an arrangement which makes them appear like bands

when the fin is not fully stretched. Again, the lower jaw of *Boreus*, judging from the figure, is less prominent. The squamation of the cheeks and operculum is also very peculiar in *Boreus*; but since you do not mention this character you may, in that respect, compare your fish with my description to complete the specific differences.

I have distinguished several other species of *Esox*, some of which were figured in *Frank Forrester's Angler*, but the author, Mr. Herbert, unfortunately transposed the names, a mistake which Mr. F. Thompson has justly noticed in his Appendix to the History of Vermont. You will also see that he has identified his *Salmo perca* with my *Percopsis*. When I saw the only specimen he had, I paid very little attention, and indeed did not remember his fish when I found and described my *Percopsis*, otherwise I would have alluded to it. I have not yet had an opportunity of satisfying myself of the *specific* identity of the two, from want of specimens from Lake Champlain.

Many thanks for the Report. I am delighted at the prospect of obtaining the fishes of your vicinity, after so many failures, and trust it may be the foundation of a more regular intercourse between us.

Respectfully Yours,

L. AGASSIZ.

Dr. J. P. KIRTLAND.

CAMBRIDGE, Mass., July 26, 1852.

Prof. J. P. KIRTLAND:

Dear Sir—It would give me much pleasure to visit you at the time proposed, although I am not a member of the Association, and I am strongly tempted

and inclined to accept the offer of your hospitality. There are, however, circumstances that may prevent my going. I have already promised to take some of my family to the White Mountains, if possible, and the second edition of my work on insects injurious to vegetation is now passing through the press, and the proofs come to me almost daily for revision; both of which engagements render it inconvenient, to say the least, for me to make another excursion from home at present. I shall have no papers to read, and no verbal communication of any interest to make to the Association.

You are probably aware that I have ceased to occupy myself actively and regularly with subjects of Natural History, and take it up occasionally only, and chiefly in answer to communications or queries from correspondents or visitors interested in agricultural or horticultural pursuits.

There was nothing objectionable in your descriptions of *Libythea Bachmani* and *Macroglossa balteata*, and you do right to publish descriptions of such new species as fall in your way.

You can much better do without such works as Donovan's than without Drury's Illustrations, which contain a considerable number of North American insects. Westerwood's edition of Drury's work is not very expensive. The various entomological works of Fabricius are indispensable, but they have now become very rare, especially the series entitled "*Entomologia Systematica Emendata et Aucta*," 4 vols., 800 pp., and "*Supplementum*," 1 vol.

I forget whether you have Boisduval and Leconte on the Lepidoptera of North America, which, though incomplete, is valuable for the determination of our butterflies. Smith's edition of Abbott's *Lepidoptera of Georgia*, though full of errors, is useful, and is an elegant show book.

You have been very fortunate in raising so many Lepidoptera from the larvæ. I trust you will keep specimens of the larvæ in spirits.

The "small copper butterfly" has, by most authors been confounded with the European *Lycæna Phlocas*. I consider it as a distinct species, and in my manuscript it stands as *L. Americana*.

There are three moths known to me which have their wings more or less tinted with carmine. One of them is the *Dryocampa rubicunda*, easily known by its antennæ, feathered at base and naked at tip in the male, short and simple in the female. Another is *Noctua* (—?) *guaræ*, Smith Abbott, known by long simple antennæ and long tongue. The third, probably your insect, is *Notodonta aurora*, Sm. Abb. The antennæ are longer than those of *Dryocampa*, very narrowly feathered, except at the tip, in the male, nearly naked in the female, the tongue very short, &c. I hope that you have preserved the larvæ in spirits.

I do not think your *Ægeria*, found on the flowers of *Asclepias*, &c., can be *Æ. cucurbitæ*. The latter is distinguished by its orange colored abdomen, having a row of five or six black dots on it, and by its hind legs, which are *very much fringed* with orange and black hairs. If you cultivate squashes, especially the delicate Winter varieties of *C. mammeata*, commonly called the Autumnal Marrow and Valparaiso squashes, you will probably find the *Ægeria* at this time, every fair day, hovering over them and occasionally alighting to lay her eggs. *Tetraopes arator*, German, is much like the *tetrophthalmus*, Foster, or *tornator*, F., and is also found on *Asclepias*.

By the way, Drury's *Sphinx tibialis*, from Guinea, and Cramer's *bambilitiformis*, from Coromandel, with Hubre's *Melittia satyriniformis*, from Georgia, are very much like our *Ægeria cucurbitæ*, but differ in the color of the abdo-

men, &c. They all belong to the same group, distinguished by the brush-like clothing of the hind legs.

In case of my being able to make arrangements for going to Cleveland about the 18th of August, I will give you seasonable notice.

Respectfully Yours,

THADDEUS WILLIAM HARRIS.

CAMBRIDGE, Mass., February 15, 1853.

Prof. J. P. KIRTLAND:

Dear Sir—The specimen of *Libythea Bachmani* was duly received, (*minus* both antennæ, no relics of which remain,) as were also the cocoons of the insects that have destroyed many of your lepidopterous larvæ.

Your letter, dated East Rockport, January 3d, (why not Cleveland?) also came to hand on the 12th of January, and ever since I have been expecting to receive the Lepidoptera, which you stated were to be sent by your neighbor, Mr. Hotchkiss, but which have not yet arrived.

The parasitical cocoons are probably those of one of the *Ichneumons minuti*, perhaps of a *Microgaster*, allied to *Ichneumon (Microgaster) glomeratus*, L. It is very provoking, when one has carefully tended some rare larvæ, to have it languish and give forth a host of intestine enemies like these *Microgasters*, which put an end to our hopes of obtaining perfect specimens from our cherished larvæ.

Your *Libythea* is identical with a specimen which I took in my little garden on the 24th of June, 1849,—the only specimen that I have heretofore seen here. I have no

specimens of the European *L. Celtis*, the figures of which your species strikingly resembles; and when my specimen was captured, finding it to differ in size and in colors beneath, from Abbott's figure of *L. Motya*, in Boisduval's *Hist. et Iconogr. des Lepidoph. de l'Amer. Sept.*, pl. 64, (unaccompanied by a description,) I thought mine must be the European species, introduced somehow with foreign trees, more especially as Hovey's Nursery, containing many trees from France, and Mr. Cushing's elegant place, also having many foreign importations, are not very far from my residence.

Abbott figures *L. Motya* or *Celtis occidentalis*. I think it must be rare in Georgia and at the South, because I have never received it from the South, and because Abbott has not figured it in his Lepidoptera of Georgia, nor in a considerable collection of original drawings of his, which my friend Doubleday purchased for me in London. As your species is common in Wisconsin, you may hereafter have numerous specimens from thence, through your friend Dr. Hoy. You will then be better able to determine whether it be identical either with *L. Motya* or *L. Celtis*. Meanwhile I will hunt up good figures, if possible, of *L. Celtis*, and compare your and my specimens therewith, and let you know the result.

Since writing the above, I have been looking for figures of *L. Celtis*. The volume of Godart and Duponchel, *Hist. Lep.*, France, containing this species, is out of the Library, and I cannot find any better figures than those in the Archives of Fuessly, Tab. 8 and 14. There is considerable disparity in the sizes of the specimens (sexes?) there represented, but in none of them are the tawny orange markings exactly like those of our species, nor are there so many white spots on the fore wings. Our species approaches to *L. Carinenta*, Cramer, from Surinam, but it is not near so large. I doubt the accuracy of Abbott's figure of *L. Motya*, and only one sex is represented. Perhaps the other sex

will be found to resemble *L. Bachmani*, or the female, or the latter may be near to or identical with *L. Motya*. In species where the sexes are liable to differ so much we should have both to be sure.

If you will let me know how to send to you a copy of the new edition of my book, which has been out of press nearly three months, I shall be happy to present it to you.

As soon as I hear from you in reply to this letter, I will write again, and may then ask permission to make some statements relative to the new edition of my book, and also to some other subjects that have occupied and probably will continue to occupy my attention.

Meanwhile I remain, very respectfully,

Your Friend and Servant,

THADDEUS WILLIAM HARRIS.

CHARLESTON, S. C., March 26, 1852.

MY DEAR SIR:

I feel ashamed that I have so long delayed answering your most kind letter. My excuse will be connected with a piece of information which I think will be a sufficient apology for my long delay. I was, for the summer, overrun with parochial duties, having many sick, the College took up some of my time, but, above all, the quadrupeds were all thrown on my shoulders, and unfortunately some of the smallest, such as the Bats and Shrews, were heavier to bear than the Buffalo and Musk Ox. I found at last that this writing and thinking at the same time—examining teeth, &c., was fairly breaking me down, so I sent for Victor Audubon to come on and hold the pen, and I would talk to him all the day long. He came, and for six weeks

we were almost invisible, and now I breathe again. The last animal on hand was described five minutes ago. I threw up my hat to the ceiling, kicked books, papers, rabbit and squirrel skins and bats about the room, and felt that the nightmare of some years was off my breast.

But I am not done as I wish to be. When a house is built it is pleasant to make improvements, and hereafter it will be gratifying to make corrections and additions. Much remains yet to be done, and as the last number of the small work will not be printed until about eighteen months, that time will be left us to correct the blunders made, and to add such new species as may yet be discovered. But let me go at once to work in turning Yankee and asking questions.

1. How can I get a look at the Fox of which you speak? Where is there a specimen? Richardson supposed that we had the English fox here. I however possess a specimen of the English Fox, procured in England, and would like to compare it with any Red Fox not hitherto examined.

2. Do you remember the deer's horns I obtained through the kindness of friends? I supposed I knew all but the Black Tailed Deer of Missouri. There is another Black Tail on the Pacific side. I supposed the horns I have now lying with me, were those of Say's *Cervus Macrotis*, but have since seen those horns and they differ from those I brought. Now, what deer had carried those horns? Have you any other deer on Lake Superior but the Rein Deer, Moose and the Virginia deer? Ask some of the gentlemen who have been far to the North.

3. I am longing to know something of a Wild Cat, called Catamount, with a tail double that of the Gray Lynx. My friend Edward Harris, of Morristown, N. J., has written to me that he had, last Summer, in company with several others, seen a Wild Cat in the mountains of Pennsylvania, and it was a foot long. I have some suspicion that this fellow may yet be procured. We heard of one in the

Cincinnati Museum and procured it, but it proved to be the common *Lynx rufus*.

If in Michigan we could get the small rodentia, Meadow Mice and Shrews, I am sure we would get something new. I think we will add about fifty new species, but will have to knock off scores of the old authors' species. I will add at the end, a synopsis in the scientific arrangement, including all our mammalia—the Bats, Whales, Porpoises, Maniti and Seals.

I constantly receive and we all read the *Family Visitor*. It is the best work of the kind ever published in our country. When I have a little leisure I will try to write a few articles for it—at present I am full of the quadrupeds. What would I give for an hour in your sanctum! Kind regards to your dear family.

You see I write in a terrible hurry. I have a dozen letters to write for Victor Audubon, who leaves in the morning for Savannah, Augusta, Columbia, &c. He obtained here, within the last four days, two hundred and sixty subscribers, and I presume his friends here will drum up a hundred more. Now don't stand upon etiquette, but just drop me a few lines.

Truly your grateful friend.

JNO. BACHMAN.

PROCEEDINGS OF THE ACADEMY.

CLEVELAND, December 7, 1860.

The Academy met in Dr. Kirtland's rooms, in the Medical College, the President in the chair.

The election of officers being in order, the following gentlemen were elected:

President—Prof. JARED P. KIRTLAND.

First Vice President—Col. CHARLES WHITTLESEY,

Second Vice President—Hon. WILLIAM CASE,

Third Vice President—Dr. J. S. NEWMERRY.

Curators:

Dr. THEODATUS GARLICK,

RUFUS K. WINSLOW,

Hon. WILLIAM CASE,

Dr. W. H. ALKINSON,

BENJAMIN A. STANARD,

L. M. COBB,

S. A. NORTON,

GEORGE B. TUTTLE.

Corresponding Secretary—Dr. W. H. ATKINSON.

Recording Secretary & Treasurer—JOHN KIRKPATRICK.

There being doubts expressed that the goose presented last meeting to the Society, by William Case, was not the *Anser hyperboreus*, it was referred to a committee consisting of J. Kirkpatrick, William Case and R. K. Winslow, for examination.

Col. Charles Whittlesey read the following paper on the different measurements of the elevation of the Northern Lakes above tide.

Lake Ontario.—1st. Lockage of the Canal along the St. Lawrence River, by the Canadian Surveys, 234½ feet. 2d. Survey of the Oswego Canal, New York, 232 feet. Mean, 233¼ feet.

Lake Erie.—1st. Survey of the Erie Canal, in 1817, 561.20 feet. 2d. Lockage of the Erie Canal as constructed, from the mitre sill at Albany to the mitre sill at Buffalo, 567 feet. 3d. Railroad survey—Catskill to Portland harbor, in 1828, 565 feet. 4th. By Capt. Williams' survey of the Niagara Ship Canal, September 1834, assuming the Canadian level 234½ feet for that lake, above Lake Ontario 328½ feet—563 feet. Mean, 564 feet.

Lake St. Clair.—By S. W. Higgins' Geological Report of Michigan, in 1840, 5 feet above Lake Erie; 564 and 5 equals 569 feet.

Lake Huron.—By S. W. Higgins' Geological Report of Michigan, in 1840, 13 feet above Lake Erie; 564 and 13 equals 577 feet.

Lake Michigan, (southern extremity.)—By Railroad Survey from Toledo to Michigan City, in 1851, (J. H. Sargent, C. E.,) 18 feet above Lake Erie; 18 and 564 equals 582 feet.

Lake Superior.—1st. By barometrical determinations of Capt. Bayfield, in 1824, 624 feet. 2d. By measurement of the rapids of St. Marys River, by A. Murray, Esq., of the Geological Survey of Canada, in 1847, above Lake Huron 23 feet; 23 and 577 equals 600 feet. 3d. By survey of the Bay de Noquet and Marquette Railroad, in 1859, 27 feet above Lake Michigan; 27 and 582 equals 609 feet. For this lake the last, or No. 3, is much the closest approximation. There are several sources of error, besides the absence of perfect accuracy in taking long levels, that may be the cause of the above differences.

The *mean* level of the lakes is never referred to in railroad and canal surveys, but always the surface of the water

at the time. Lake Erie has a fluctuation of *seven* feet between the known extremes, and of five feet between the mean of the highest and lowest months. Probably the other lakes have as great a range of surface. It is necessary, therefore, to have a bench mark on each of them, representing its mean surface, corresponding to the mean tide on the ocean, before the true elevation can be determined.

There must be also some inclination of surface towards the outlet, causing a difference of elevation between the two ends of a lake, as, for instance, at Buffalo and at Toledo. This difference is not known. The mean level at a central point, like Cleveland, would, however, represent closely the elevation of the lake.

To determine the mean level accurately, daily observations are necessary, covering a space of at least twenty-five years. The attention of the Government, and particularly of the Chief of the Topographical Bureau, was long since called to this subject. Soundings and harbor works, docks, warehouses and channels, that are liable to changes of five feet in the depth of the water, cannot be a safe reliance for commercial purposes.

Although some officers of the Topographical Corps, in charge of harbor constructions, had, on their own responsibility, kept detached water registers, they were not encouraged by the head of the Bureau, and it was not until 1859 that Capt. Meade, who is now in charge of the lake surveys, procured an appropriation for that purpose. Before that year, the members of the Geological Surveys of Ohio and Michigan, and the Regents of the New York University, with the assistance of civil engineers, collected what information we have concerning the fluctuations of level.

At least two daily registers are now kept under the direction of Capt. Meade, on all the lakes. There will thus

eventually be a mean water line fixed on each lake, connected with bench marks on the shore, and then their elevation above the ocean can be correctly established.

An interesting discussion then took place in relation to the great storm of November 23d and 24th—the fall of the barometer and wind currents.

The Academy then adjourned for two weeks.

JOHN KIRKPATRICK, *Sec'y.*

MOUNTED BIRDS FROM NORTHERN OHIO,

IN THE ACADEMY'S MUSEUM.

DESCRIPTION BY J. P. KIRTLAND, PRESIDENT, 1858-9.

INTRODUCTION.

These specimens include nearly all the birds of Northern Ohio, with many from other parts of the State. A large part of them were procured and mounted by R. K. Winslow, Esq., of this city. Some were donations of skins from South America, by Lieut. Phelps of the Navy, a citizen of Ohio. There are others from other parts of the United States and the world, but it is only for the country that lies on or near the South shore of Lake Erie that the collection is reasonably complete. A number of these were procured and mounted by Capt. B. A. Stanard and the late Hon. William Case.

Dr. Kirtland expended upon these descriptions, which are taken from the *Ohio Farmer*, edited by the late Thomas Brown, more labor than a naturalist at this time would imagine. He was obliged to draw more on personal observation, and less upon books than they do who treat the subject now.

Some species have disappeared from the country during the period of forty years covered by his observations, on account of changes which took place while he was studying

its natural history. New species have become domiciled here, or at least have become resident during a part of the year.

As an introduction to the series, the *Farmer* remarks that as the land was cleared of forest, species of birds, previously rare, became numerous, while the reverse holds good with those species that love the deep recesses of the dim old woods. A few years ago specimens of the Pinnated Grouse, or Prairie Hen, were quite numerous on our small prairies, now they are rare, and this is the case with many others, influenced, no doubt, by various causes. The want of a game law in the State, until recently, gave unbridled liberty to every one who longed to try his skill on the feathered denizens of the forest, has helped to banish many species from the more densely inhabited parts of the State, that would have been glad to take up their dwellings with us, and would, if protected by man, increase greatly and repay their benefactors for that protection with sweet music, and useful assistance in thinning out the ranks of injurious insects, which prey on our fruits and grains, our meadows and gardens.

Our position as a State brings within our borders a very large number of the birds of our entire country. Many species of land and water-fowl, who breed in summer on the shores of Hudson's Bay and the many lakes and rivers of the far North, pass through Ohio in their spring and fall migrations, while numerous species that are generally to be found in southern States only, ascend the Ohio river and its tributaries, and even reach the northern limit of the State, the southern shore of Lake Erie, encouraged by the warm genial weather of our summer months.

Birds are divided by naturalists into six orders, founded principally on the structure of the bill and feet, these organs being adapted, as in mammals, to the peculiar habits

and wants of the animal. A strong, curved and sharp bill, fitted for tearing flesh, being as emblematic of the predacious habits of the bird, as are the canine teeth of the tiger; while a webbed foot, like that of the duck, tells the element in which it principally dwells, as distinctly as does the paddle of the whale or the fin-like extremities of the seal.

The *Rapaces* or *Accipitres*, the truly predacious order, being terrestrial in their habits, having very strong talons, armed with sharp pointed claws; beak hooked and sharp. The Eagle and Owl are examples of this order.

Passerines, having four toes, three before and one behind, weak and feeble, and not armed with strong claws; tarsi short, compared with that of the waders; beak generally pointed. Examples—Thrush, Swallow, Sparrow, Crow and Humming-bird.

Scansores, or *Climbers*. Characters as in the last, with the difference of two of the toes being placed behind and two before, thus adapting the foot for grasping and climbing. Examples—Woodpecker and Parrot.

Gallinacæ. The upper mandible of the bill is in this order arched; nostrils placed in a membranous space at the base of the beak, and partly covered by a soft scale. Examples—Turkey, Common Fowl, Partridge and Pigeon; the latter has been, however, considered by some authors as worthy of being placed in an order by itself.

Gralliatores—*Waders generally*. Aquatic; tarsus very long, and lower part of the leg naked. In some species the fourth toe, or thumb, is wanting. The Plover, Crane, Snipe and Rail are examples.

Palmipedes. Feet formed for swimming; webbed; the legs placed far back on the body. Examples—Duck, Goose, Gull and Loon.

RAPACIOUS BIRDS.

In all species of rapacious birds the female is the largest and most powerful, while the reverse is the case in the other orders.

I. FAMILY VULTURIDÆ.—*Vultures.*

This family is spread over the whole temperate and tropical parts of the earth, but the number of species is limited to about twenty. The generic characteristics are: Bill strong, rather over the medium length, strongly hooked; claws moderately large, slightly curved; anterior toes connected at the base by a web; wings very long; plumage full; head and neck generally naked, with or without caruncles. All feed on dead animals, and if putrescent, all the better.

GENUS CATHARTES, *Illiger.*—TURKEY VULTURES.

Head and upper part of neck naked, or thinly covered with down; skin of the head wrinkled; bill of moderate length, rather slender, straight, and curved at the end; nostrils, large, oblong, open, without protection; head oblong; wings long, the third and fourth primary feathers being generally the longest; tail of moderate length, with twelve feathers; legs and feet strong, of moderate size, covered with scales; claws strong and arched, middle toe long, hind one very short.

To this genus belong the two species of Vultures which inhabit Ohio.

1. CATHARTES AURA, *Linn.*—TURKEY BUZZARD.

Wilson's Amer. Orn., IX., pl. 75, fig. 1; Audubon's B. of Am., Oct. ed., I., pl. 2.

Plumage brownish black, darker on the neck and upper

parts, some of these feathers having a purplish lustre; bill tinged with yellow; head and neck bright red, naked or thinly sprinkled with down, skin wrinkled; feet, flesh colored, tinged with yellow; length of skin from 30 to 32 inches; extent of wings, 6 feet to 6 feet 4 inches; tail 12 inches.

No specimen in the Museum of the Cleveland Academy of Natural Science.

At the present time these birds are to be found distributed over a great part of the State, and prior to 1832-4, were very numerous around Cleveland. A favorite roosting place was in the immediate vicinity of where the Medical College now stands; but since that period, owing to some unknown reason, the birds have entirely deserted their old haunt, and are seldom to be seen within many miles of Cleveland. In Huron, Erie and Sandusky counties they are comparatively plentiful, and their nests are said to be occasionally found on tall oak trees. In the neighborhood of Chillicothe, Ross county, they are abundant, and Mr. R. K. Winslow believes they pass the winter there. In the southern part of the State they are quite common.

The Turkey Buzzard feeds principally on carrion, and is, therefore, a benefactor, by removing putrid animal remains that would otherwise taint the air. According to Audubon, it lays only two eggs, and builds its nest on the ground, at the roots of trees, or among long grass, and he says that it will eat the young and eggs of herons and other birds. The eggs are large, cream colored, with markings of brown and black on the largest end. The young are, in all probability, fed by regurgitation, in the manner of pigeons, this being the habit of the family. When disturbed after feeding, the old birds will vomit the unsavory contents of their crops in the face of any one who attempts to capture them, a pretty powerful way of making

an impression, as no man could stand such a charge for a single moment.

The flight of this species is powerful, and not without grace. It sails high in the air in broad circles, and it rises readily from the ground. In the southern States they often mingle with the Carrion Crows, roosting on the same trees and feeding on the same carcass.

2. CATHARTES ATRATUS, *Bartram*.—THE CARRION CROW OR BLACK VULTURE.

Entire plumage deep black; head and naked portion of the neck rough and warted, and thinly sprinkled with hairs, color blackish; bill longish, with wide nostrils; legs rather long, and tail even, while that of the preceding species is somewhat rounding. Length of skin, 22 to 26 inches; extent of wings, 50 to 54; tail $8\frac{1}{2}$ inches.

This species is added to our fauna on the authority of Audubon, who states that it is to be found along the Ohio river as far up as Cincinnati, but if it visits us at all it is but seldom. In the more southern States it is to be found in great numbers, and, along with its cousin, the Turkey Buzzard, it is protected by law. They sit on the house-tops in the southern cities, and some even roost there.

This is the smallest species of the Vulture known, and its habits agree with the rest of the family. Carrion is its delight. These birds are the scavengers of the South, and remove on short notice any filth capable of being digested by them. They form no nest, breed on the ground and lay two eggs, and the young are fed by regurgitation.

No specimen in the Museum of the Cleveland Academy of Natural Science.

II. FAMILY FALCONIDÆ—*Falcons, Eagles, Hawks, Kites.*

Head and neck usually covered with feathers; superciliary ridges prominent. Bill very strong, curved and sharp. Tarsi and toes strong. Claws large, curved and very sharp. Wings large and well adapted for rapid and vigorous flight. Great difference in size, but all are organized to pursue, capture and kill living animals.

To this family belong the highest types of rapacious birds.

1. SUB-FAMILY AQUILINÆ.—EAGLES.

Generally of large size. Tarsi of medium length, occasionally rather long, and of great strength. Toes long and strong. Claws curved, sharp and very strong. Bill large, compressed; curved and sharp at point, straight at base.

GENUS AQUILA, *Mæhring.*—EAGLES.

Large; bill large, strong, compressed and hooked at the tip; wings long, pointed, very strong; tarsi moderate, feathered to the base of the toes. Tail rather long, rounded and wedge shaped. Toes and claws long, the latter very sharp and curved.

AQUILA CHRYSÆTOS, *Linn.*—GOLDEN EAGLE.

“*Adult Female.*—Wings long, the fourth quill longest, the third almost equal, the second considerably shorter, the first short; the first, second, third, fourth, fifth and sixth abruptly cut out on the inner webs; the secondaries long, broad and rounded. Tail rather long, ample, rounded, of twelve broad, rounded and acuminate feathers.

“Bill light bluish grey at the base, black at the tip; cere and basal margins yellow. Eye brows and margins of the eye lids light blue; iris chestnut. Toes rich yellow; claws bluish black. Fore part of the head, cheeks, throat, and

under parts deep brown. Hind head, and posterior and lateral parts of the neck, light brownish yellow; the shafts and concealed parts of the feathers deep brown.

“The back is deep brown, glossy, with purplish reflections; the wing coverts lighter. The primary quills brownish black, the secondaries, with their coverts, brown, and those next the body more or less mottled with brownish white, excepting at the ends; the edge of the wing, at the flexure, pale yellowish brown. Tail dark brown, lighter toward the base, and with a few irregular whitish markings, like fragments of tranverse bands; the coverts pale brown, mottled with white at the base, and paler at the ends. The short feathers of the legs and tarsi are light yellowish brown, each with a dark shaft; the outer elongated feathers dark brown; the lower tail coverts light yellowish brown. The base of the feathers on the upper parts of the body is white, on the lower pale dusky grey.

“Length, 3 feet 2 inches; extent of wings, 7 feet; bill along the back, $2\frac{3}{4}$ inches, edge of lower mandible $2\frac{1}{2}$ inches; tarsus, $4\frac{1}{2}$ inches; middle toe and claw, $4\frac{1}{2}$ inches; hind claw, $2\frac{3}{4}$ inches. The extremity of the wings are one inch short of that of the tail.”—*Audubon*.

This is the only species of the true eagle that is known to inhabit the United States, and is considered identical with the European species that bears the same name, although Cassin, in his *Synopsis of the Birds of America*, expresses some doubt in regard to their identity. In comparing Audubon's figure with some well executed figures of the European bird, we cannot see any difference in the markings, but it is necessary to compare well preserved skins, from animals of equal age, before a definite opinion can be given.

The habits of this bird in both hemispheres are alike. It generally prefers inaccessible rocks on which to build its eyrie, and hunts and feeds on the same kinds of animals.

It prefers dead to living prey, and frequents the shores of seas and lakes for the dead animals thrown up by the waves, and will even feed on carrion. We are not aware that this eagle breeds in Ohio, as our State has no wild mountainous districts in which it can build its nest, but it has been found breeding in the Highlands of the Hudson, and among the rocks and hills of the Upper Lakes, and may be found sparingly on all our mountain chains.

In 1810, when Dr. Kirtland first came to this State, eagles were plentiful, and were often seen flying along the lake shore. Among these Golden Eagles were occasionally to be seen, but as all the large predacious birds have become comparatively scarce, it is somewhat doubtful if this species now visits Ohio.

In describing this eagle, Macgillivray, in his *British Birds*, says:

“The flight of the Golden Eagle is very beautiful. Owing to the great size of its wings, it finds some difficulty in rising from the ground, although it is considerably more active in this respect than the White Tailed Eagle; but when fairly on wing, it proceeds with great ease, and on occasion it is capable of urging its speed so as to equal that of most large birds. However, even at its utmost stretch, it is certainly much inferior to that of the Rock Pigeon, the Merlin, and many other species, and the Raven, during breeding season, finds no difficulty in overtaking an Eagle that may happen to fly near its nest.

“When searching the hills for food, it flies low, with a motion of the wings resembling that of the Raven, but with occasional sailings and curves, in the manner of many hawks. At times it ascends high into the air, and floats in a circling course over the mountains, until it has discovered some large object; but in tracing grouse and other animals concealed in the herbage, or in hunting for sea fowls and their

young, it does not indulge in these aerial gyrations, which many closet and some field naturalists have supposed to be performed solely for the purpose of enabling it to spy out its prey from afar. In its ordinary flight, it draws its legs close to the body, contracts its neck, and advances by regular flappings of the wings; but when sailing, it extends these organs nearly to their full stretch, curving them at the same time a little upwards at the tips. An Eagle sweeping past in this manner is a most imposing object, the more especially if in the vicinity of its rocky haunts, and still more if the observer be groping his way along the face of a crag, anxiously seeking a point or crevice on which to rest his foot.

“Both our native eagles sometimes ascend to an immense height in fine weather, and float high over the mountain tops for hours together, but certainly not for the purpose of descriing the objects beneath, for no person has ever observed their sudden descent from this sublime station. It is a popular notion, countenanced even by many anatomists and others, who ought to know better, that the Eagle mounts towards the sun in order to enjoy unrestricted the sight of that glorious luminary. They tell us that its eye is peculiarly fitted for this purpose, by having a strong semi-opaque nycitant membrane, by means of which the rays are blunted, but they forget that the common duck, the domestic fowl, and the sparrow, which are not addicted to astronomical observations, have eyes organized precisely in the same manner.

“On the ground the Golden Eagle, like all others, is extremely awkward, for, owing to its large wings, its great weight, and the form of its toes, which are encumbered with very large curved and pointed claws, it can only walk in a very deliberate manner, or remove from place to place by repeated leaps, in performing which it calls in the aid of its wings. Its feet, in fact, are not adapted for walking; they are most powerful organs of prehension, capable of

inflicting mortal injury on any animal not exceeding a sheep in size. It is with them that it deprives its prey of life, and carries it off to its nest or to some convenient place of retreat. With its curved bill it tears off the feathers and hair, separates morsels of the flesh, and even crunches the bones of small animals."

The young differ from the old in plumage, the base of the tail being white.

There is no specimen in the Museum of the Cleveland Academy of Natural Science, but Dr. Kirtland possesses a skin.

II. GENUS HALIÆTUS, *Savigny*.—FISHER EAGLES.

Size, large; tarsi short, naked, or feathered for a short distance below the joint of the tibia and tarsi, and with the toes covered with scales. Bill, large, strong, compressed; margin of upper mandible slightly festooned; wings rather long, pointed; tail moderate; toes rather long; claws very strong, curved, sharp.

Of this genus there are four species indiginous to North America, viz: The Northern Sea Eagle, *H. pelagicus*; the Washington Eagle, *H. Washingtonii*; the Grey or European Sea Eagle, *H. Albicilla* (?) and the Bald or White Headed Eagle, *H. leucocephalus*. All prefer to feed on fish, and frequent the shores of the ocean and lakes, and the banks of the larger rivers, for that purpose. They chase and destroy quadrupeds and birds, and the last named species will kill and devour young pigs and lambs.

The *H. pelagicus* is the largest Eagle known, and frequents the shores of the Pacific, from California to the

Arctic Circle. *H. Albicilla* inhabits Greenland, but Cassin doubts if it is identical with the European bird of that name.

1. HALIÆTUS LEUCOCEPHALUS, *Linnaeus*.—WHITE HEADED OR BALD EAGLE.

Wilson's Amer. Orn., IV., pl. 36; Audubon's B. of Am., Oct. ed., I., pl. 14.

This Eagle was of more frequent occurrence during the early settlement of Ohio, than at the present day. Yet at this time they are not rare, as scarcely a season passes during which several are not killed on the Lake shore. In the last five years we have seen three or four specimens that were obtained in the neighborhood of Cleveland. None of our eagles have so wide a range as this. It has been found from the Atlantic to the Pacific coasts, and from the Gulf of Mexico to the shores of Hudson's Bay.

The Bald Eagle is remarkable for its great strength and daring. It provides well for its young, and has a life-long attachment for its mate. The nest is always built in the forks of some tall tree, and the chosen locality is seldom deserted during the life of the pair. Year after year this spot is their home, and in this first nest they raise their young. They breed very early, laying two or three eggs of a dull white color, and rounded alike at both ends. These hatch in about three weeks, and the young are covered with a soft cottony down. When fully fledged, the young have not the peculiar markings of the adult bird, and it is not until they are from three to five years of age that the feathers of the head and tail become white. When in the immature state the bird is commonly known as the Grey or Brown Eagle, from the uniform color of the plumage. The young breed the first year after they leave the nest, and it often occurs that an adult bird is mated to

a young one. This occurs when the former partner of the old one has been killed or has died.

With all the strength and vigor which this Eagle possesses, he is a mean tyrant, utterly unworthy of the honor bestowed in selecting him as the emblem of our country. His habits accord better with those of a fillibuster or robber, and we think with Franklin, that the selection was a poor one. During the summer he watches the motions of the Fish Hawk—*Pandion Halietus*—and when the latter has by its industry secured a fish, the Eagle gives chase, and overtaking the Hawk, compels it through fear to relinquish its prey. This is no sooner done than our robber bears off the prize to its nest in the woods. When it can not obtain fish in this manner, it feeds on such as are thrown ashore. It also attacks pigs, lambs, rabbits, and such of our wild animals as it can conquer. The water fowl suffer severely, a pair of eagles generally assisting each other in this kind of hunt, swooping alternately at the devoted victim, compelling it to dive until it is exhausted for lack of breath, when it makes for the shore and is instantly killed.

Audubon records a case of one of these Eagles attempting to carry off a child, which it did not succeed in doing in consequence of the dress of the babe giving way. When hard pressed for food, he will devour carrion, and even compel the Turkey Buzzard to disgorge, and will then swallow the fetid morsel.

For many years a pair of these birds bred on a high oak tree, upon the farm of Prof. Kirtland, on a precipice overlooking the lake. The original tree on which this nest was built, was destroyed, and the birds immediately selected one close to it for their future home. This nest is now used, and in all probability contains eggs or young at the present time, (March, 1858.) Nine or ten years ago, the female was shot by some one, and the male left the locality for that season. Next year he came back with a

new mate, and with her established themselves in the old nest. When the young are able to forage for themselves the parents drive them away, but they remain in the vicinity of the nest, and roost on the same tree for a considerable time after they are able to fly.

The flight of this bird is very powerful, and it can ascend to great heights with little apparent exertion, sweeping in wide curves upward, on almost motionless wings, until it appears like a mere speck in the sky.

The length of this Eagle is about 3 feet; extent of wings 7 feet; bill, $2\frac{3}{4}$ inches along the upper ridge; tarsi 3, and middle toe $3\frac{1}{2}$ inches.

In the adult, the head and tail, with the upper and under coverts of the latter, are white, the rest of the plumage dark brown; bill and feet yellow. The young bird has the entire plumage brown, with the bill blackish; slight mottlings of white on the tail, especially on the inner margins of the feathers. The iris of the young bird is also brown, while that of the adult is yellow.

There are several specimens in the Museum of the Cleveland Academy of Natural Science.

HALLÆTUS WASHINGTONII—THE WASHINGTON SEA EAGLE.

Audubon's Birds of America, Oct. ed., I., p. 53, pl. 13.

Considerable doubt exists in regard to this Eagle, no naturalist having been able to identify the bird since the time Audubon discovered and described it, and as this description is based on a single specimen, shot by him, at the village of Henderson, Kentucky, it is the more remarkable.

In Ohio there are fisher eagles that neither agree in specific character with *H. leucocephalus* nor *H. Washing-*

tonii, exceeding in size the former, but wanting the continuation of the tarsal scutella to the base of the toes, which is one of the distinguishing marks of the latter species. The Cleveland Academy of Natural Science has in its possession two specimens of this Eagle, one mounted, the other a skin. The latter is now lying before us; the bird was shot three or four years since within a few miles of Cleveland, and the skin has shrunk a good deal in drying; the measure of the total length cannot therefore be at all reliable. It is now about 3 feet 2 inches, and probably when recent was 3 feet 4 inches; the wings, from the flexure to the tips of the longest primaries, 2 feet 1½ inches; bill along the ridge 3¼ inches; tarsi 3½ inches; middle toe and claw 4½ inches; tail 15 inches long. Color dark brown; tail and portion of the secondary feathers of the wing irregularly blotched with white; primaries black, the third, fourth and fifth being the longest, and of equal length. Bill blackish; feet yellow. The sex or age unknown. There is considerable shading of yellowish throughout the whole plumage, but is rather irregular.

As the dimensions of this bird do not agree with those of *H. Washingtonii* nor of *H. leucocephalus*, we cannot say to which it really belongs, and shall wait until an opportunity offers for the examination of a recent specimen, but we may state that it has been a question in the minds of the best ornithologists of Ohio, if this is not *really* the Washington Eagle.

Audubon states that this bird frequents the course of the Ohio River and its tributaries, and also the chain of the great Lakes, the latter on the authority of the voyageur who first called his attention to it. He also states that this species breeds in the cliffs of rocks, a habit that the Bald Eagle has not, the latter always building in trees. It is also more industrious than its white headed relation, fishing for itself in the manner of the Fish Hawk, and does not rob this bird of food, like the former species.

We annex the following description taken from the above named author.

“*Adult Male.*—Tarsus and toes uniformly scutellate in their whole length. Bill bluish black; cere yellowish brown; feet orange yellow; claws bluish black. Upper part of the head, hind neck, back, scapulars, rump, tail coverts, and posterior tibial feathers blackish brown, glossed with a coppery tint; throat, fore neck, breast and belly light brownish yellow, each feather with a blackish brown streak; wing coverts light greyish brown, those next the body becoming darker; primary quills dark brown, deeper on their inner webs; secondaries lighter, and on their outer webs of nearly the same light tint as their coverts; tail uniform dark brown.

Length 3 feet 7 inches; extent of wings 10 feet 2 inches; bill $3\frac{1}{4}$ inches along the back; along the gap, which commences directly under the eye, to the tip of the lower mandible, $3\frac{3}{8}$, and $1\frac{3}{4}$ deep. Length of wing, when folded, 32 inches; length of tail 15 inches; tarsus $4\frac{1}{2}$; middle claw $4\frac{3}{4}$; hind claw $2\frac{1}{2}$.”

Whether this is really a distinct, or the young of an otherwise undescribed species, it is hard to say. Cassin in his *Synopsis* favors the latter conclusion. Some have supposed it to be the young of *H. pelagicus*, while others have thought it was only a very large specimen of the young *leucocephalus*. But is it not highly probable that there are some undiscovered species belonging to this family that inhabit the higher latitudes of British America, and may we not be occasionally favored with a visit from some of these birds.

III. GENUS PANDION, *Savigny*.—OSPREYS.

Bill short, curved from the base, hooked, compressed; wings very long; tarsi short, very thick and strong, and

covered with small circular scales; claws large, curved, very sharp; tail moderate.

I. PANDION CAROLINENSIS, *Gmelin*.—THE FISH HAWK.

Wilson's, *Amer. Orn.*, V., pl. 37; Audubon's *B. of Am.*, Oct. ed., I., pl. 15; DeKay, *Nat. Hist. N. Y.*, Birds, pl. 8, fig. 15.

The Fish Hawk is widely distributed over the whole country, and at one time was quite plentiful in Ohio. When Dr. Kirtland resided at Poland, Mahoning county, these birds built their nests in the vicinity of the village, and could be seen every day during the summer season. Now they are rare. A few pairs are generally to be found fishing in Sandusky Bay, but they are somewhat shy and it is difficult to get a shot at them. Occasionally a specimen will make its appearance near the shore of the Lake, in the vicinity of Cleveland. The last we saw there was about ten years since, although others have seen individuals more recently.

We are not aware that this Hawk breeds near this place, but in the less frequented parts of our State, and in the neighborhood of water, the nests may sometimes be seen. On the Upper Lakes these birds are very numerous, and along the rapids of Sault Ste. Marie, Dr. Garlick informs us, he has seen them plying their trade with great diligence, darting into the water and bringing up white fish of the largest size. At one time, this gentleman observed a Hawk endeavoring to carry off two large fish, one grasped in each foot, but finding the weight too great, dropped one and bore off the other.

For a long time our species was considered identical with that of Europe—*P. haliaetus*—and it is figured and described by both Wilson and Audubon as such. Cassin, however, is of a different opinion, and says: "The American Osprey is very similar to that of the Old Continent,

and specimens from Western America even more intimately resemble it. It is, however, larger, and retains in all the specimens that we have seen, differently formed spots on the breast, being heart shaped and circular instead of narrow and lanceolate, as in the European species."

In habits all the Fish Hawks are models of industry, and are perfectly harmless to everything but fish. They never attack quadruped or bird, although armed in the most dangerous manner. Their flight is elegant, sweeping in beautiful curves. When he sees a fish suited to his wants, he descends with great swiftness into the water, often disappearing for a few moments among the foam and spray, but soon emerging, he rises with his struggling victim grasped in his powerful talons. It he bears to his eyrie, supplying his family with abundance of food. In America the nest is generally to be found on trees, but in Europe some ancient ruin is preferred. It is large, and in general sufficient to make a good load for a cart. The materials are sticks of various sizes, mingled with grass and seaweed if in the neighborhood of the ocean. The eggs are from two to four, of the shape of those of the common fowl, but a little larger, and vary from dark cream color to white splashed with dark Spanish brown all over. The eggs usually hatch about the last of June, and the young are abundantly supplied with food by both parents, who exhibit every sign of extreme watchfulness and care of their offspring. A remarkable trait recorded of this Hawk is that it will permit the Purple Crackle, or Crow Blackbird—*Quiscalus versicolor*—to build its nest in the interstices of that of the Hawk. They live together in the greatest harmony, and carry on the business of life without interference.

The length of the adult female Hawk is about 25 inches; wing $21\frac{1}{2}$; tail $10\frac{1}{2}$ inches. Color: Head and under parts white; crown and hind head white; front brownish, with a wide stripe of dark brown through the eye, and extending down the neck behind; wings and tail deep brown, shaded

with a lighter hue; tail with eight bands of dark brown, with a large portion of the inner webs white; breast spotted with dark brown in heart shaped and circular markings; bill and claws bluish black; feet yellow, with a greenish tinge; cere lightish blue.

They migrate south at the coming of winter.

A dilapidated specimen is in the possession of the Cleveland Academy of Natural Science, and a perfect one in the collection of the Hon. William Case, of Cleveland.

IV. GENUS BUTEO, *Cuvier*.—BUZZARDS.

Bill short, wide at base, edges of upper mandible festooned; nostrils large, ovate; wings long, wide, fourth and fifth quills longest; tail moderate, rather wide; tarsi rather long, and having transverse scales before and behind, but laterally small circular scales; toes moderate, rather short; claws strong. Contains seven species indigenous to the United States, three only are known to inhabit Ohio: The Red Tailed Hawk, *B. borealis*; the Red Shouldered Hawk, *B. lineatus*, and the Broad Winged Hawk, *B. Pennsylvanicus*. It is, however, quite probable that individuals belonging to other species may yet be discovered within our borders.

1. BUTEO BOREALIS, *Gmelin*.—THE RED TAILED HAWK.

Wilson's Amer. Orn., VI., pl. 52, figs. 1-2; Audubon's B. of Am., Oct. ed., I., pl. 7.

The Red Tailed Hawk is a widely scattered species, having been found as far South as Jamaica and Cuba, and in the fur countries around Hudson's Bay. In Ohio they occur sparingly, and their nests may occasionally be found

on tall trees. Some years ago we obtained of a farmer's boy a young living specimen, which he had reared from the nest. At that time it was nearly full grown; the plumage did not differ much from that of the adult. The tail was not red colored, as in the older bird, but barred. This bird became as thoroughly domesticated as an animal of its fierce disposition could be, and was in our possession for nearly two years. We kept it in a coop with a high perch, and would often take it out for an airing. Sometimes, when tired of being kept in too long, our Hawk would tear down the wooden bars of his cage, come out and fly around, but would generally return to us when called. At other times, when perched on our own or a neighbor's house, he would remain for hours. He was great on rats, and would kill them with a single grasp of his talons; never troubled cats, but would let our own puss sit in the coop beside him. Poultry gave him a wide berth, and he was an excellent protection to our garden from the scratching propensities of the biddies. Occasionally he would become mischievous, or rather too familiar, for he would sweep from the top of a fruit tree, and alight on the back or shoulder of some one of the family, uttering his terrible scream. Without intending it his claws hurt so that he was rather a rough playfellow. Unfortunately he was killed by a boy, who struck him over the head with a hoe. During the time he was with us, he never attempted to leave, although birds of his own species would circle high in the air above him, and he would answer scream for scream.

The Red Tailed Hawk is commonly called the Hen Hawk, in consequence of its fondness for poultry, and farmers make war on it in retaliation. They are strong, fierce birds, and prey on everything wild or tame that they can master. After discovering a small animal, they alight on the top of some neighboring tree, and then descend with a rapid swoop. They seldom miss their aim. The male and female join in hunting the squirrel, and take opposite sides of the

tree, thereby depriving the little animal of the benefit of running round the trunk.

In the adult male the bill is blackish; cere greenish yellow; feet yellow; claws blackish. Upper part of the head lightish brown, shaded with grey. A band of dark brown from the angle of the mouth backwards; back brown with light shadings. Upper part of the neck yellowish red, with spots of brown. Tail covers whitish with bars of brown. Tail bright yellowish red, with a narrow bar of black near the tip. On the tail of a specimen in the Museum of the Cleveland Academy, there are the remains of numerous black bars, which coincide with the bars on the tail of the young. On looking closely, these can be distinctly traced. The abdomen and chin are white; the long feathers of the leg yellowish, with small brown spots. The length is about 22 inches; extent of wings 47. The female is larger, and wants the black bar at the end of the tail.

Specimens of both sexes in the Cleveland Academy's Museum.

2. BUTEO PENNSYLVANICUS, *Wilson*.—BROAD WINGED HAWK.

Wilson's Amer. Orn., VI., pl. 54, fig. 1; *Audubon's B. of Am.*, Oct. ed., I., pl. 10; *DeKay's Nat. Hist. N. Y. Orn.*, pl. 5, fig. 11.

Very little seems to be known regarding the habits of this Hawk, although it is of common occurrence in this and neighboring States. All writers agree in describing it as of a mild character, more so than any other species known. It was first described by *Wilson*, from a specimen shot by him while it was feeding on a meadow mouse. *Audubon* obtained the individual, from which he made his drawing of the female, in its own nest, while sitting on its

eggs, and it did not have spirit enough to defend either itself or its nest, but was quietly tied in a handkerchief, carried home, then placed on a stick, and sat for its portrait, without even moving. When done with, Mr. Audubon opened the window and let the bird fly, when it sailed slowly off to the woods.

It seldom attacks other birds of any size, contenting itself with very young chickens or ducklings, small birds, snakes, meadow mice, frogs and insects. The little Sparrow Hawk and King Bird drive it off without much effort. Its nest is built in the forks of a tree, and much resembles that of a Crow. The eggs are generally five, of a greyish white, blotched with dark brown. From its peaceable habits this Hawk can do but little damage, for the hen can easily protect her chickens from its assaults.

The Broad Winged Hawk is so called from the great breadth of the wings through the secondary quill feathers. It flies with an easy gliding motion, and in circles. The following description, taken from Cassin's *Illustration of Birds*, is better than any we could write, and applies to the specimens we have seen:

“*Adult*.—Entire upper parts dark umber brown; feathers on the back of the neck white at their bases. Throat white, with narrow longitudinal lines of brown, and with a patch of brown on each side, running from the base of the lower mandible; breast with a wide band composed of wide cordate and sagittate spots and transverse stripes of reddish ferruginous tinged with ashy; other under parts white, with numerous sagittate spots disposed to form transverse bands on the lower part of the breast, flanks, abdomen and tibiae. In some specimens, in winter plumage, the ferruginous color predominates on all the under parts, except the under tail coverts, and all the feathers have large circular spots on the edge; under tail coverts white. Tail dark brown, narrowly tipped with white, and with one broad band of white and several other narrower

bands near the base. Quills brownish black, widely bordered with pure white on their inner webs.

“*Young.*—Plumage above umber brown, edged on the head and back of the neck with fulvous, and with many feathers on other upper parts edged with the same color and ashy white; upper tail coverts spotted with pure white. Under parts white, generally tinged with yellowish, many feathers having oblong and lanceolate longitudinal stripes and spots of brown; a stripe of brown on each side of the neck from the base of the under mandible. Tail brown, with several bands of a darker shade of the same and of white on the inner webs of the feathers, and narrowly tipped with white.

“*Dimensions.*—Female, total length 17 to 18 inches; wing 11; tail $6\frac{1}{2}$ to 7 inches. Male smaller.”

Specimens in the Cleveland Academy of Natural Science Museum.

3. BUTEO LINEATUS, *Gmelin.*—RED SHOULDERED HAWK.

Wilson's Amer. Orn., VI., pl. 53, fig. 3; Audubon's B. of Am., Oct. ed., I., pl. 9.

The Red Shouldered Hawk is a permanent resident of our State, and is found more frequently than its Red Tailed relative. Its range is a wide one, being from the Atlantic to the Pacific Oceans. The young was considered as a distinct species, under the name of Winter Falcon—*Falco hyemalis*. Audubon and Wilson considered them quite distinct, but Cassin says that they are identical.

This species pair for life, and select the same locality in which to build their nest. Audubon states that he has

caused the tree on which the nest of a pair of these birds was built to be cut down, and in a short time a new nest was begun within a short distance.

They are decidedly arboreal in their habits, and prefer a life in the woods to one in the clearings. Their prey consists of squirrels and other small quadrupeds, occasionally a young rabbit. They also kill wild pigeons, black birds, and small birds, and are not so apt to visit the poultry yard as the Red Tailed species. The young, as *F. hyemalis*, are described as feeding voraciously on frogs. Wilson says that he has taken the fragments and whole carcasses of ten frogs from the stomach (crop?) of a single individual.

The Red Shouldered Hawk is very noisy in the early part of the season, and its note is easily recognized. The nest is about the size of that of the Crow, and is built near the top of some tall tree. The eggs are greyish white, with dark brown blotches. The young are fed by the parents after they are capable of flight, but as soon as they are able to shift for themselves, the young separate and remain apart until the pairing season.

This species is nearly as long as the Red Tailed, but is not as heavy; its legs are also more slender. The wings are shorter than those of the other species of the genus, and Sir William Jardine considers it the joining link between *Buteo*, *Astur* and *Circus*, partaking of the character of all these genera. The species is considered as somewhat difficult to identify in its various states of plumage, as it is variable in both coloring and size. Males are found 18 inches only in length, while females sometimes reach that of 24 inches. The adult bird is easily distinguished by the bright rufous wing coverts, and rather paler coverts of the breast; the upper parts brown mixed with rufous; tail brownish, with five transverse bands of white and tipped with white. The young want the rufous characteristics, and have the under parts of a yellowish white,

with stripes and oblong spots of brown; the tail is numerously barred.

Being very abundant throughout the State, the habits of this species may be studied with great ease. The young can generally be found in the nest by the middle of April, or even earlier.

Specimens in the Museum of the Cleveland Academy of Natural Science.

V. GENUS ARCHIBUTEO, *Brehm, Bis* 1828.

Character similar to those of the preceding genus, but with the tarsi feathered to the base of the toes, but more or less naked on the hind part. Toes short; claws moderate; wings rather long. Species of this genus are found in both the eastern and western hemispheres, *A. logopus* being considered common to both. Three species inhabit the United States.

1. ARCHIBUTEO SANCTI JOHANNIS, *Gmelin.*—BLACK HAWK.

Wilson's Amer. Orn., VI., pl. 53, figs. 1-2; Audubon's B. of Am., Oct. ed., pl. 11; Richardson's Fauna Boreali-Americana, Birds, pl. 28.

Many naturalists consider this species identical with *A. logopus* of Europe, while others look upon them as quite distinct. Cassin says that specimens of what has been considered the young bird, agree in all respects with individuals from Europe, and that it is impossible to distinguish any difference. As both species—if there are two of them—are indigenous to this continent, and breed in the far countries of the North, coming South at the approach of winter, and leave us in March or April for their breeding places, it is rather difficult to decide, unless living birds of the light colored plumage are obtained and kept in confine-

ment until it becomes apparent, after several moultings, to which species they belong. Wilson regarded the species as distinct, but Audubon was of a different opinion.

The Black Hawk cannot be regarded as injurious to the interests of man, as he feeds on frogs, lizards, meadow mice, moles, &c., occasionally capturing a wounded duck or teal, but does not visit the farm yard in pursuit of poultry. His favorite hunting grounds are swamps, the banks of rivers or lakes, and marshes in the neighborhood of the sea. In such places his food is abundant and easily procured. His flight is not rapid, and he never attempts to capture birds by this means. Endowed with great size and strength, his habits are more like those of an owl than a falcon, and he pursues his game long after sunset, in dusky twilight.

The plumage of our Hawk is more soft than that of other Buzzards or Hawks, and in this there is a resemblance to the Owls, and the same may be said of the feathered tarsi.

Having no set of specimens of this bird, from which a description can be given, we subjoin that of Cassin's *Synopsis*:

“Large, and rather heavy; wings long; tarsi feathered, a narrow space naked behind; toes naked and rather short.

“*Adult.*—Entire plumage glossy black, in many specimens, with a brown tinge; forehead, throat and a large space on the head behind mixed with white. Tail with one well defined band of white, and irregularly marked towards the base with the same color. Quills with their inner webs white, most readily seen on the under surface of the wing. Some specimens have several well defined bands of white in the tail. Others have the entire plumage dark chocolate brown, with the head more or less striped with yellowish white and reddish yellow. Cere and legs yellow.

“*Younger.*—Upper parts light umber brown, with the feathers more or less edged with yellowish white and reddish yellow; abdomen with a broad transverse band of

brownish black; other under parts pale yellowish white, longitudinally striped on the neck and breast with brownish black; wings and tail brown, tinged with cinnereous; quills for the greater part of their length white on their inner webs; tail feathers white at their bases. Plumage of the tibiæ and tarsi pale reddish yellow, spotted with brown. Other specimens have the throat and breast with the black color predominating.

“*Young Male*.—Entire upper parts light ashy brown, more or less mixed with white, especially on the head, and fulvous; under parts yellowish white and dark brown, the latter assuming the form of longitudinal stripes on the breast, and narrow transverse stripes on the abdomen; tarsi and tibiæ dark brown, striped with dull white and reddish; greater part of quills and tail white. The cere and legs yellow.

“*Dimensions*.—Female, total length 23 to 24 inches; wing 17 to 17½; tail 9 inches. Male, total length about 20 to 21 inches; wing 16 to 16½; tail 8 to 8½ inches.”

[Specimens of *Archibuteo Sancti Johannis* are quite plentiful in the neighborhood of Cleveland this winter, (December, 1858.) Some are in splendid plumage and very dark colored. Prof. Kirtland saw a fine one in the act of capturing a mouse a few days ago. They seem to search the meadows for this kind of game, and should be welcomed by our farmers for this service. They will not kill chickens.]—*Ed. Ohio Farmer*.

2. ARCHIBUTEO LOGOPUS, *Gmelin*.—ROUGH LEGGED BUZZARD.

Wilson's Amer. Orn., IV., pl. 33, fig. 1; Gould's Birds of Europe, I, pl. 15; Audubon's Birds of Am., Folio edition, pl. 166.

There is considerable difference of opinion among naturalists in regard to the identity of this bird, specimens

obtained in this country agreeing in every particular with others from Europe, while they also agree with individuals of the preceding species in immature plumage. If the species are distinct, we may claim this as an Ohio bird, as a specimen now in the Cleveland Academy's Museum was obtained by Prof. Kirtland in that portion of Cleveland formerly Ohio City. This agrees in the most minute particular with descriptions of the European bird, and was labelled *A. logopus* by him. In habit the present species agrees with *A. Sancti Johannis*, and preys on meadow mice, frogs, &c. It cannot be considered an injurious bird, and it should not be killed because it belongs to a bad family.

In form this is similar to the preceding, and in color almost, if not quite, identical with that of the younger bird. The upper parts are amber brown, with occasional feathers edged with whitish and fulvous, these becoming quite numerous on the head and back part of the neck. A wide band of brownish black across the abdomen. The rest of the lower parts yellowish white with longitudinal lines and spots of brownish black. Quills of the wings ashy brown, with the basal portion of their webs white; lower side of the tail white, upper white on the basal half, the remainder brown tipped with white; feathers of the legs pale reddish yellow with longitudinal stripes of brown.

General size same as preceding species. Inhabits all portions of North America, from the Atlantic to the Pacific Oceans, and breeds in the fur countries of the North. It is common also in Europe, where its habits are the same as in this country. It nests in low trees and is pretty shy.

VI. GENUS ASTUR, *Lacepede*.

Form strong, but rather slender; bill short, curved, festooned; nostrils large, slightly ovate, inserted in the cere;

tarsi rather long, covered in front with wideish transverse scales; toes long; claws long and sharp.

1. ASTUR ATRACAPILLUS, *Wilson*.—THE GOSHAWK.

Wilson's Am. Orn. VI., pl. 52, fig. 3; *Audubon's B. of Am.*, Oct. ed., I., pl. 23; *Fauna Boreali Americana, Birds*, pl. 26.

This Hawk is considered by many authors as identical with the Goshawk of Europe—*A. palumbarius*—but Cassin considers that they are quite distinct. Audubon was of a different opinion, while Temminck and Bonaparte agree with Cassin.

When Prof. Kirtland, in 1838, wrote his Report on Birds for the Ohio Geological Survey, he added this bird to our fauna, on the authority of Audubon, who stated that they were numerous in Kentucky during the winter; also in Indiana and Pennsylvania, and at Niagara. Of course they must necessarily occur in Ohio. They breed North of the Lakes and pass southward in the fall, returning again in the spring. They are very rapid and powerful fliers, pursuing the flocks of wild pigeons and capturing the birds with ease.

The Goshawk is large and powerful, and was used for capturing game in Europe when falconry was a noble sport. Our American species flies at and kills rabbits, squirrels and all kinds of water fowl under the size of a goose. They carry off chickens and ducks from the farm yard and are looked upon, and with justice, as vermin of the very worst kind.

In size this Hawk is large, but rather slender in form; wings short, but the tail large, which it uses greatly in changing its course when flying. In the adult the upper part of the head, back of the neck and a stripe behind the eye is black mixed with ash color. The rest of the upper parts cinereous. A stripe of white above the eye, and a slight collar on the back of the neck of the same color.

Abdomen and entire under parts white, each feather having a longitudinal line of brownish black, and a few irregular bands of greyish brown. The quills of the wings brown with darker bands, the inner webs mottled with white. Tail dark brownish grey, with irregular bands of black and tipped with white; under side whitish; under tail coverts pure white.

In the young the head and upper parts are dark brown, mixed with reddish. The under parts white tinged with reddish yellow, and marked with large oval and round spots of brown.

Dimensions.—Female 22 to 24 inches in length. Male 19 to 20 inches.

[Since writing the article on the Goshawk, we have seen specimens, and had an opportunity to examine and compare these with the European species—*A. palumbarius*—and from that examination we would be led to consider that they were quite distinct. Our Goshawk has been shot in the neighborhood of Cleveland, and Dr. Kirtland informs us that they are very numerous in Wisconsin. He has seen them flying around, and can distinguish them at a glance, from their peculiar method of flight. Dr. Stirling shot a specimen in this vicinity that is now in the possession of the Hon. William Case.]

VII. GENUS ACCIPITER, *Brisson.*

The generic characters are similar to those of the preceding genus, but the species are smaller and more slender. The fourth wing quills are the longest, but shorter than in *Astur*. Tail also long. Tarsi long and slender, with the scales almost wanting. Species distributed over the whole

world. Three inhabit the United States, one of which—*A. Mexicana*—is limited to the Pacific coast and Mexico.

1. ACCIPITER COOPERII, *Bonaparte*.—COOPER'S HAWK.

Audubon's Birds of America, Oct. ed., I., pl. 24.

This hawk is much more injurious to the farmer than we might be led to believe from its comparatively small size and slender form, but its great courage and rapidity of flight enables it to combat and destroy much larger birds than itself. Audubon relates an instance in which a young male attacked a cock and succeeded in killing him, although the fowl was prepared for the combat. The marauder paid the penalty of his foray with his life, Mr. Audubon having shot him in the act of rising in the air after the battle.

Cooper's Hawk destroys great quantities of game, and often visits the farm yard for the purpose of preying on everything it can conquer. It builds its nest in the forked branch of some tall tree, often an oak. The eggs are three or four in number, nearly round, of a dull white, and very rough.

It is rather difficult to distinguish the species sometimes, as the variations of the plumage are considerable, and the markings vary. Its form is slender, with short wings and rounded tail. In the adult the upper part of the head is brownish black, with a few marks of white. Upper parts of the body dark ashy brown, with an obscure reddish collar on the back of the neck. Tail dark slate color, with four broad bands of black and tipped with white; under tail coverts white. Throat white with lines of dark brown. The breast and abdomen barred with light reddish and white.

The female measures from 18 to 20 inches in length; the male 16 to 17.

Specimens in the Cleveland Academy of Natural Science's Museum.

2. ACCIPITER FUSCUS, *Gmelin*.—THE SHARP SHINNED HAWK.

Wilson's Amer. Orn., V., pl. 45, fig. 1, Young Female, VI., pl. 46, fig. 1, Male; Audubon's B. of Am., Oct. ed., I., pl. 25.

This handsome little Hawk is common in Ohio, and may often be seen in pursuit of its prey during the spring, summer and fall months. Specimens are often shot in the vicinity of Cleveland.

We have never seen the nest of this bird, but it has been found in various places within the State. The eggs are four in number, nearly alike rounded at each end. Color white, with a bluish tinge, and thickly blotched with chocolate. The nest is built either in a tree or a hole in a rock, and consists of a few sticks and grass very loosely put together.

The food of the Sharp Shinned Hawk consists of every animal he is capable of capturing, from the common passenger pigeon to insects. Small quadrupeds, such as mice and moles, are often taken, and snakes and frogs form part of the feast. Little chickens are often captured, and Nuttall relates an incident in which one of these birds carried off a chicken before his face, while the housewife was endeavoring to frighten it away, and also of another, that came every day to a farm house and carried off a chicken each time, until twenty or thirty were taken.

In size there is a great variation between the sexes, and also between individuals of the same sex. Wilson described the two sexes as different species. The tail is long, nearly even at the end. Wings short; tarsi and toes very slender, and claws sharp.

In the adult the upper parts are dark brown, approaching to black, with an occasional feather of an ash color. Under part light reddish, darker on the legs, and banded with white. Throat and under tail coverts white. Tail ashy, with four broad bands of black, and tipped with white. Wing quills brownish black, with obscure bands of blackish,

and whitish on the inner webs; secondaries with whitish spots, concealed when the wing is folded.

The young have the upper parts brown, with a tinge of ash, and a few white feathers on the back of the neck. Under parts white, with oblong and circular spots of brown, and cross bands of the same on the legs.

Length of the female, 12 to 14 inches. Length of the male, 10 to 12 inches.

Inhabits all North America, from Hudson's Bay to Texas, Mexico and California, passing to the South on the approach of winter, and returning in the spring.

Specimens in the Museum of the Cleveland Academy of Natural Science.

VIII. GENUS TINNUNCULUS, *Viellot*.

The individuals comprising this subdivision of the typical falcons, are of small size, with the tarsi and toes rather long and slender. The bill is short, hooked, and the upper mandible has always a distinct tooth. The head rather large; the claws are very sharp. Wings long and pointed, and the tail rather long.

Only one species indiginous to the United States.

TINNUNCULUS SPARVERIUS, *Linn.*—THE SPARROW HAWK.

Wilson's Amer. Orn., II., pl. 16, fig., 1, and IV., pl 32, fig. 2; Audubon's B. of Am., Oct. ed., I., pl. 22.

This pretty little Hawk is found in every part of the States, and is quite common in Ohio. It cannot be consid-

ered as an injurious bird, but rather the contrary, as it feeds on mice, small snakes, crickets, grasshoppers and other insects, and occasionally small birds. In its wild state, it has never been observed to attack poultry however young, although a specimen in the possession of Audubon lost its life by attacking a brood of chickens, the old hen putting him *horse du combat*.

In selecting a place for their nest, the birds usually take possession of the deserted hole of a woodpecker. The eggs are from five to seven, of a nearly round form; color, deep buff, covered with blotches of brown and black. Sometimes there are two broods in a season, but we do not know that this occurs in Ohio. Both parents assist in the work of incubation, and are active in providing for the wants of their young family. In their general habits, they are more amiable than other Hawks, are easily tamed, and exhibit considerable attachment. They occasionally winter in this State.

In size the male and female are nearly alike. The adult male has a white frontal band, with a spot on the back of the neck, and two others on the side of the neck, and a line running from the eye downwards black. Upper part of the head bluish lead colored, with a spot of light reddish. Back of the neck and back, down to the middle of the tail, light reddish. Wing coverts bluish lead colored, with black spots; quills brownish black, barred with white on the inner webs. Under parts paleish red, approaching in many specimens to white, spotted with circular and oblong black markings. Tail with a broad band of black, often tipped with white, sometimes the outer feathers are ash colored, with black bars. Bill blue; feet and legs yellow. The wing coverts of the female are rusty red, with numerous cross bars of brownish black; tail the same. Under side with many longitudinal stripes of blackish, and cross bars of the same on the tibia. The red spot on the head, in many specimens of both sexes, is sometimes very obscure.

NAUCLERUS FURCATUS—SWALLOW TAILED HAWK.

Length 11 to 12 inches, including tail, which is from 5 to 5½ inches.

Specimens in the Museum of the Cleveland Academy of Natural Science.

IX. GENUS NAUCLERUS, *Vigors*.

Bill short, weak; wings long and pointed; tail long and forked. Tarsi and toes short. Believed to contain but three species, one of them African, the other two American.

NAUCLERUS FURCATUS, *Linn.*—SWALLOW TAILED HAWK.

Wilson's Amer. Orn., VI., pl. 51, fig. 3; Audubon's B. of Am., Oct. ed., I., pl. 18.

This beautiful bird was once pretty plentiful in Ohio and often seen in Summit and Portage counties, but recently it has become scarce in the northern part of the State. The prairies in Crawford county were formerly a favorite place of resort, and occasionally a specimen may be found there still. Further South it becomes more plentiful, and may sometimes be seen in small flocks during the spring.

The flight of this Hawk is peculiarly graceful. It glides through the air in a manner quite different from other hawks. Its food consists of grasshoppers, cicada, (seventeen year locusts,) beetles and other insects; also small lizards and insects, and is thus more beneficial than otherwise to the farmer. Their prey is always devoured upon the wing, the bird never alighting for that purpose. The Swallow Tailed Hawk often flies very high in pursuit of insects.

This species is said to build on the top of high trees and the nest resembles that of the crow. The eggs are from four to six, greenish white with blotches of brown at the larger end. Both parents take part in the labors of incubation. The young have the distinct black and white markings of the parents the first year.

This Hawk is migratory, and leaves the United States in September for the lands South of the Gulf of Mexico, returning in the spring. They are much more plentiful in the Southern States than in the Northern, and are not found in the Eastern at all.

The head, neck, breast and abdomen are white. The rest of the body black, with metallic purplish reflections. The feet greenish blue, with flesh colored claws; bill bluish black; cere light blue; iris black. Both sexes alike, but the male rather smaller. Length of female 23 to 25 inches; wing 16 to 17½; tail 14 inches.

There is a very fine specimen in the Cabinet of Prof. Kirtland.

GENUS FALCO, *Linn.*

Form robust and powerful; wings long and pointed, capable of rapid and vigorous flight; tail rather long; bill short, upper mandible curved, and with a distinct tooth; nostrils circular, with a central tubercle; tarsi short and robust, covered with hexagonal or round scales; middle toe long; claws large, curved and very sharp.

This genus is spread over a considerable portion of the world. There are three species indiginous to the United

States, of which the *F. nigriceps* and *polyagrus* belong to the Pacific coast, and were recently described by Cassin.

FALCO ANATUM, *Bonaparte*.—THE GREAT FOOTED HAWK.

Wilson's Am. Orn., IX., pl. 76; Audubon's B. of Am., Oct. ed., I., pl. 20.

This Hawk has, by most writers, been considered identical with its European analogue, the Peregrine Falcon—*F. peregrinus*. Both Wilson and Audubon took this view. Charles Bonaparte was the first who gave it a separate name, and Cassin, in his recent work on the *Birds of California and Texas*, gives a description of those points in which it differs from the latter bird.

The great Footed Hawk is one of the swiftest birds known, and is one that destroys chickens, ducks, and every kind of land and water fowl under the size of a Mallard. Its rapacity is great, and in boldness it has few equals. Specimens are more plentiful now than they were thirty or forty years ago. They may often be seen in the neighborhood of Cleveland, but are not often shot. Dr. Kirtland shot a fine adult specimen at Poland, Mahoning county, several years ago, in the act of flying away with a half grown chicken. Audubon says he has often observed them flying over the rivers and sheets of water in pursuit of ducks, water hens and other water fowl. When a bird was captured, it was borne, if not too heavy, to the land, and there devoured, and he cites a case in which one of these birds came at the report of a gun and bore off the game—a Teal—at thirty yards distance from the sportsman.

We give the following description of the adult from Cassin's *Birds of California*, as we have no specimen from which to give an original description:

“Frontal band white; top of the head, back, wing coverts and rump blueish cinereous, every feather crossed

transversely with bands of brownish black; rump and lower part of the back lighter, and with the dark bands less numerous. Throat, sides of the neck and upper part of the breast white, with a tinge of buff, without spots; other under parts same color, with a deeper shade, and with cordate and rounded spots of black on the lower breast and abdomen, and *transverse* bars of the same black on the sides, under tail coverts and tibiae. Quills brownish black, with transverse bars of yellowish white on the inner webs. Tail brownish black, with transverse bars of cinereous, very pale and nearly white on their inner webs, and narrowly tipped with white. Cheeks with a patch of black, most narrow and clearly defined in the adult bird, and separated from the color of the back of the head by a white space; back of the neck mixed with yellowish feathers, forming an irregular color. Bill light blueish horn color, paler at the base; legs and feet fine yellow. The sexes are alike.

“Female, total length 19 to 20 inches; wing $14\frac{3}{4}$ to 15 inches; tail $7\frac{1}{2}$ to 8 inches. Male and young smaller.”

This bird is a little larger than the European Peregrine Falcon, and the young, the above quoted author says, differ.

GENUS HYPOTRIORCHIS, *Boie*.

Size small; tarsus lengthened and rather slender. Toes long, slender, and furnished with sharp curved claws. In its other characters it resembles the typical falcons. The species scattered over different parts of the world.

HYPOTRIORCHIS COLUMBARIUS, *Linn.*—THE PIGEON HAWK.

Wilson's Amer. Orn., II., pl. 15, fig. 3; Audubon's B. of Am., Oct. ed., I., pl. 21.

This handsome little Hawk is of pretty common occur-

rence in this State. Dr. Kirtland says that it is a permanent resident. A pair have built their nest for several years past near his house at Rockport, and he has observed them during the whole season. They visit his barns and out-houses in pursuit of mice and other small prey. He shot two young specimens, but the old ones are too shy to be approached within shot. They are now (December, 1858,) in very fine dark plumage, the young being much lighter colored.

Its name of Pigeon Hawk is probably derived from its size, which is that of a pigeon, and not from any habit of making war on that bird. Its food consists of small quadrupeds, such as mice, and, in all probability, frogs and small snakes. Small birds may also be destroyed by it, but it is too small to harm any of the denizens of the farm yard.

The head and body of this little hawk are broad and strong. Tarsi and toes slender, but stronger than those of the Sharp Shinned Hawk—*Accipiter fuscus*. Bill short; wings with the second and third quills longest; tail slightly rounded.

The color of the adult male is of a blueish slate on the upper parts, each feather with a black stripe; under parts yellowish or reddish white, each feather also lined with a blackish stripe. Throat and forehead white; feathers of the legs light reddish. Quills of the wings black, with bands of white on their inner webs, and tipped with whitish. Tail on the upper side blueish grey, tipped with white and a broad subterminal band of black, with several smaller bands of the same color towards the rump, and inner webs white; feet and cere yellow; bill blue.

Less mature specimens have the upper parts brownish black, and the under side of a deeper reddish yellow. The longitudinal stripes brownish, and the tail with four bars of white, while still younger birds have the forehead and

under parts white, with a dark stripe on each feather, and the upper parts brown, but lighter than the last, and the tail with six white bars. The bars are variable.

Length of the female 13 to 14 inches. Males 10 to 12 inches.

Specimens in the Museum of the Cleveland Academy of Natural Science.

GENUS CIRCUS. *Lacepede.*

Species of medium size; head rather large; face with a disc of short feathers partially encircling it, as in the Owls. Bill short, compressed, curved from the base; nostrils large; wings long and pointed; tail long and wide; tarsi long, slender and compressed; toes moderate; claws long and rather slender. The species, about fifteen, are scattered all over the world, one only in North America.

CIRCUS HUDSONIUS, *Linn.*—THE MARCH HAWK.

Wilson's Amer. Orn., VI., pl. 51, fig. 2; Audubon's B. of Am., Oct. ed., I., pl. 26.

A widely distributed species, having been obtained in California, Oregon, Cuba and all the rest of North America. It is quite common in Ohio, and abundant around Sandusky Bay, in the marshes of which it obtains a rich supply of food. Along the Cuyahoga bottoms it may often be seen, and it no doubt breeds in these localities.

The nest of this species is usually built on the ground, and often within a few feet of the water level. The eggs, usually four, are of a blueish white color, sometimes being slightly sprinkled with small light brown spots. In form,

rather round, smooth, and an inch and three-quarters in length.

The food of this species consists of insects, frogs, mice, and small birds, including quail and young ducks. Sometimes, when pressed by hunger and a good opportunity offers, a young chicken may fall a victim. It cannot, however, be looked upon as a dangerous neighbor, and may, possibly, do as much good as evil, in killing mice and other vermin.

The color of the adult is a pale greyish cinereous, sometimes almost blue, generally tinged with brown, or fuscous; back of the head darker; upper tail coverts white; abdomen and the rest of the under parts white, usually spotted with small heart shaped rusty brown markings. Tail slate colored, with obscure brown bars; inner webs whitish; under side white. Inferior wing coverts white.

Young, brown, mixed with yellowish on the upper parts, with white marks on the head and back neck. Tail brown, barred with fulvous.

The female measures from 20 to 21 inches in length, the tail being 10 inches. The male from 15 to 18 inches, with the tail from $8\frac{1}{2}$ to 9 inches.

This includes all the Hawks, Eagles and Vultures known to inhabit Ohio. Other species may occur occasionally, in consequence of the occurrence of a very warm or very cold season. In the former the more southern species may visit us, in the latter those from the north. The Gyr Falcon—*Hierofalco sacer*—is said to have been captured at Louisville, Ky., and, as this is a very beautiful and powerful species, strictly northern in its habitat, building on the rocks of Greenland, Labrador, and in the vicinity of Hudson's Bay, and not common even in Maine, its appearance

in Ohio would be apt to be observed. It cannot, therefore, be claimed as belonging to our fauna.

It is doubtful if the extermination of our Hawks would result in any very great benefit to farmers, as nearly all the larger species feed indiscriminately on both useful and injurious animals; and as the latter are generally more numerous in the haunts of the Hawks than the former, their destruction is a positive benefit. Those species that, like the Red Tailed Hawk, destroy chickens, also kill squirrels and the other small quadrupeds that infest the grain fields and barns. In this manner the undue increase of squirrels, rats, mice, &c., is checked. Nature is nicely balanced in all her relations, and man's interference often does more harm than good. It becomes necessary to weigh judiciously the ultimate consequences of our actions, or we may find evil effects when good only were expected.

III. FAMILY STRIGIDÆ.—*The Owls.*

There is no better defined family among birds than the one containing the various species of Owls. The peculiarity of appearance, structure and habits, separate them distinctly from all other birds, and no one will, under any circumstances, mistake a specimen of any given species for anything else than an Owl. The great majority of the species are night fliers; some prefer the twilight, and a few pursue their prey during the day, but even the latter prefer cloudy weather and the deep wood to the full blaze of the sunshine and the open field.

In early times the Owl was considered by the ignorant and even by some pretenders to learning, as a bird of ill omen. Its associates were thought to be ghosts and goblins. It held nightly converse with unholy things, and its cry

was the herald note of misery and death to the hearers or their friends. When it flapped its wings at the window of a sick person, his time had come, and his friends already wailed him as among the dead. These charges against the poor Owl were about as well founded as the claim of wisdom set up for it by the Greeks, who made it sacred to Minerva. All such notions were founded on *appearances* only. It frequented churchyards, because the buildings attached to them abounded with secure places in which to build its nest, and their nooks afforded protection from the light of day, its eyes being unfitted to receive the full rays of sunlight, that, instead of shedding light upon surrounding things, dazzled and blinded the poor Owl. The most surprizing thing is, that Owls should still have retained a foothold in the midst of such hosts of human enemies, all thirsty for their blood, and killing them without mercy whenever an opportunity offered.

If farmers knew their own interests, they would encourage the visits of these birds, with few exceptions, as their food consists of a class of vermin extremely injurious to the farmer. Rats, mice, field mice, and all the small nocturnal quadrupeds, are the chief reliance of his owlship, and the number of these killed by a pair of these birds during the breeding season is very great. The poultry yard never suffers, unless from some of the largest species, that are partly day fliers. And it would be well if Owls were encouraged to breed in the vicinity of the farm. Some intelligent English farmers, aware of these facts, now protect the Owls, and, in return, are rewarded by a reduction in the number of vermin that prey upon the produce of the farm.

Owls are scattered over the whole world, and there are about one hundred and forty described species. America contains about forty of them, but the number belonging to the United States is much less. All the species are distinguished by a peculiar cat-like appearance, and their habits

correspond in a remarkable degree. All, with the exception of a single genus indigenous to Asia, have the legs and toes feathered, some very densely. The head is apparently very large; the eyes large and look forward, and the face is surrounded by a more or less perfect disc of short, stiff feathers. The ears are very large internally, and some of the species have ear tufts that increase their feline appearance. The form is short and heavy; wings rather long, and formed for noiseless flight; the outer edges of the main quills are fringed; tail usually short; bill apparently small, being concealed by projecting bristle-like feathers. The female is larger than the male, and the species vary much in size. All select living prey, and never feed on carrion. The small species feed on insects.

GENUS OTUS, *Cuvier*.

Head moderate, with erectile ear tufts of various sizes in different species; bill short, curved from the base, almost concealed by the bristle-like erect feathers; facial disc nearly perfect; wings rather long, the second and third quills being longest; tail of moderate length; eyes rather small; legs long; tarsi and toes densely feathered; claws long, curved and sharp.

OTUS BRACHYOTUS, *Forster*.—THE SHORT EARED OWL.

Audubon's B. of Am., Oct. ed., I., pl. 38; Wilson's Amer. Orn., IV., pl. 33, fig. 3; DeKay's Nat. Hist. N. Y., Birds, pl. 12, fig. 27.

The Short Eared Owl is a very common species in Ohio during the winter, and may also be found in its favorite

haunts in the neighborhood of rivers and swamps during the whole year, and is believed to breed in the swamps of Sandusky. Its food in all probability consists of small quadrupeds, and perchance an occasional small bird, but of the latter we have no evidence. Its small eyes, however, and the habit of flying about during twilight and cloudy weather, shows that it is better adapted to pursue its prey during the day than most of its congeners. Occasionally this Owl may be seen in considerable numbers on low lands and wet meadows during the fall and winter, and may generally be found upon the ground or on low bushes or fences.

We obtained a specimen several years ago from the border of the horse shoe pond, beneath the University Heights and close by the Cuyahoga River, that is now before us. It is a female in mature plumage, and answers the description given by both Audubon and Cassin. The ear tufts are short, and not likely to be observed, unless erected; the bill short, curved, and almost covered by the bristles; wings extend two inches beyond the tip of the tail, the second quill the longest; tail of moderate length; tarsi and toes densely feathered; entire plumage buff, darker on the back, every feather with a stripe of dark brown; abdomen paler, and central dark stripe narrower; legs and tarsi buff; eyes surrounded by a spot of black; throat white; wing coverts and secondary quills brown, with buff and reddish spots, and a few bars of a like color at the tips of the larger secondaries; primaries brown, with large round fulvous spots on the inner webs; on the inner side a few irregular dark brown bars, and a distinct dark spot on the small feathers that cover the base of the primary quills; tail pale fulvous, with five dark brown bars; under tail coverts white.

Length 15 inches.

Specimens in the Museum of the Cleveland Academy of Natural Science, and likewise eggs, obtained from Chicago, Illinois.

OTUS WILSONIANUS, *Lesson*.—THE LONG EARED OWL.

Wilson's Amer. Orn., VI., pl. 51, fig. 1; Audubon's B. of Am., Oct. ed., I., pl. 37.

This species, though nearly related to the preceding, differs considerably in habits. While the former prefers the open ground, in or near swamps or rivers, this is an inhabitant of the woods, from which it seldom ventures far. It is extremely abundant in the Eastern States, on the seaboard, but is much scarcer west of the Alleghanies. In Ohio it occasionally occurs, and is, in all likelihood a constant resident with us, and specimens are sometimes obtained, but it is, however, more plentiful than formerly.

According to various authors, its food consists of mice, rats and small birds, and in summer it is said to destroy great numbers of large beetles. Wilson says it generally selects the deserted nest of some other bird, in which to deposit its eggs—usually three or four in number—which are white and roundish, and about one and a half inches in length.

For a long time this species was considered identical with the *Otus vulgaris* of Europe, and it is thus named in Audubon's work, but is larger and of a darker color. The ear tufts are long and very conspicuous, differing widely in this respect from the *brachyotus*. The wings are long, and the legs and feet densely feathered.

The plumage of the adult is mottled, in the upper parts, with dark brown, fulvous and ashy white, with the dark hue preponderating; throat white. The breast is pale yellowish white, with each feather marked with a wide dark brown stripe. The abdomen is white, with like markings, and transverse stripes of dark brown. The legs and feet are of the same color as the breast, but usually with spots. The facial disc, in front of the eye, is ashy white, with small

black lines; the rest brownish yellow, tipped with black; a black ring nearly around the eye; the disc feathers tipped with black; ear tufts brownish black, edged with ashy white and yellowish; quills of the wings yellowish at base, brown towards the tip, marked with irregular bars of brown, and mottled with the same color; under wing coverts yellowish, sometimes white, the larger feathers tipped with brownish black; tail brown, irregularly banded with ashy fulvous and mottled like the wings; iris of the eye yellow; bill and claws blackish.

The length of the female is 15 inches; tail 6 inches. Male smaller.

Specimens in the Museum of the Cleveland Academy of Natural Science.

GENUS BUBO, *Cuvier*.

Size large; general form very robust and strong; head large, with prominent ear tufts; eyes very large; wings long and wide; tail moderate; tarsi short, and with the toes densely feathered; claws very strong, curved; bill rather short, curved from the base, strong, covered at the base by projecting plumes.

BUBO VIRGINIANUS, *Gmelin*.—THE GREAT HORNED OWL.

Wilson's *Amer. Orn.*, VI., pl. 50, fig. 1; Audubon's *B. of Am.*, Oct. ed., I., pl 39.

The Great Horned Owl is a very common species in Ohio, and occurs during the whole year. It is the largest species

of the family, with the exception of one—the Great Cinnereous Owl, that inhabits North America—and in courage it equals some of the eagles. When wounded, it will fight to the last, and the grip of its strong and sharp talons will produce a respect towards the bird in the unlucky wight who ventures within its reach.

Its food consists of small quadrupeds, such as rabbits, rats, squirrels, &c., and also such birds as it can capture. The farmer's chickens are sometimes visited, and if these visits are not put an end to, few will be left. The favorite haunts of this bird are the deep swamps and woods, and its nest is built in the forks of some tall tree. It flies during the twilight and in moonlight, or during clear night, and its cry is one of the dreariest and most appalling known.

The upper parts of the plumage are dark brown, finely mottled with ashy white and yellowish brown; breast and abdomen white and fulvous, with each feather distinctly barred with brownish black, the bars being more numerous towards the tip. The throat and chin are white, in some specimens the former is uniform with the breast—this is the case with one in the Museum of the Cleveland Academy of Natural Science. This white band seems to vary in size in different birds. Between the chin and throat there is a band of fulvous, every feather having a broad longitudinal stripe of dark brown down the center. Ear tufts brownish black, edged with fulvous; facial disc dark fulvous, edged with black; a line of black extending from the inner angle of the eye towards the ear tufts; tarsi and toes fulvous; the upper parts of the wings and tail mottled like the back, but with broad greyish bands on the quills of the former, and narrower ones on those of the latter. The quills of the tail are also lighter colored than the rest. Bill and claws bluish black.

The usual length of the female is about 24 inches; the male about three inches less.

The specimen from which the above description is taken

was shot at Hinckley, Medina county. There are also specimens in the Museum of the Cleveland Academy of Natural Science.

GENUS SCOPS, *Savigny*.

Species of small size, with large heads and prominent ear tufts; facial disc imperfect above the eyes; wings long; tail short, often with a slight inward curve; tarsi and toes long, and more or less covered with feathers; claws long, curved and strong. The general form is short and very compact.

SCOPS ASIO, *Linn.*—THE SCREECH OWL.

Wilson's Amer. Orn., pl. 19, fig. 1, and pl. 42, fig. 1; Audubon's B. of Am., Oct. ed., I., pl. 40.

An abundant and well known species in Ohio, and one that is often quite familiar in its habits, approaching the house and barns often in pursuit of insects. The orchard is also a favorite place of resort. Occasionally it enters the cities and helps to rid them of small vermin. We were much interested, two years ago, (in 1857,) by a family of these birds that established itself for several weeks in our garden. Finding that the family did not molest them, they would sit on the fruit trees until we were within a few feet of them, and would turn their droll little heads around while looking at us. The garden was full of mice at the time, and the owls, doubtless, came there to feed upon them.

Beetles, Seventeen Year Locusts and many other insects are destroyed in great numbers by these owls, and our farmers should encourage their visits to the vicinity of their dwellings. They never prey on domestic animals, and seldom, if ever, on small birds. Their cry is far from being pleasant, and is well known to every school boy.

The bird itself is not likely to be confounded with any other species belonging to our State. It resides with us during the whole year. The colors of the adult and young differ very much. The former has the whole of the upper plumage of a light ashy brown, mottled and striped with brown and ash. The under parts are ashy white, each feather striped with brown, and with small cross lines of the same color. Face ashy white, lined and mottled with pale brown; throat and tarsi the same; wing quills brown, with cross bars; tail pale brown, with many cross bars of grey. The ear tufts are large, and the fourth quill of the wing is longest.

The young differ from the adult in being of a reddish brown color, darker on the back and almost white on the the under parts, barred and mottled with darker brown.

The nest of the Screech Owl is usually built in the hollow of a tree, and is composed of grass, hay and feathers. The eggs are of a pure white, nearly round, as are those of all owls with which we are acquainted, and four in number. A hollow apple tree is sometimes selected as the nesting place.

This bird is strictly a night flier, and its whole aspect is changed when the shades of evening fall. Instead of the solemn appearance which it exhibits in day time, there is the greatest activity and energy.

Length from 9 to 10 inches.

Specimens in the Museum of the Cleveland Academy of Natural Science.

GENUS NYCTEA, *Stephens.*

Large size; head large; destitute of ear tufts; without facial disc. Bill very strong, short, and nearly covered by projecting feathers; claws curved, strong and sharp, and nearly covered by the feathers of the toes; wings long and wide, with the third quill longest; tail moderate, or long and broad; plumage dense. Only one species.

NYCTEA NIVEA, *Daudin.*—THE SNOWY OWL.

Audubon's Birds of America, Octavo edition, I., plate 25.

This large and beautiful species is very common along the lake shore during the winter. As these owls do not breed in our State, but in high northern latitudes, they appear here in winter only, but their visits do not depend on the severity of the weather alone, as they are often quite plentiful in mild seasons. This is the case the present winter, 1858-59, so remarkable for its mildness. In the neighborhood of Cleveland a great many were shot, and this is the case almost every year.

This bird leaves its summer haunts when winter sets in, and, proceeding southward, spreads over the temperate latitudes of North America, Asia and Europe. It is said to build its nest on the ground. The rugged and inhospitable mountains and shores of Greenland, and the neighborhood of Hudson's Bay are its favorite hunting grounds, and it is said to feed on hares, rabbits, ducks, grouse and other small quadrupeds and birds. It has also obtained some celebrity as a fisher. In its winter visits with us, it devours great numbers of mice and other vermin, hunting them during the day, and also during the twilight.

Few birds attract more attention than this, and consequently a great many of them are annually shot. It is not, however, likely that the number visiting us will decrease,

as it abounds in its summer haunts, where it is undisturbed and raises its young in perfect safety from the unwelcome visits of bird-nesting school boys.

Its feathers are a pure white, with spots of dark brown. The specimens vary greatly, some being almost entirely white, while others are thickly spotted and barred with the dark brown. Quills and tail are regularly banded with brown. All are beautiful birds, and cannot be mistaken for any other species.

The female is, as usual, larger than the male, and measures from 24 to 26 inches in length, the tail being 10 inches.

Several specimens in the Museum of the Cleveland Academy of Natural Science, and in the private cabinets of Prof. Kirtland and others.

GENUS NYCTALE, *Brehm*.

Small size; large head; without visible ear tufts; bill of moderate size, and nearly covered with feathers; disc nearly complete; tarsi and toes short, and fully feathered; wings moderate or long; tail short.

NYCTALE ACADIA, *Gmelin*.—SAW WHET—ACADIAN OWL.

Wilson's Amer. Orn., IV., pl. 34, fig. 1; Audubon's B. of Am., Oct. ed., I., pl. 33.

A pretty little owl, and the smallest species of the family that inhabits Ohio. It is not plentiful with us, but may occasionally be found. Audubon describes this owl as often visiting cities, for what purpose seems not known.

It probably feeds on insects and occasionally mice, and is strictly a nocturnal species, nesting in trees, selecting the deserted nest of a crow or a squirrel's hole, or that made by the woodpecker. The eggs are four or five, and pure white. We have never seen its nest, but there is a single egg in the Museum of the Cleveland Academy of Natural Science.

In Macgillivray's edition of Cuvier's *Animal Kingdom*, there is a very good plate of this species, under the name of *Strix Dalhousii*, or Lady Dalhousie's Owl. Some naturalists are of the opinion that the *N. albifrons* is identical with this species, but Cassin, from a thorough examination of numerous specimens, considers them distinct. Its European analogue is the *N. passerina*, to which it bears a strong resemblance.

The color of the upper parts is olive brown, with irregular blotches of white on the wing coverts; the face ashy white; breast and abdomen white, with oblong brownish red markings; quills of the wings dark olive brown, with four ash white bars; tail lighter, with two or three narrow bars of white; tarsi light fulvous; bill and claws dark. Many specimens are lighter colored.

Length from $7\frac{1}{2}$ to 8 inches.

Specimens of the bird and egg in the Museum of the Cleveland Academy of Natural Science.

GENUS SURNIA, *Dameril*.

Of small or medium size; head moderate, without ear tufts and the facial disc obsolete; wings long, with the third quill longest; tail long and broad; bill strongly curved, of

moderate size, and covered at base with projecting feathers; legs short and densely feathered to the tips of the toes.

One American species.

SURNIA ULULA, *Linn.*—THE HAWK OWL.

Wilson's Amer. Orn., VI., pl. 50, fig. 6; Audubon's B. of Am., Oct. ed., I., pl. 27.

This bird is the joining link between the Hawks and Owls. Like the former, it hunts by day, pursuing its prey in the same manner. It also resembles the hawks in form of body and length of tail. The distinguishing facial disc has almost disappeared, and the head is smaller than that of the owl proper. It is an active and courageous bird, and is very abundant in Arctic America, from Hudson's Bay to the Pacific coast. With us, it is, in all probability, a winter visitor only. It breeds, however, in some of the more Northern States and in Canada, and is said to feed on small quadrupeds, grouse and ptarmigan, and to endeavor to seize the small game shot by the hunter.

This species is rare in Ohio. Having no specimen, we give the following description from Cassin's *Synopsis*:

“Size medium; first three quills incised on their inner webs; tail long, with its central feathers about two inches longer than the outer; tarsi and toes thickly feathered.

“*Adult*—Entire upper parts fuliginous brown; the head and neck behind with numerous small circular spots of white; scapulars and wing coverts with numerous, partially concealed, large spots of white; face silky, greyish white; throat mixed, dark brown and white; a large brown spot on each side of the breast; all the other under parts transversely lined or striped with pale brown; quills and tail brown, with white stripes; bill pale yellowish, and claws horn color; irides yellow; color of upper parts darkest on

the head, and the white markings on the head and body varying somewhat in different specimens.

“*Dimensions*.—Female, total length, 16 to 17 inches; wing 9 and tail 7 inches. Male smaller.”

GENUS SYRNIUM, *Savigny*.

Head large, and without ear tufts; facial disc almost perfect; bill strong, and curved from the base; broad at base, and re-curved at tip; wings long, with the fourth and fifth quills longest; tail broad, rounded and long; tarsi rather short, and with the toes densely covered with feathers; claws long, curved and sharp.

SYRNIUM NEBULOSUM, *Forster*.—THE ROUND HEADED, OR BARRED OWL.

Audubon's Birds of America, Octavo edition, I., plate 36.

Probably the most common species in Ohio. In the neighborhood of Cleveland it is abundant during the whole year. It inhabits the woods, and, if surprised during the day, it will fly off a short distance to the branch of some neighboring tree, where it will perch, and generally wait until shot at.

During the day it is the most awkward of its family, and the saying of “solemn as an owl” will occur to any one who sees it. Night, however, puts greater energy into it, and the dull unmeaning look becomes wonderfully changed. It feeds on squirrels, rats, mice, small birds and chickens, and prefers living in the woods. We have seen it, however, flying during moonlight over the principal streets of Cleveland, probably in pursuit of rats. These owls have the bad habit of visiting the barn yard, and attacking the young

chickens. No owl glides on more silent pinions than this. Its soft, downy plumage produces no sound in the night air.

The upper parts of this owl are light brown, with bars and blotches of white; face ashy, with several obscure rings of brown on the facial disc, around each eye; breast ashy white, with brown bars; abdomen and tarsi ashy white and fulvous, with oblong stripes of dark brown; quills of the wings brown, with six or seven roundish spots of white on the outer webs, arranged in the form of bars, the markings on the inner webs being ashy; tail brown with narrow bars of white; bill light yellow; claws dark.

Different specimens exhibit great variation in color and markings, but all may be easily distinguished by the peculiar barred appearance on the back and wing coverts, and the large size of the head.

The length of the female is from 19 to 20 inches; the male smaller.

Specimens in the Museum of the Cleveland Academy of Natural Science.

SYRNIUM CINEREUM, *Gmelin*.—THE CINEREOUS OWL.

Audubon's Birds of America, Octavo edition, I., plate 35.

This largest of North American Owls has been added to our fauna, in consequence of an owl answering the description of this species having been shot some years ago at Huntsburgh, Geauga county. We did not see the specimen, but as no other species could be readily confounded with this, there is little doubt concerning it. This owl is, or was quite plentiful at the opposite side of Lake Erie, in

Canada, and it is very likely that this species, like the Snowy Owl, should venture across during the winter.

Being in Canada, and about twelve miles from London, in the latter part of September, 1843, we were returning home in the evening, after a day's hunting of ruffed grouse, when, in passing an old beaver dam, at the lower end of a swamp, where the trees were large, something that the increasing darkness did not allow us to recognize at the moment, swept towards us. A close shot brought it down badly mutilated, the head being severed from the body, the latter falling at our feet. It proved to be a fine large specimen of this owl.

Some time during the following February, and near the same place—about twelve miles from Port Stanley—an individual of the same species attacked and instantly killed a large rooster, that had previously come off victor in many an encounter with the hawks. The head of the gallant bird was struck from its body by the owl, within a short distance of the barn and in sight of the farmer. Coming up a short time afterwards, the owl was pointed out sitting on the trunk of a tree whose top had been blown off. The first shot secured it in excellent condition; the skin, however, was unfortunately lost six months afterwards.

Both these birds were lighter colored than Audubon's plate, and of a bluer shade. They bore a closer resemblance to the figure of the same species in Macgillivray's edition of Cuvier's *Animal Kingdom*, with which they were compared at the time. There were, however, no notes taken that would enable a description to be given at this time.

As the Cinereous Owl will never, in all probability, be a common bird in Ohio, our farmers need not be afraid of its ravages. It feeds on rabbits and other small quadrupeds, chickens, grouse, quail, or any other bird that it can capture. It is bold and courageous, and is a dangerous

visitor to the barnyard. It is not likely that it breeds in this State.

The following description is taken from Cassin's *Birds of California, &c.*:

“Large; head very large; eyes small; tail long. *Adult*—Entire upper parts smoky brown; nearly every feather more or less mottled and transversely barred with ashy white; under parts smoky brown; feathers on the breast edged with ashy white, and on the abdomen edged and transversely barred with ashy white, with wide longitudinal stripes of smoky brown; legs brown, with numerous ashy white transverse stripes; quills brown, with about five wide irregular bands of ashy white, which bands are mottled with brown; throat black; discal feathers on the neck tipped with yellowish white; eye nearly encircled by a black spot; radiating feathers around the eye with irregular transverse narrow bars of dark brown and ashy white; bill pale yellow; claws pale, and dark at their tips. Sexes alike.

“*Dimensions*.—Female, total length 26 inches; wing 18 inches; tail 12 inches.”

STRIX PRATINCOLA, *Bonaparte*.—THE BARN OWL.

The Barn Owl will probably be found resident in Ohio, but as yet we do not know of a specimen being seen within its limits. It is found as far north as Vermont and Wisconsin, and is plentiful in the Southern States, occurring in Kentucky, Illinois and Pennsylvania. Its color is a pale fawn, or tawny brownish yellow. Some are nearly white, and it measures about 16 inches in length. This species should be encouraged, as it is beneficial to the farmer by killing rats and mice, upon which it principally feeds.

ORDER INSESSORES.

FAMILY CAPRIMULGIDÆ—THE GOAT SUCKERS.

This family obtained its name from the mistaken idea that the European species, *Caprimulgus Europeanus*, obtained its living by sucking the goats; and it is rather strange that this, or a like notion, prevailed in different countries of the Old World from a very early day down almost to our own times.

This popular belief originated in the fact that the bird was always seen flying about in the dusk of the evening, and often in the neighborhood of cattle and flocks, with its mouth wide open, in the manner of all the known species of its family. In such locations the bird obtained an abundant supply of the insects upon which it feeds exclusively, and this idea that possessed the popular mind shows how readily men may be deceived, unless guided by close and accurate scientific examination.

But this is not all, for many denied the bird the faculty of seeing in the usual manner, saying that it turned its eyes downwards and looked through the roof of its mouth. All manner of crimes and misdemeanors have been laid to this poor bird's charge, but they are now swept away by the clear light of knowledge, and the supposed culprit is found to be highly useful in destroying hosts of insects. Our American species of the family are exclusively insect feeders, and never eat fruit or any vegetable matter whatever. They pursue their prey on the wing, in the manner of swallows, to whom they are nearly allied; but, unlike them, always select the evening, or at least very cloudy weather for flight.

There is a resemblance, in some points, between this family and the owls. Like them, their plumage is soft and

light, and of a dusky, mottled hue. Their eyes are also large. In the aberrant, exotic genus, *Podargus*, the resemblance is still greater, for the bill is as large as that of an owl, with an approximation in form, but the feet are small and weak, like those of the rest of the family. A person unacquainted with ornithology would be apt, upon seeing a *Podargus*, to call it an owl, and, from these facts, many naturalists consider this the joining link between the present order and the last.

The *Caprimulginae* have the mouth opening to beneath the middle of the eye, with the bill depressed and generally feeble, and the horny part small, with the tip of the upper mandible decurved; the eyes extremely large; ear aperture large; head very broad and depressed; feet small, with the tarsi partly feathered and scaly, claw of the middle toe elongated and generally pectinated; body slende. ; plumage soft and light; wings long, the second and third quills longest; tail of ten feathers.

Ohio contains two species, belonging to different genera—the Whip-Poor-Will, (*Antrostomus vociferus*,) and the Night Hawk, (*Chordeilus virginianus*.) Both are widely known. Other species are found west and south, but no other has so wide a distribution.

GENUS ANTROSTOMUS, *Gould*.

Bill remarkably small, with tubular nostrils, and the gape with long, stiff, sometimes pectinated bristles; wings long, somewhat rounded, second quill longest, the primaries emarginated; tail rounded; plumage loose and soft.

ANTROSTOMUS VOCIFERUS, *Wilson*.—THE WHIP-POOR-WILL.

Wilson's Amer. Orn., V., pl. 41, figs. 1, 2, 3; Audubon's B. of Am., Oct. ed., I., pl. 42.

Throughout Ohio this species is very common, and every person is familiar with its evening song. To some, like

Audubon, these few simple notes have a cheerful, pleasant sound, while to others they are plaintive and sad.

The bird reaches us from the south, where it passes the winter, about the same time as the Swallow, or during the month of April. It begins to breed in May, and it is at this time that its notes are most commonly heard. In places where they are plentiful, the chorus is far from being disagreeable, unless some one, more presuming than the rest, should use your window sill as his favorite perch, and drive slumber from your eyes with his oft repeated chant during the whole night.

The Whip-Poor-Will builds no nest, but lays her two eggs on the ground. The young are unshapely little things, covered with yellowish down. Audubon says the parents disgorge the food with which they feed their young. It consists of ants, beetles, moths and other insects, which is the only food of this species at all times. No vegetable matter is ever eaten by them, and they must be recognized as beneficial birds to the farmer in the fullest extent.

This bird is more nocturnal in its habits than the Night Hawk, as it is seldom seen, even in cloudy weather, during the day. When resting, it always sits lengthwise of the branch, never across, and during the day will be found in dense thickets, seated on the ground or a log. When disturbed, it flies off for a short distance and settles. Both sexes are much attached to the young, and assist in the labor of incubation and feeding. In the fall they retire southward, traveling during the night.

The color of the Whip-Poor-Will, like that of the rest of its family, is rather difficult to describe, owing to the great mingling of shades. The upper parts are brownish grey, minutely sprinkled and streaked with brownish black; wings dark brown, and barred with spots of reddish brown. The tail has three feathers on each side that are white on the terminal half, the four central the same color as the

back. There is a white band or collar on the throat; the rest of the breast and neck like the upper parts; the abdomen paler and mottled. The female has the tail feathers reddish white at the tip only, and the collar on the neck yellowish brown. The bristles at the base of the bill are without lateral filaments, but are very long; the wings rather short.

GENUS CHORDEILES, *Swainson*.

Bill very small, the gape with very short, feeble bristles. Wings very long and pointed, with the first quill nearly or quite equal to the second, and the primaries not emarginated on the inner edge. Tail long, slightly forked in the North American species; plumage rather compact.

[This generic description is taken from the valuable work of Prof. S. F. Baird, on the Birds of America, being the ninth volume of the Pacific Railroad Survey. We shall use this work for a like purpose in future articles.]

CHORDEILES POPETUE, *Viellot*.—THE NIGHT HAWK.

Audubon's Birds of America, I., plate 43.

These birds are known to every one, whether they live in town or country. They arrive from the south about the same time as their relatives, the Whip-Poor-Wills, and may be seen in the early morning and evening, flying about with light and graceful motion, in pursuit of insect food. In cloudy weather they may often be seen during the whole day, thus differing materially from the Whip-Poor-Will that comes forth only when the shades of night have fallen.

The Night Hawk has great power of wing and can sustain itself in the air for a long time, and is seldomer found on

the ground than its congener, and its legs and feet are very small and slim, but poorly adapted to a pedestrian mode of progression, and the deeply pectinate middle claw of the adult adds to the difficulty. When it alights, it is there ore compelled to squat down; but the long and ample wings fully remunerate this bird for any deficiency of foot.

The usual cry is a short squeak, but in the courting season, the male emits a peculiar sound which the boys call "booming." He rises on the wing to a considerable height, and then darts towards the earth; when within a few feet of it, the wing tips are brought downwards, checking the descent, and sending the bird upward in a curve—at this time the sound is produced. These gambols are repeated again and again, and many males may at one time be seen thus paying court to a particular female.

The Night Hawk does not build a nest, but deposits its eggs on the bare ground, often in the middle of a field. There are always two, which are deeply freckled. The young, like those of the Whip-Poor-Will, are covered with brownish down, and squat close to the ground, so that it is difficult to discover them. The female will pretend lameness, like many other birds, so as to lead a person or dog away from the eggs or young.

The color of the adult, in the upper parts, is a rich, deep brownish black, often with a dark greenish tinge, with mottlings of brown, grey or white. There is a white V shaped mark on the throat, mixed with reddish in the other sex, the apex of which is near the base of the lower mandible, and the ends extend below and behind the eyes. The breast and abdomen are alternately banded with yellowish white and dark brown. The wing primaries are dark brown; the five outer ones with a distinct band of white formed by blotches on each quill, and very apparent when the wing is extended, and the ends of the secondaries are tipped with white. The tail of the male is dark brown, with mottled bands, and a band of white near the tip, on all but the two

central feathers. The female is without this white band. These white markings will enable any one to distinguish between this species and the Whip-Poor-Will; but the want of the long bristles around the mouth, so conspicuous in the latter species, and the greater length of wing, is sufficient to settle any doubt in the matter.

The length of the male is $9\frac{1}{2}$ inches.

There is a specimen in the cabinet of Hon. William Case, Cleveland.

FAMILY HIRUNDINIDÆ.—SUB-FAMILY HIRUNDININÆ.—THE SWALLOWS.

Bill triangular, very short and broad, much depressed; the ridge much less than half the head; the gonys two-thirds this length, the gape extending to below the eye. Primaries nine; the first longest, and, with the second, considerably longer than the others; the secondaries and tertials not reaching the middle of the primaries; the secondaries deep'y emarginate. Wings very long, reaching beyond the commencement of the fork of the tail, which is generally more or less deep. Tarsi scutellate, very short, less than the lateral toes, the inner of which is more deeply cleft than the outer.—*Baird*.

In Ohio we have five species belonging to this family, the *Hirundo rufa*, *H. lunifrons*, *H. bicolor*, *Progne purpurea* and *Cotile riparia*. *C. serripennis* is found in the interior of Pennsylvania, and may yet be found in our own State.

The swallows are all handsome birds, of strong and rapid flight, and are eminently fitted for pursuing the insect prey on which they feed exclusively. They have always been taken under the protection of man, and in many places in

Europe it is considered very "unlucky" to even accidentally destroy one of their nests. It would be well if the idle boys about our cities were imbued with a little of this same feeling, as then the poor little Bank Swallow might rear its young in peace in the vicinity of our cities and towns.

The coming of the swallows in the spring is welcomed in every land. They are hailed as the harbingers of clear skies, sunshine and warm breezes, fit companions to the buds and flowers of spring. They all take their flight to the south, when autumn comes, leaving us for climes that never feel the icy chains of winter. Our bleak, wintry skies and piercing winds are poorly adapted to their sunny natures, and our woods and fields are utterly unable to supply them with food during that inclement season. Occasionally the Barn Swallow comes back too early, and a sudden snow storm deprives him of food.

A few years ago a heavy snow storm, at the end of April, after these swallows had come, caused the death of many. We picked up several that had evidently died from exposure and a probable want of food.

GENUS *HIRUNDO*, *Linn.*

Nostrils basal, small, oblong, and covered partly by a membrane; tail more or less forked, the outer lateral feather sometimes greatly lengthened. Tarsi shorter than the middle toe, and scutellated, naked; toes long, slender, the lateral ones unequal; claws moderate, curved, acute.

HIRUNDO RUFÆ, *Viellot.*—THE BARN SWALLOW.

Audubon's Bird's of America, Octavo edition, I., plate 48.

We have given the specific name *rufæ* in preference to that of *horreorum*, of Barton, or *rustica*, of Audubon, as it

is better known by that name than the second, and the third was previously applied to the European Chimney Swallow, a nearly related species.

The Barn Swallow is a very widely distributed species, being found from the Atlantic to the Pacific, and plentiful everywhere in the neighborhood of the habitations of man. By the early writers it was considered identical with the European *rustica*, but the species are quite distinct. Still there is considerable confusion in the plates and descriptions. Some American individuals approach very near the coloration of the European one, and *vice versa*.

The favorite nesting place of our bird is the interior of barns and out houses. The nest is built of mud, mixed with grass or straw, and is securely placed on the side of a beam or ridge pole. It is open at the top, with a bed of grass covered with feathers. The eggs are from four to six, of a transparent white, with small brown spots. When the young are hatched they are fed by both parents, who are unremitting in pursuit of insects for this purpose, and it is surprising what an immense number a single pair will capture during the breeding time.

They generally appear in the neighborhood of Cleveland about the middle of April, and leave in the beginning of September, sometimes a little earlier. For several days before leaving, they associate in great flocks and keep up an almost constant twittering. They may be often seen by hundreds perched on a telegraph wire. Sometimes other species mingle with them.

The color is a bright, steel blue, on the upper parts and pectoral collar. Throat chestnut, paler on the abdomen; often reddish white. Tail with a white spot near the middle of the inner webs of each feather, except the middle one, and deeply forked, the outer feather much the longest. Female paler in color.

In our species the pectoral collar is interrupted in the middle, while the European has it complete.

Length about 7 inches. Female smaller.

HIRUNDO BICOLOR, *Viellot*.—THE WHITE BELLIED SWALLOW.

Audubon's Birds of America, I., plate 46.

One of our most common swallows, and found in all the States and Canada. Like the Barn Swallow, it arrives in Ohio in April, and departs about the first of September. It winters in the States bordering on the Gulf of Mexico.

Some of the earlier ornithologists confounded this species with the House Martin, (*H. urbica*), of Europe, from which it differs in several points, and particularly in the mode of nesting. The natural place of resort for purposes of nidification, with the White Bellied Swallows, is the interior of hollow trees, and probably holes in rocks. In the vicinity of dwellings, they select holes in buildings, and in cities, to which they often resort, the boxes put up for the accommodation of the Blue Birds and the Purple Martins are often appropriated by this bird. A few years ago, a pair of these swallows endeavored to oust a family of Blue Birds from a box in our garden, but without success. The battle, however, was kept up for over a week. They contented themselves finally with an empty box a few yards off.

Like all the swallows, they capture their prey on the wing and their flight is protracted, swift and graceful. They are often found in the neighborhood of water, skimming over the surface and occasionally dipping their wings in the stream. In different conditions of atmosphere they fly high or low, and this depends on the scarcity or abundance of their insect prey at different heights in the air.

No birds have greater control of their wings than swallows, with the exception of the humming birds, and the light and airy manner in which they wheel, dart or glide is very beautiful. Now they rush forward with scarcely a movement of wing; suddenly their course is altered, and the bright metallic tints of their backs gleam in the sunshine; another change, and their white breasts are seen, and all this time the little insects that form their food are being captured and swallowed with scarcely a movement to show how it was done. Thousands of small moths, flies and other insects are destroyed by these birds, and the hosts that would otherwise ravage our fields and gardens are thus thinned.

The White Bellied Swallow may be easily distinguished from its congeners by its glossy, metallic bluish green upper parts, and its white throat, breast and abdomen. The tail is not forked like the Barn Swallow, but the outer feathers are a little longer than the inner.

Total length $6\frac{1}{4}$ inches.

HIRUNDO LUNIFRONS, *Say*.—THE CLIFF OR REPUBLICAN SWALLOW.

This species was first described by Thomas Say, in 1823, in the narrative of Long's Expedition to the Rocky Mountains. Audubon discovered it in 1815, on the banks of the Ohio River, but his description was not published until 1824. The name *republicana*, then given to this species by him, was subsequently dropped for that of *rulva*, in this author's Ornithological Biography. Both names are, however, superseded by that of Say, the latter having the priority.

This species breeds in many places throughout the State, although not so generally distributed as the Barn and White Bellied Swallows. Their natural habitat is the vicinity of rocks, on the precipitous sides of which they build their nests; but they are now continually found building upon the walls of houses, often directly beneath the eaves. The nest is made of mud, gathered from the sides of rivers, or wherever it can be found. Like the Window Martin, of Europe, it probably uses the well tempered mud of the streets for this purpose, when it is not too sandy. It is a bottle like structure, the neck forming the entrance, and projects horizontally from its base.

Like the majority of its congeners, the Cliff Swallow is eminently gregarious, their nests being often built close together in great numbers. Audubon says that they move off to the north (south?) by the 3d of August. About that time, the present season, a large party of swallows was observed passing over Cleveland, in a body, for the south, and, as all the other species still remain with us, it may have been composed of this.

We know of no place in this locality where they are plentiful. Several built their nests on the house of Norman C. Baldwin, in the vicinity of this city, last year, (1858,) but we do not know whether they returned this season. The cliffs on the lake shore, between Cleveland and Rocky River, are rather too much exposed to the north and west winds, by which their frail domicils would be apt to be destroyed, although there are many nooks that a colony might find shelter in, and it is probable that this bird may breed there.

The eggs are usually four, of white color, with dusky spots, and are laid on a little straw or dry grass as a bed, in the cavity of the nest. While the nest is being built, the birds work in the morning and evening, letting the sun dry the structure during the heat of day. We have observed the Window Martin of Europe do the same thing. This

shows considerable foresight, as, if the frail tenement was hurried up too rapidly, it would come down of its own weight. These nests begin to be built about the end of April, and the young are abroad by the end of July.

The species is easily distinguished from the rest of its allies by the difference in color. The back and crown of the head are steel blue; sides of the head, the chin and throat chestnut; a crescent shaped, whitish mark extending over the forehead; breast rusty; belly white; rump light chestnut; a spot of black, with steel blue reflections, on the throat; tail and wing black, tail slightly emarginate; bill short; sexes and young nearly alike.

Total length 5 to 5½ inches.

GENUS COTYE, *Boie*.

Bill very flat, extremely broad at the base, and gradually narrowed towards the tip. Nostrils prominent and rounded. Tail moderate, nearly straight, or somewhat emarginated. Tarsi rather shorter than the middle toe, slender and scutellated. Toes very slender, the claws slightly curved. Colors generally dull brown above, without gloss.

There are two species of this genus in the United States, and both are found in Ohio. They differ from every other native species of this family in their habits of nesting and dull colors. All the species are much alike in color and markings, and are often confounded under the common name of Bank Swallow.

COTYLE RIPARIA, *Boie*.—BANK SWALLOW.

Hirundo Riparia, Linnaeus.—Wilson and Audubon.

Considered by naturalists as identical with the European bird of the same name, the closest examination and com-

parison not exhibiting any appreciable difference. These birds are common in the neighborhood of cities, wherever there are sandy banks or bluffs of a sufficiently firm structure in which to dig holes for their nests. The nests were abundant, a few years ago, in many sand banks in Cleveland, particularly in the one on Columbus street, above the bridge. That is now deserted, but there are still a number near the Cleveland, Columbus & Cincinnati Railroad, on the same street. They are also numerous in the banks above the old river bed.

These poor birds are much persecuted by idle boys, who rob their nests and otherwise molest them, and this is a great pity, as they are very useful in capturing the insects that are always abundant in our gardens. Would-be sportsmen often try their skill in shooting at them, but luckily, from their swiftness of wing, none but the really good marksman will be apt to hit them, and true sportsmen disdain such small game.

The Bank Swallows visit us a week or two before the other swallows appear in the spring. Mr. Audubon says they winter in Louisiana, where he discovered them pursuing their insect prey over the rivers and streams. Their flight is light and graceful, and their low twitter quite musical.

The holes in which the nests are placed are usually near the top of a bank, and about three feet in depth, with a slight upward slope, and enlarged at the farther end for the accommodation of the nest and birds. There are usually two broods in a season. The eggs number from five to seven. Both parents assist in digging the hole, their bills and feet being the only implements. When the young are nearly full grown, they may often be seen sitting at the mouth of the hole, where they are fed by the parents. Both sexes assist in the labor of incubation, and are greatly attached to their eggs and young, exhibiting much anxiety when these are molested.

In size this is the smallest of our swallows. Its color is greyish brown on the upper parts, pure white on the under side, with a band of brownish color across the breast and sides of the body. The lower part of the tarsus has a few scattered feathers upon it. Tail slightly emarginate. It differs from the next species in having the outer web of the first primary of the wing soft, and without hooks.

Length $4\frac{3}{4}$ inches; tail 2 inches.

COTYLE SERRIPENNIS, *Bonaparte*.—THE ROUGH WINGED SWALLOW.

This bird is a resident of almost every part of this State, but has generally been confounded with the preceding species. It is common near the mouth of Rocky River, where it nests. Prof. Kirtland has seen it in that locality, carrying sticks and straws for its nest towards the high rocky banks of the river, where he supposes it breeds, but he has never seen the nest. It probably resembles that of the *C. riparia*, but it may prove to occur in clefts of rocks. We know of no description of the nest, although Dr. Brewer figures the egg, and probably describes the nest, in his unpublished North American Oology.

The *C. serripennis* may be easily distinguished from the *C. riparia* by its larger size, and particularly by the first primary quill having the outer web stiffened, with the extremities of the pennulæ re-curved into a hook. By passing the finger down the edge of the wing, this is easily felt.

The upper parts are of a light sooty brown; the lower varies, in different specimens, from pure white to light

ashy brown, paler on the belly and beneath the tail. Tarsi and toes without feathers. The young have the wing feathers edged with pale brown.

Length of male $5\frac{1}{2}$ to $5\frac{3}{4}$ inches. The female is smaller. Feeds, like its congeners, entirely on insects.

GENUS PROGNE, *Boie*.

Bill strong and short, the gape very wide, the sides gradually compressed, the culmen of the lateral margins arched to the tip, the latter inflected; the nostrils basal, lateral, open and rounded; tail considerably forked; tarsi shorter than the middle toe and claw, about equal to the toe alone; toes long, strong; lateral ones equal.—*Baird*.

This genus was founded on the *Hirundo purpurea*, (our species,) as the type. The larger size, and more robust form, distinguish the species from their relatives of the two preceding genera.

PROGNE PURPUREA, *Boie*.—THE PURPLE MARTIN.

A well known species, and very widely distributed, being found on both sides of the Rocky Mountains, in all the States and Territories. It arrives in Ohio from the middle of April to the first of May, according to the season. Occasionally it may appear in the neighborhood of Cincinnati during the first or second week in April, when the weather is warm.

They seldom begin to breed near Cleveland until the beginning of May. Two broods are raised in the season. Audubon says that they leave the Northern States earlier than other swallows, but several have remained in this

vicinity until the present time, (September 8, 1859,) and the season has been far from favorable, the nights being unusually cold. They generally leave this locality in small flocks, and without a great deal of preparation.

Their food, during the period of their stay with us, consists of beetles, moths, &c. They also capture many dragon flies, but these they seldom, if ever, give to the young. Ephemera, during the short time they appear, are also caught and brought in great numbers to the young. They are strictly insectivorous in their tastes, and should be encouraged. We do not *know* whether they eat bees. Audubon says they seldom do.

A description of the habits of this species is almost superfluous. Every one welcomes them as harbingers of spring, and the martin boxes, set up in the neighborhood of many dwellings, give evidence of the kindly feelings entertained for them by man. They will fight with other birds for the possession of a box, and generally come off victorious. The blue bird, especially, is often the victim of the Martin, being ousted from its favorite box by this pugnacious intruder. Sometimes, however, they resist such illegal ejection effectually.

The Martin wages battle against all invaders of the vicinity of its nest. The eagle or the hawk are impotent against the assaults of this swift winged foe, and are soon driven from the field. It even makes war on the king bird successfully, but will join with the latter against all strangers that dare approach the premises. The cat herself, dire enemy of the feathered tribe, is driven from the house top by the Martin, who charges upon her in defence of his mate and young.

Twelve or fifteen years ago the Martins were more numerous than now in the vicinity of Cleveland. For some reason or other fewer visit us, and many boxes are no longer inhabited by them. This desertion cannot be owing to a decrease in the amount of food, nor in any persecution they have

suffered, for insects are more numerous than ever, and the birds are never molested, even by idle boys.

The color of the Martin is uniform lustrous dark steel blue, with purple reflections. The female and young are less richly tinted, and have the under parts brownish. The tips of the wings extend a little beyond the end of the forked tail. The tarsi and toes are naked.

Total length nearly $7\frac{1}{2}$ inches.

FAMILY BOMBYCILLIDÆ.

In this family we have two species only in the United States, both belonging to the genus *Ampelis*, Linnaeus—*Bombycilla* of Viellot, and both are found within the confines of this State. The family is distinguished by having ten primaries, the first short, less than half the length of the second. Bill short, broad and triangular, much depressed; gape wide, opening nearly to the eyes; mandibles notched, and the upper with a tooth behind the notch; tarsi shorter than the middle toe; generally scutellate, or plated anteriorly, with indications of scales on the inferior sides; toes unequally cleft, and the outer longest; head usually with a crest.

The Sub-Family, *Bombycillinae*, have the “wings very long and pointed, reaching nearly to the tip of the short tail. First primary excessively rudimentary, scarcely appreciable; second about the longest. Rictus without bristles. The frontal feathers extending forward on the bill beyond the nostrils.”—*Baird*.

GENUS AMPELIS, *Linn.*

Head with a broad, depressed crest. Tail nearly even. Tips of secondary quills with horny appendages, like red

sealing wax. Legs stout. Bill with short, velvety feathers at base, and bristles protecting the nostrils.

AMPELIS GARRULUS, *Linn.*—THE BOHEMIAN CHATTERER.

Audubon's B. of Am., IV., pl. 246; Jardine's Naturalist's Library, British Birds, Vol. II., pl. 11.

This bird is a winter visiter only and does not breed within the United States, inhabiting, during the summer season, the high northern latitudes of both hemispheres. During the winter it is common on the lake shore, and particularly so in and around Cleveland, where it feeds on the fruit of the mountain ash, cedar and hawthorn.

A few years ago this species was rare, and seen only occasionally during severe winters. Now they are numerous, almost every season. The only reason we can give for this, is the increase of food resulting from the large number of ornamental trees and shrubs that now decorate the thousand gardens and shrubberies of our city and suburbs.

The Bohemian Chatterer generally arrives in small flocks of ten or twenty individuals, who keep together during the whole period of their sojourn with us. When they visit a garden, in which there is a good supply of winter berries, they remain in that vicinity until all the food is exhausted. This is always the case with the flocks that annually repair to a large European hawthorn, that is usually covered with berries, that is in our garden, and we have often seen flocks of eighteen or twenty of these beautiful birds upon it at once, eating the ripe, red fruit. They are never allowed to be disturbed during their visit to us.

This species is larger than the common Cedar Bird, to which it bears a great resemblance, but may easily be distinguished from it by the black chin and throat, instead of black chin alone. The under tail coverts are also brownish chestnut; in the Cedar Bird they are white. The former has white bars across the wing which the other has not.

They are said to feed occasionally on insects, but the great bulk of their food consists of berries, and generally of sorts not remarkable for fine flavor.

This bird cannot be considered injurious to the farmer or gardener, as it appears at a season when all cultivated fruits are gone. We are not aware that it ever eats grain of any kind. It is valuable to us from its beauty, enlivening our grounds during the drear winter months when our summer friends have all left for the warmer lands of the South, and we need not grudge the mountain ash and other berries that it feeds upon, all being without any real value to us.

The general color is brownish ash with a reddish tinge on the back and breast, paler on the abdomen and rump; brownish orange on the forehead, sides of the head and under tail coverts. Chin and throat black, with a black frontal line from the upper part of the bill across the eye and extending toward the back of the head. Quills blackish; tips of the secondaries white, and a spot of the same color on the outer web of all the primaries, forming two bars when the wing is closed. A red sealing wax-like ornament on the tips of the secondaries. Tail black, tipped with bright yellow.

Length about $7\frac{1}{2}$ inches; tail 3.

Specimens in the Museum of the Cleveland Academy of Natural Science, and in the private collection of Prof. Kirtland.

AMPELIS CEDRORUM, *Baird*.—CEDAR BIRD—CHERRY BIRD.

Audubon's Birds of America, IV., pl. 245.

A much commoner species than the last, and found with us during the whole season. In June and July they commit great havoc among the ripe cherries, on which they feed.

Sometimes these fruit trees will be visited by flocks of this bird, who strip the branches of their luscious load, unless prevented. When there are many cherry trees it requires considerable attention to keep them off, and for this purpose a boy with a gun is often posted in the orchard, who makes war upon the birds, and, if he is a good shot, will kill them by dozens, as they sit steady, and perch well up among the topmost branches.

We have often felt sorry for this wholesale destruction of such a beautiful creature, without being able to give a sufficient reason why the carnage should cease. A friend of ours gave the best we have heard, namely, that the shot did more damage, by cutting the bark and branches of the trees, than the birds could do by eating the fruit, and this is often the case.

As soon as whortleberries are ripe, the Cedar Birds repair to their vicinity, and feed greedily upon them, in preference to cherries. In spring and winter, they eat the berries of juniper and red cedar, the fruit of our native hawthorns, and, in the cities, mountain ash berries. But it is not on wild, uncultivated fruits only that they feed, for they often seek out and devour numbers of insects. The young, in particular, are fed with many of these, and thus this bird repays us in part for the cherries he eats.

The flocks of these birds and their relatives, the Bohemian Chatterer, do not mingle together; at least we never saw any do so.

Incubation, in this species, takes place much later in the season than is usual with small birds, for the nest is not usually built until the middle of June, and, at the north, near the end of that month. After this time food is abundant, and the young are liberally supplied by both parents. The nest is generally built on a low tree, those of the orchard being often selected, and is composed of dry grass, lined with that of finer quality. The eggs are three or four, dingy

bluish white, tinged at the larger end with dull purplish, and blotched and spotted with black. They are somewhat conical in form, having considerable taper. The old birds, during the breeding season, are very quiet, and, in fact, at no period deserve the name of Chatterer, as applied to the genus.

The plumage of the Cedar Bird is truly beautiful. In texture it is soft, yet compact, and of such a peculiar color that no two authors, that have described from specimens, agree in regard to its tints and shades. In form it is robust and plump. The large crest, which is usually elevated, gives it a jaunty appearance. Unlike many birds of less beauty, it has no pretense to melody, its voice being merely a low kind of twitter. The sexes do not differ in coloring; the female, however, has a rather smaller crest, and the colors are somewhat duller in tint. Both have the peculiar sealing wax-like tips at the ends of the secondaries. The young do not obtain them until after moulting. We have shot specimens with these tips on one wing only, the feathers of the other being quite plain.

Color of the upper parts and breast, olive brown, fading to light yellow on the abdomen. A black stripe from the upper mandible across the eye, with a white line above and below, the lower being broadest. Chin black; quills and tail feathers, ashy black, the latter tipped with yellow. Rump and upper tail coverts ash; lower white. Bill and feet bluish black.

Length 7 inches.

Although the difference in length between this species and the Bohemian Chatterer is but small, that of bulk is considerable, the latter species being nearly double]the weight. It is more robust

The earlier naturalists considered the *A. cedrorum* as merely a variety of the *A. garrula*, but they must have

been misled by descriptions or figures, as a comparison of the two exhibits the most decided difference.

Specimens in the Museum of the Cleveland Academy of Natural Science.

SUB-FAMILY TYRANNINÆ.—TYRANT FLYCATCHERS.

All the Flycatchers are characterised by the bill being broader than high, gape wide, and with bristles surrounding the base. They are almost as insectivorous as the swallows. In this sub-family the culmen, or ridge of the bill, is straight to near the tip, then hooked, with a notch behind. The tip of the under mandible is also notched; nostrils oval or rounded, more or less concealed by the long bristles; these have lateral branches at the base. Tarsi short; middle and outer toe united at base by a membrane. Wings moderate; the first quill always more than three fourths the length of the second. Tail with twelve feathers.

Of this family we have representatives of five genera—*Tyrannus*, *Myiarchus*, *Sayornis*, *Contopus* and *Empidonax*. The *Milvulus tyrannus* was found by Audubon in Kentucky, but we are not aware that it has ever been found in Ohio. It seldom visits the United States, being a South American and Mexican species. There is a specimen of this bird in the Museum of the Cleveland Academy of Natural Science, but it was obtained by Mr. Winslow from Mexico.

TYRANNUS, *Cuvier*.

Tail nearly even, or moderately forked, rather shorter than the wings; the feathers broad, and widening somewhat at the ends; wings long and pointed, the outer primaries

rather abruptly attenuated near the ends, the attenuated portion not linear, however; head with a concealed patch of red on the crown.

TYRANNUS INTREPIDUS, *Viellot*.—KING BIRD.

Audubon's Birds of America, Octavo edition, I., plate 56.

This is the *Muscicapa tyrannus* of Audubon's Ornithology, and the *T. Carolinensis* of Baird. We prefer, however, the name given by Viellot as more appropriate, independent of its priority. It is not more plentiful in the Carolinas than in other States, and these peculiarly local names are objectionable, unless when given to a species entirely or nearly limited in its range to the locality after which it is designated.

Few of our smaller birds are so extensively distributed over the country as this. It is found during the summer in every State east of the Rocky Mountains, extending into Canada and around Hudson's Bay. Over all this region it is a summer visitant only, retiring in the fall to Central America and Mexico. A few winter occasionally in the south part of Florida and Texas.

Every farmer's boy knows the King Bird. Its character for bravery is undoubted, and, were it not for its habit of devouring the honey bee, it would be looked upon by all as a friend, and receive, instead of persecution, protection. To those who do not keep bees this bird is a friend. He protects the farm yard from the assaults of every species of rapacious bird. Should hawk, eagle or crow dare approach the vicinity of his nest, he rushes to the combat, and, assailing his foe with the greatest impetuosity, soon obliges it to beat a retreat. The size, strength or valor of the enemy is nothing, our active and indomitable champion attacks him at every weak point, until the more bulky antagonist is glad to leave the field defeated. The hawk lacks opportunity to carry off a chicken if a pair of King Birds have their nest near by, for the male is always on

the watch for such vagrants, and instantly sounds the charge on its approach.

Its food consists almost entirely of insects, of which it devours a large number, capturing them on the wing. So far, it is highly useful, and we incline to the belief that the benefits conferred far exceed the injuries committed by this species. Of course, a pair of King Birds would do a great deal of harm if located in the immediate vicinity of an apiary; but as birds, like other animals, desire a change of diet, they would not confine themselves to a feast on honey laden bees. Moths, beetles, wasps, &c., would form no small share of their food, and a reduction of the number of such is highly desirable.

The nest of the King Bird is usually placed on an upper horizontal branch of some tree in the neighborhood of the farm house, or even in the orchard—seldom in the woods. It is large. The eggs are from four to six in number; color reddish white, spotted with brown. During the period of incubation, the male is always on the alert, and supplies the female with an abundance of food. The young are well attended by the parents.

Color, on the upper parts, bluish grey; head brownish black, with a red spot surrounded with yellow on the crest; under parts white, greyish on throat; quills and tail greyish black. The outer edges of the former with a narrow white line; tip of the tail white. Female somewhat duller.

Length $8\frac{1}{2}$ inches.

Specimens in the Museum of the Cleveland Academy of Natural Science.

GENUS MYIARCHUS, *Cabanis*.

Tarsus equal to or longer than the middle toe, which is decidedly longer than the hinder one. Bill wider at the

base than half the culmen. Tail broad, long, even, or slightly rounded, about equal to the wings, which scarcely reach the middle of the tail; the first primary shorter than the sixth. Head with elongated, lanceolate, distinct feathers; above brownish olive; throat ash; belly yellow. Tail and wing feathers varied with rufous.—*Baird*.

Of the four North American species, belonging to this genus, one only inhabits the Northern States. Of the others, two have their northern limit at the Rio Grande, and one is an inhabitant of Mexico.

MYIARCHUS CRINITUS, *Cabanis*.—THE GREAT CRESTED
FLYCATCHER.

Audubon's Birds of America, Octavo edition, plate 57.

Abundant throughout the State, especially in woods. It is not so familiar as the King Bird, seldom approaching the vicinity of the dwelling house. The deep woods are its delight, and there it builds its nest, generally in the hollow of a tree, at a considerable distance from the ground, but occasionally in a fallen log or a hole in a fence rail. We have never seen the nest, but learn from Audubon that the eggs are from four to six, of a pale cream color, thickly streaked with deep purplish brown, of different tints. One brood only is raised in a season, and the family remain together until they leave us for the south in September.

The species is very pugnacious, but seems to lack the daring courage of the *Tyrannus intrepidus*, which prompts it to attack the largest and most powerful of the rapacious birds, whenever they approach its nest. The present bird is more apt to battle with less dangerous foes. Among the males, during the love season, there are frequent wars, and woe to the vanquished rival, for his conqueror punishes him without mercy. Audubon, in his plate of this bird.

represents a male in the act of literally plucking his rival, and this author states that such is often the case.

The food of the Great Crested Flycatcher consists of insects, but in the fall, when such food becomes scarce, it devours wild berries, principally those of the common poke weed. In no sense is it an injurious bird to the farmer, and, as it does not usually come near the apiary, the bees do not suffer.

Should this bird remain numerous, in spite of the destruction of the woods, its habits must necessarily be modified, and it may then frequent our orchards and small strips of wood in the vicinity of our dwellings.

From the rest of its family it may easily be distinguished by its color, which is of a dull greenish olive on the upper parts. Upper tail coverts rusty brown. Breast, throat and neck ashy blue. Abdomen bright yellow. Sides of the body tinged with olive. Wings brown; lower wing coverts yellow. A narrow band of dull white across the margins of the upper wing coverts. Tail light brown with the lateral feathers edged with pale olive.

Length $8\frac{3}{4}$ inches. In general, about the same size as the King Bird.

Specimens in the Museum of the Cleveland Academy of Natural Science.

GENUS SAYORNIS, *Bonaparte*.

Head with a blended, depressed, moderate crest. Tarsus decidedly longer than middle toe, which is scarcely longer than the hind toe. Bill rather narrow; width at the base

about half the culmen. Tail broad, long, slightly forked, equal to the wings, which are moderately pointed, and reach to the middle of the tail. First primary shorter than the sixth.

There are three species of this genus described, that inhabit the United States. The *S. nigricans* is found on the California coast, the Gila River valley, Upper Rio Grande and New Mexico. The *S. sayus* is found in Missouri, west to the Rocky Mountains, and south to Mexico.

SAYORNIS FUSCUS, *Baird*.—PEWEE, OR PHÆBE BIRD.

Audubon's Birds of America, Octavo edition, I., plate 63.

A common species throughout the United States. It ranges from the Gulf of Mexico to Newfoundland and Labrador.

In the spring they are quite numerous, while passing through the State northward. From the time of their arrival their call of *phæbe* may be heard in all sorts of places, and the bird itself is seen perched either on some tree, low shrub, or in the orchard, near the farm house, and it is also quite commonly seen on the shade trees lining the streets of our cities. The nest may also be found in all these different localities, and also among rocks, the latter locality being quite a favorite retreat for this bird.

At no time does this species appear to be very shy. It will sit on a tree, a few yards from the person observing it, utter its plaintive call and dart off in pursuit of its insect prey. It soon becomes familiar with those it sees often, and will allow their approach without manifesting fear. We have known them to breed in Cleveland, building their nests in the vicinity of one of our most common thoroughfares.

The migrations of this bird are always performed, according to Audubon, at night, and this is the case with a great many birds, that, at all other times, are day flyers only. A reason for this may be that they are less liable to attack; at such times, from the rapacious species that hover in numbers on the skirts of migrating flocks. But why some species should do so, and not others, is rather strange.

The flight of the Phœbe is a sort of fluttering motion, interrupted by a gliding or sailing. When it alights, it erects its crest, and jerks up the tail, with a sort vibratory spring. When pursuing insects it can urge its flight to a considerable speed.

The nest is composed of mud, with grass and straw, and lined with feathers, and is often built on the face of a rock, in the manner of some swallows; also on the rafters of a barn, or other outhouse; sometimes beneath the porch of a dwelling house, and the bird seems no ways disturbed by the movements of the family. It resembles that of the swallow.

The eggs are white, usually six, are hatched in thirteen days, and the young leave the nest in about sixteen. The parents assist each other in the labor of incubation, and the male is very attentive and faithful to his partner. The same pair often return to the old nest, year after year, and after making a few repairs, raise a new family within it. Occasionally two broods are raised in a season, and this is often the case farther south.

They pass the winter in Florida, and along the Gulf of Mexico, returning to us often before the snow is entirely gone. The food consists of insects of all kinds, and it may therefore be looked upon as a beneficial and useful species to the farmer and gardener.

The color of the *S. fuscus* is dull olive brown on the upper parts and sides of the breast, becoming paler towards the tail. Head dark brown, with a few whitish feathers

on the eye lids. Lower parts white, with a tinge of yellow, mixed with brown on the throat and chin. Wings and tail brown; the upper quills of the former edged with dull white, and the outer tail feathers edged with white. Bill and feet black; bill slender; legs brown. Tail broad and forked; third quill longest.

Length 7 inches.

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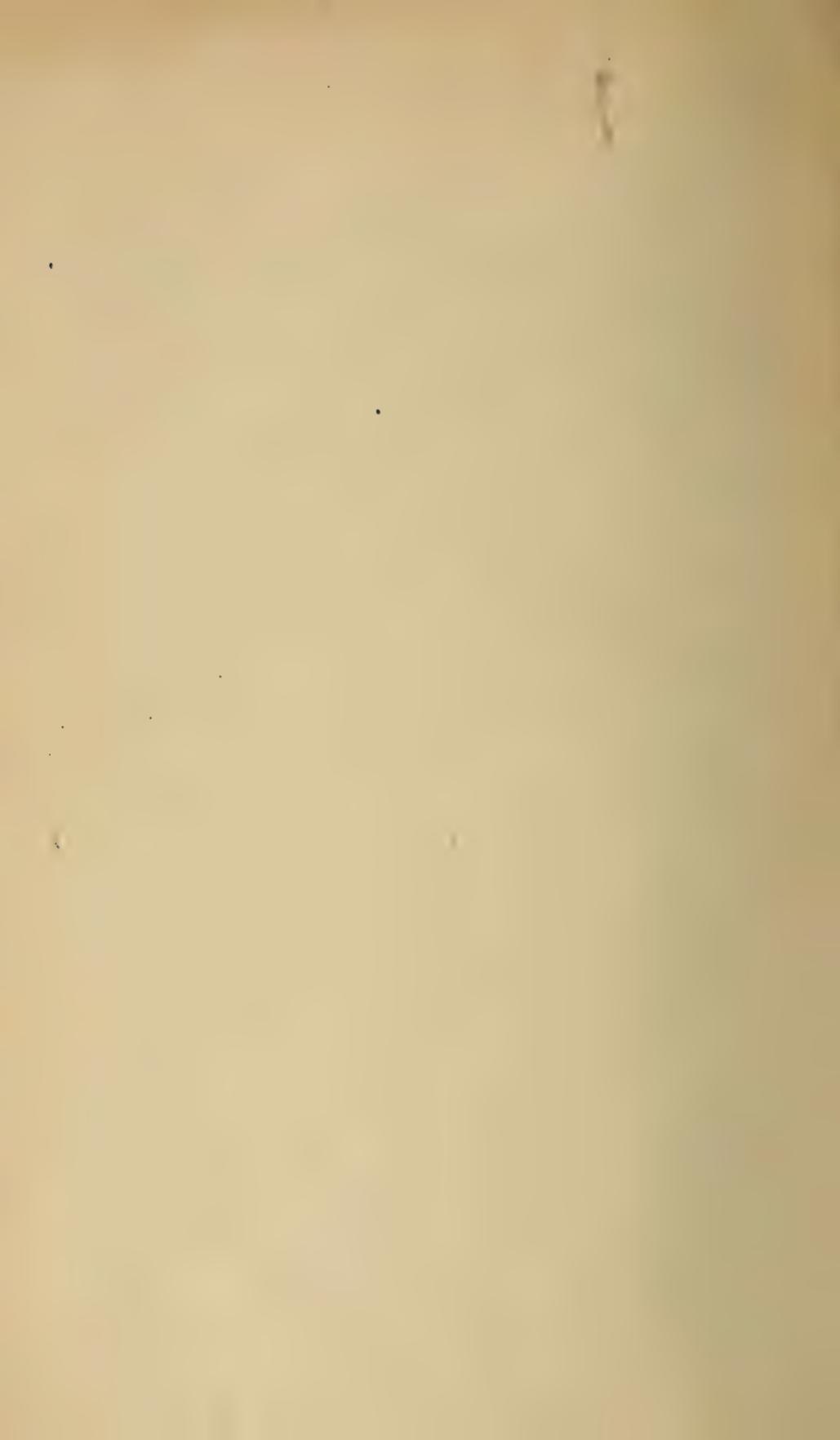
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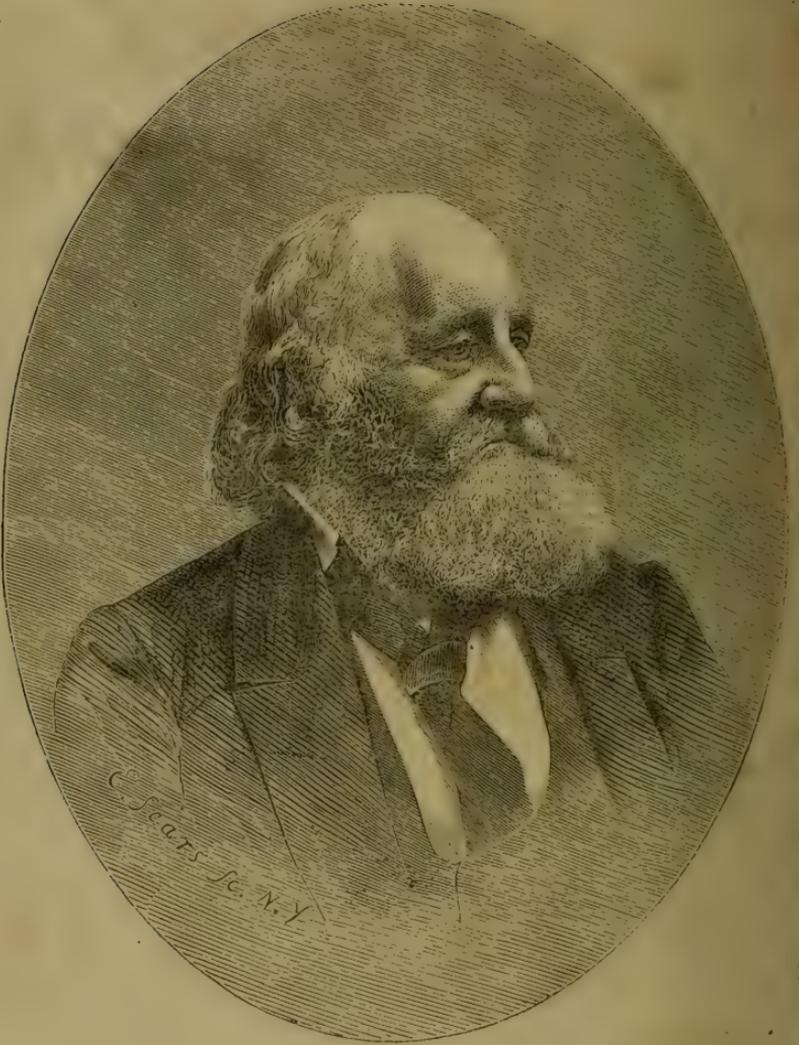
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