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ESSEX INSTITUTE,  
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## CONTENTS.

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	Page.
Prefatory Note, . . . . .	1
The North American Reptiles and Batrachians; by Samuel Garman, . . . . .	3
An Extraordinary Shark; by Samuel Garman, . . . . .	47
A Species of Heptranchias supposed to be new; by Samuel Garman, . . . . .	56
Pigeons and the Pigeon Fancy; by Wm. G. Barton, . . . . .	59
Annual Meeting, Monday, May 19, 1884,. . . . .	82
Election of officers, 82; retrospect of the year, 83; members, 83; field meetings, 88; meetings, 89; lectures, 90; publications, 91; library, 92; art exhibition, 103; horticultural, 105; museum, 105; financial, 107; abstract of secretary's report, 108.	
Field Day at Topsfield, Wednesday, June 18, 1884, . . . . .	109
Remarks of the President, 111; of James J. H. Gregory, 111; of Rev. Fielder Israel, 112.	
Notes on the Condition of Zoölogy, fifty years ago and to-day: in connection with the growth of the Essex Institute; by E. S. Morse, . . . . .	113
The Progress of Botany in Essex County during the last half century, especially as influenced by the Essex Co. Natural History Society and the Essex Institute; by John Robinson, . . . . .	122
Geology and Mineralogy in Essex County; by B. F. McDaniel, . . . . .	133
An Historical Sketch; by Samuel P. Fowler, . . . . .	141
A Field Day at Annisquam, Wednesday, July 16, 1884, . . . . .	146
Remarks of the President, 147; of Alpheus Hyatt, A. C. Perkins, 147; of Jonas H. French, James Davis, 148.	
The Annisquam Laboratory; by J. S. Kingsley, . . . . .	149

## CONTENTS.

Field Day at Asbury Grove, Hamilton, Thursday, July 31, 1884,	152
Remarks of the President, 153; of James F. Almy, 153; of George D. Phippen, F. W. Putnam, 154; of J. H. Sears, Rev. B. F. McDaniel, N. A. Horton, 156.	
Field Day at Newbury Old Town, Thursday, August 28, 1884,	158
Remarks of the President, 158; of Luther Dame, Alfred Osgood, 159; of Stephen H. Phillips, D. B. Hagar, 160; of Rev. Fielder Israel, George Osgood, 161; tribute to Rev. Dr. Withington, 161.	
Geology and Mineralogy of Newbury, by B. F. McDaniel,	163
Flowering of Plants, December, 1884, . . . . .	170

# BULLETIN

OF THE

## ESSEX INSTITUTE.

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### PREFATORY NOTE.

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At a meeting of the Essex Institute, held on Monday, December 17, 1883, it was announced that the Friday evening preceding (Dec. 14) was the fiftieth anniversary of the assembling together of a few friends, among whom may be mentioned Dr. Andrew Nichols of Danvers, William Oakes of Ipswich, John C. Lee, Thomas Spencer, J. M. Ives, B. H. Ives, Charles G. Page and others, of Salem, to take the initiatory steps in the organization of a society for the promotion of Natural History, under the name of the Essex County Natural History Society. At this meeting a committee was appointed to draft a constitution and by-laws, and these were adopted at an adjourned meeting held on the Wednesday following.

The completion of the organization was effected at a meeting held in Topsfield on Wednesday, April 16, 1834. This last event it is proposed to commemorate in April next at Topsfield.

This Society united with the Essex Historical Society, organized in 1821, was incorporated by the Legislature of 1848 under the name of the ESSEX INSTITUTE.

THE FOLLOWING PUBLICATIONS may be specified among those issued by the Institute since its organization in 1848.

*Proceedings and Communications* 6 vols., 8vo, 1848 to 1868. These volumes contain a large number of descriptions and figures of new species, especially of corals, insects and polyzoa, and many valuable papers in natural history. The first three volumes also contain many important historical papers. In addition to the papers on special subjects, these volumes contain the proceedings of the meetings of the Institute, the records of additions to the Library and Museum, and many important verbal communications made at the meetings.

*Bulletin* 15 vols., 8vo, issued quarterly, a continuation of the "Proceedings of the Essex Institute" containing an account of the Regular Home and Field Meetings of the Society and papers of scientific value.

*Historical Collections* 20 vols., 8vo, issued quarterly, contain extracts from the records of courts, parishes, churches and towns in this county; abstracts of wills, deeds and journals; records of births, baptisms, marriages and deaths, and inscriptions on tombstones; also papers of historical, genealogical and biographical interest. In these volumes will be found memoirs of deceased members of the Institute and others; also genealogies of Essex County families.

Flora of Essex Co., by John Robinson, 8vo, pp. 200.

First Cruise of Frigate "Essex," by Admiral Geo. H. Preble, U. S. N.

In the year 1883 the Institute exchanged publications with thirty-two societies in Germany, ten in France, four in Switzerland, three in Austria, one in Denmark, four in Sweden, two in Italy, two in Belgium, thirteen in Great Britain (besides receiving the Government Surveys of India and the United Kingdom), and with eighteen Miscellaneous, twenty-three Scientific and twenty-three Historical Societies in America.

## THE NORTH AMERICAN REPTILES AND BATRACHIANS.

A LIST OF THE SPECIES OCCURRING NORTH OF THE ISTHMUS  
OF TEHUANTEPEC, WITH REFERENCES.

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BY SAMUEL GARMAN.

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THE following list is presented in the shape in which it has proved most useful in my own work. As in other publications, I have placed the date immediately after the authority, as one naturally thinks it. In order accurately to determine species, comparison should be made with the original description rather than with the opinion of a subsequent writer; for this reason reference is made to the discoverer and not to one in whose opinion the species belongs to a genus some other than that in which it was originally placed. Consequently, the references are under names unaffected by frequent changes from one genus to another.

Heretofore, the faunal limit for North America has been patriotically placed at the Mexican boundary. The distribution of the reptiles and Batrachians proves this limit to be unscientific, and shows the nearest approach to a separation between the faunæ of the Americas, North and South, at the southern extremity of the tableland of Mexico. Attempt is made in this list to include all the species known to occur north of that point.

When several localities for a species are given, they are chosen to indicate the extent of its range as nearly as possible.

With a slight modification, the binomial system is followed. For various reasons, as will be seen below, the tri-

or polynomials affected by different authors, can hardly be considered improvements. Such names as, for example, *Cinosternum* (*Thyrosternum*) *pennsylvanicum pennsylvanicum* (v) x, or *Tropidonotus* (*Nerodia*) *compressicaudus compressicaudus flavirostris* (v) y, if there were varieties, have the appearance of doubtful advances from a binomial system. According to that system, if V first describes a species under a certain title, and W discovers one closely allied — giving it a name — and X says W's species is not sufficiently distinct, X is entitled to the credit rather than W, and the formula reads *Genus* (*Subgenus*) *species subspecies* (V) X. That is, V is credited with a form he never saw, and W is discredited by X who claims to rank with V because, for whatever reason, possibly insufficient knowledge, he arrives at a conclusion differing from that of W. If there are varieties, Y may displace X, and for authorities we should have (V) Y, or, if Z discovers that Y's variety is out of place, (V) Z, and in either case the authorities cited may give us no information concerning the form to which the names refer.

If we are now to adopt a polynomial system, we might, to be more consistent, accept the names given before Linné's time.

The modification suggested in the binomials consists in using a symbol, a letter, to represent each form or race of a species with its history or synonymy. To illustrate, *Eutænia sirtalis* Linn.; B. & G., is the first (A) of a group of forms of the species *sirtalis*, Linné being authority for the species, and Baird and Girard for its position in the genus. The A can always be understood and need not be written with the first described form. If either the symbol or the name following it is in italics there can be no confusion.

B *Eutæniæ sirtalis* is the form to which Catesby gave the name *Vipera gracilis maculatus*, afterward named by

Linné *Coluber ordinatus*. The authorities for the races succeeding the first may or may not be written. To write them, D *E. sirtalis* Say; Jan, is that described by Say as *Coluber parietalis*, but placed as a variety of *sirtalis* by Jan. In the synonymy, the history of each of the various forms is indicated under their respective letters. The use of the letter leaves little or no excuse for duplication, confusion, and excessive length in the name, or for a questionable disregard of the earlier authorities. It may be objected that the original name tells more about the form than would a symbol. To

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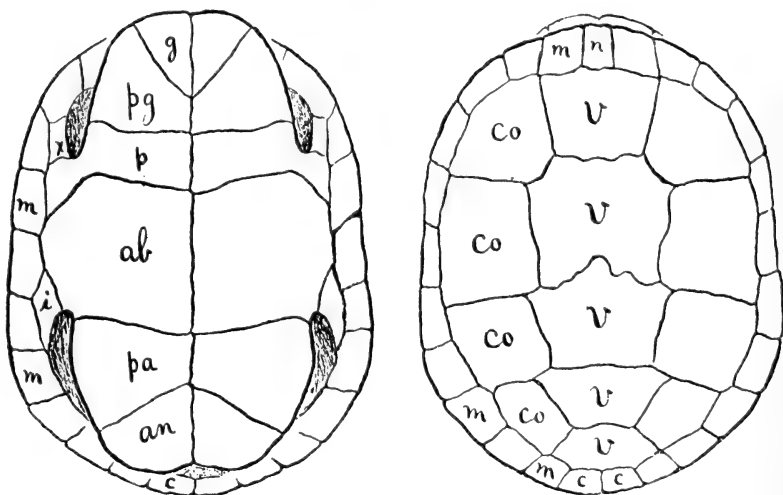
December 22, 1906

names, is easier to learn or remember than a single one.

Letters are in use among English and French writers to indicate varieties, the custom dating back half a century or more.

The method suggested has been applied in a few of the following genera. There are numerous others in which the present list of species, as in *Sceloporus*, *Geotriton*, and others, is susceptible of a considerable reduction, which will be a necessary consequence of further study.

## TESTUDINATA.



CHRYSEMYS PICTA.

g. Gular.  
 pg. Postgular.  
 p. Pectoral.  
 ab. Abdominal.  
 pa. Preanal.  
 an. Anal.

x. Axillary.  
 i. Inguinal.  
 n. Nuchal.  
 m-m. Eleven Marginals.  
 co. Four Costals.  
 c. Caudal.

v-v. Five Vertebrae.

## SPHARGIDIDAE.

**DERMATOCHELYS** Blainv., 1816, Bull. Soc. Philom., p. 111.

**Testudo coriacea** (Rond.) Linn., 1766, Syst., Ed. 12, 350.

Tropical Atlantic and adjacent waters.

**D. schlegeli**

Tropical Pacific and Indian oceans.

## CHELONIOIDAE.

**THALASSOCHELYS** Fitz., 1836, Ann. Mus. Wien, I, 121.

**Testudo cephalo** Schneid., 1783, Schildkr., 303 (*caouana* auct.).

Tropical Atlantic and adjacent waters.



**Chelonia olivacea** Eschsch., 1829, Zool. Atlas, p. 3, pl. 3.  
Tropical Pacific and Indian oceans.

**COLPOCHELYS** Garman, 1880, Bull. Mus. Comp. Zool., 124.

**C. kemp** Grmn., l. c. 123.

Northeastern part of the Gulf of Mexico.

**ERETMOCHELYS** Fitz., 1843, Syst. Rept., 30.

**Testudo imbricata** Linn., 1766, Syst., 350.

Tropical Atlantic and adjacent waters.

**Caretta squamata** Krefft, 1871, Austral. Vertebr., 39.

Tropical Pacific and Indian oceans.

**CHELONIA** Brongn., 1805, Essai d'une Class. Rept.

**Testudo mydas** Linn., 1758, Syst., 197.

Tropical Atlantic and adjacent waters.

(B) **Chelonia marmorata** D. & B., 1835, Erp., II, 546.

Atlantic around Ascension Island.

**Chelonia agassizii** Bocourt, 1870, Miss. Sci. Mex., Rept., p. 26,  
pl. 6.

Tropical part of the eastern Pacific.

## TRIONYCHIDAE.

**AMYDA** Fitz., 1843, Syn. Rept., 30.

**Trionyx muticus** Les., 1827, Mem. Mus., XV, 263.

**PLATYPELTIS** Fitz., 1836, Ann. Wien Mus.

**Testudo ferox** Penn., 1767, Phil. Trans., LVI.

Mississippi valley and eastward.

**ASPIDONECTES** Wagl., 1830, Amph., 134.

**Trionyx spiniferus** Les., 1827, Mem. Mus., XV, 258.

Mississippi river, tributaries and eastward.

**A. asper** Ag., 1857, Contr., I, 405.

Valley of the lower Mississippi.

**A. nuchalis** Ag., l. c., 406.

Tennessee river and eastward.

**A. emoryi** Ag., l. c., 407.

Texas to Mexico.

## CHELYDROIDAE.

**CHELYDRA** Schweigg., 1814 (read 1809), Prodr. Monogr. Chelon.,  
23.

**Testudo serpentina** Linn., 1754, Mus. Ad. Fridr., 36,—1758  
Syst., 199.

From Canada southward, east of the Rocky mountains.

**MACROCLEMYS** Gray, 1855, Cat. Sh. Rept., 48.

**Chelydra lacertina** Schw., 1814, Chelon., 23.  
Florida to Texas.

### CINOSTERNOIDAE.

**AROMOCHELYS** Gray, 1855, Cat. Sh. Rept., 46.

**Testudo odorata** Latr., 1801, Rept., I, 122.  
Maine to Texas.

**GONIOCHELYS** Ag., 1857, Contr., I, 423.

**Aromochelys carinata** Gray, 1855, Cat. Sh. Rept., 47.  
Florida to Texas.

**G. minor** Ag., 1857, l. c., 424.  
Alabama to Louisiana.

**THYROSTERNUM** Ag., 1857, Contr., I, 427.

**Testudo pennsylvanica** Gmel., 1788, Syst. Linn., I, 1042.  
Virginia to Florida.

**Cinosternum sonoriense** LeC., 1854, Pr. Phil. Ac., 184.  
Arizona; Sonora.

**C. integrum** LeC., l. c., 183.  
Mexico.

**C. henrici** LeC., l. c., 182.  
Arizona.

**C. doubledayi** Gray, 1844, Cat. Tort., 33.  
California.

**C. cruentatum** Dum., 1851, Cat. Met., 16.  
Mexico; Texas.

**K. punctatum** Gray, 1855, Cat. Sh. Rept., 45 (s. d.).  
Eastern Florida.

**K. shavianum** Bell., 1825, Zool. Jour., II, 304.

**PLATYTHYRA** Ag., 1857, Contr., I, 429.

**P. flavescens** Ag., l. c., 430.  
California; Texas; Utah.

## EMYDOIDAE.

**PSEUDEMYS** Gray, 1855, Cat. Sh. Rept., 33.

**Testudo rugosa** Shaw, 1802, Zool., III, 28.

New Jersey; North Carolina.

**T. concinna** LeC., 1820, Ann. N. Y. Lyc., 106.

North Carolina; Missouri; Louisiana.

**Emys mobiliensis** Holbr., 1842, Herp., I, 71.

Florida to Mexico.

**E. hieroglyphica** Holbr., l. c., 111.

Gulf States to Tennessee.

**E. ornata** Gray, 1831, Syn. Rept., 30.

Mexico.

**Callichelys? pulcherrima?** Gray, 1863, Ann. Mag., 181.

Mexico.

**TRACHEMYS** Ag., 1857, Contr., I, 434.

**Testudo scabra** Linn., 1758, Syst., I, 193.

North Carolina to Georgia.

**Emys troostii** Holbr., 1842, Herp., I, 123.

Illinois and southward.

**E. elegans** Wied., 1839, Reise N. Amer., I, 176, 213.

Dakota to Texas.

**GRAPTEMYS** Ag., 1857, Contr., I, 436.

**Testudo geographica** Les., Jour. Phil. Ac., I, 85, pl. 5.

New York to Texas.

**Emys lesueurii** Gray, 1831, Syn. Rept., 12.

**MALACOCLEMMYS** Gray, 1844, Cat. Tort., 28.

**Testudo palustris** Gmel., 1788, Syst. Linn., I, 1041.

New York to Texas.

**CHRYSEMYS** Gray, 1844, Cat. Tort., 27.

**Testudo picta** (Herrm.) Schneid., 1783, Schildkr., 348.

Nova Scotia to Louisiana.

**C. marginata** Ag., 1857, Contr., I, 439.

Michigan to Iowa.

**C. dorsalis** Ag., l. c., 441.

Mississippi to Louisiana.

**Emys belli** Gray, 1831, Syn., 12.

Illinois to Missouri.

**E. oregonensis** Harl., 1837, Am. Jour. Sc., 382, pl. 31.

Oregon.

- DEIROCHELYS** Ag., 1857, Contr., I, 441.  
*Testudo reticulata* (Bosc.) Daud., 1805, Rept., II, 144.  
 North Carolina to Louisiana.
- EMYS** Brongn., 1803, Mem. des Sav. Étrang.  
*Testudo melagris* Shaw & Nodder, 1793, Nat. Misc., pl. 144.  
 New England to Wisconsin.
- NANEMYS** Ag., 1857, Contr., I, 442.  
*Testudo guttata* Schn., 17—, Berl. Gesellsch. Nat. Fr., IV, pl. 4.  
 New England to North Carolina.
- CALEMYS** Ag., 1857, Contr., I, 443.  
*Testudo muhlenbergii* Schoepff, 1792, Test., 132.  
 Pennsylvania to New Jersey.
- GLYPTEMYS** Ag., 1857, Contr., I, 443.  
*Testudo insculpta* LeCl., 1828–1836, Ann. Lyc. N. Y., III, 112.  
 Nova Scotia to Kentucky.  
*Emys incisa* Boc., 1870, Miss. Sci. Mex., Rept., 11, pls. 1 and 2.  
 Mexico.
- ACTINEMYS** Ag., 1857, l. c., 444.  
*Emys marmorata* B. & G., 1852, Pr. Phil. Ac., 177.  
 California to Puget sound.
- CISTUDO** Flem., 1822, Philos. Zool., 270.  
*Testudo carinata* Linn., 1758, Syst., I, 198.  
 New England; South Carolina; Michigan.
- C. triunguis** Ag., 1857, Contr., I, 445.  
 Georgia; Louisiana.
- C. ornata** Ag., l. c., 445.  
 Kansas; Dakota.
- C. major** Ag., l. c., 445.  
 Alabama; Florida.
- Onychotria mexicana** Gray, 1849, P. Z. S. Lond., 17.  
 Mexico.

## TESTUDINIDAE.

- XEROBATES** Ag., 1857, Contr., I, 446.  
*Testudo carolina* Linn., 1758, Syst., 198.  
 South Carolina; Texas.
- X. berlandieri** Ag., l. c., 447.  
 Texas; Mexico.
- X. agassizi** Cooper, 1863, Pr. Cal. Acad., II, 120.  
 California; Sonora.

## RHIZODONTA.

## CROCODILIDAE.

**CROCODILUS** Gronow, 1756, Mus. Ichth., II, 74,—1763, Zooph., 1, 10.

**C. acutus** Cuv., 1807, Ann. Mus., X, 55.

South America; West Indies; Florida.

**C. pacificus** Boc., 1870, Miss. Sci. Mex., Rept., 31.

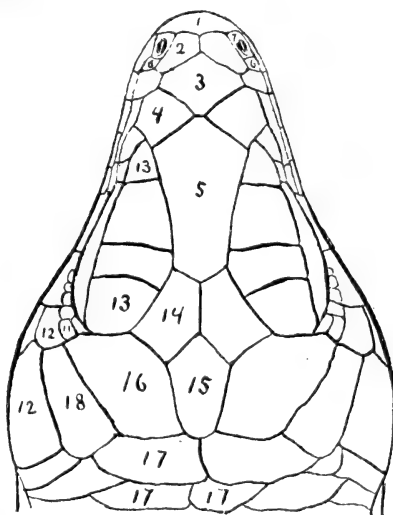
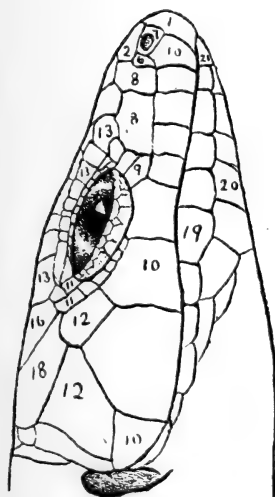
Mexico; Ecuador.

**ALLIGATOR** Cuv., 1807, Ann. Mus., X.

**Crocodilus mississippiensis**, Daud., 1805, Rept., II, 412.

North Carolina to Mexico.

## SAURIA.



**EUMECES FASCIATUS.**

- 1 Rostral.
- 2 Supranasals.
- 3 Internasal.
- 4 Prefrontals.
- 5 Frontal.
- 6 Postnasals.
- 7 Nasals.
- 8 Loreals.
- 9 Preorbitals.
- 10 Labials.

- 11 Postorbitals.
- 12 Temporals.
- 13 Supraciliaries.
- 14 Frontoparietals.
- 15 Interparietal.
- 16 Parietals.
- 17 Occipitals.
- 18 Supratemporals.
- 19 Infralabials.
- 20 Submentals.

## EUBLEPHARIDAE.

**COLEONYX** Gray, 1845, Ann. Mag., XVI, 162.

**Stenodactylus variegatus** Bd., 1858, Pr. Phil. Ac., 254.  
Texas; California.

## GECCONIDAE.

**SPHAERODACTYLUS** Wagl., 1830, Amphib., 143.

**S. notatus** Bd., 1858, Pr. Phil. Ac., 254.  
Key West, Fla.

**PHYLLODACTYLUS** Gray, 1829, Spicil. Zool., 3.

**P. tuberculosus** Wiegman, 1835, Act. Acad. Caes. Leop., XVII,  
241, pl. 18, f. 2.  
Mexico.

**P. xanti** Cope, 1863, Pr. Phil. Ac., 102.  
Cape St. Lucas.

**DIPLODACTYLUS** Gray, 1832, Pr. Zool. Soc., 40.

**D. unctus** Cope, 1863, Pr. Phil. Ac., 102.  
Lower California.

## HELODERMIDAE.

**HELODERMA** Wiegman, 1829, Isis, 627.

**H. horridum** Wiegman, l. c.  
Mexico.

**H. suspectum** Cope (name only) 1875, Checklist, 47.  
Utah to Mexico.

## TEIIDAE.

**CNEMIDOPHORUS** Wagl., 1830, Syst. Amph., 154.

**Lacerta 6-lineata** Linn., 1766, Syst., 364.  
Southern States to Colorado.

**Ameiva tessellata** Say, 1823, Long's Exp., II, 50.  
Colorado.

(B) **Cnem. gracilis** B. & G., 1852, Pr. Phil. Ac., 128.  
Desert of Colorado.

(C) **C. tigris** B. & G., 1852, Stansbury's Rep., 338.  
Texas to California.

(D) **C. melanostethus** Cope, 1863, Pr. Phil. Ac., 104.  
California.

**C. inornatus** B. & G., 1858, Pr. Phil. Ac., 255.  
New Leon.

- C. octolineatus** Bd., 1858, l. c.  
New Leon.
- C. grahami** B. & G., 1852, Pr. Phil. Ac., 128.  
Texas to California.
- C. maximus** Cope, 1863, Pr. Phil. Ac., 104.  
Lower California.
- C. perplexus** B. & G., 1852, l. c.  
Texas; New Mexico.
- C. mexicanus** Pet., 1869, Mb., Brl. Akad., 62, pl. 34.  
Mexico.
- C. deppii** Wieg., 1834, Herp. Mex., 28.  
Colima.
- C. guttatus** Wieg., l. c., 29.  
Mexico.
- C. hyperethra** Cope, 1863, Pr. Phil. Ac., 103. (?).  
Lower California.

**AMEIVA** Meyer, 1795, Syn. Rept.

- A. undulata** Wieg., 1834, Herp. Mex., 27.  
Mexico.
- Cnemidoph. praesignis** B. & G., 1852, Pr. Phil. Ac., 129.  
Acapulco.

## ZONURIDAE.

**BARISSIA**<sup>6</sup> Gray, 1838, Ann. Mag., 390.

- Gerrhonotus olivaceus** Bd., 1858, Pr. Phil. Ac., 255.  
Mexico; California.

**GERRHONOTUS** Wieg., 1828, Isis, 379.

- Elgaria nobilis** B. & G., 1852, Pr. Phil. Ac., 129.  
Arizona; Sonora.
- G. (Elgaria) kingi** (Bell) Gray, 1838, Ann. Mag., 390.  
Mexico.
- G. deppei** Wieg., 1828, Isis, 379.  
Mexico.
- G. leiocephalus** Wieg., l. c.  
Mexico.
- G. imbricatus** Wieg., l. c.  
Guanahuato.
- G. rudicollis** Wieg., l. c.
- Elgaria principis** B. & G., 1852, Pr. Phil. Ac., 175.  
California.

**G. multicarinatus** Blainv., 1835, Nouv. Ann. du Mus., 289, pl. 25, f. 2.

California.

**Elgaria grandis** B. & G., 1852, l. c., 176.

California; Oregon.

**G. infernalis** Bd., 1858, Pr. Phil. Ac., 255. (?)

Texas.

**Tropidolepis scincicaudus** Skilton, 1849, Am. Jour. Sci., 202.

California.

**XENOSAURUS** Pet., 1861, Mb. Brl. Ak., 453.

**Cubina grandis** Gray, 1856, Ann. Mag., 270.

Vera Cruz.

### ANGUIDAE.

**OPHEOSAURUS** Daud., 1803, Rept., VII, 346.

**Anguis ventralis** Linn., 1766, Syst., 391.

South Carolina; New Mexico; Illinois.

### ANNIELLIDAE.

**ANNIELLA** Gray, 1852, Ann. Mag., X, 440.

**A. pulchra** Gray, l. c.

California.

### XANTUSIIDAE.

**XANTUSIA** Bd., 1858, Pr. Phil. Ac., 255.

**X. vigilis** Bd., l. c.

California.

### SCINCIDAE.

**OLIGOSOMA** Grd., 1857, Pr. Phil. Ac., 196.

**Scincus lateralis** Say, 1823, Long's Exp., II, 324.

South Carolina; Mexico; Nebraska; Illinois.

**EUMECES** Wieg., 1834, Herp. Mex., 36.

**Lacerta fasciata** Linn., 1758, Syst., I, 209.

Nebraska; Florida; South Carolina; Texas.

**Plestiodon obsoletum** B. & G., 1852, Pr. Phil. Ac., 129.

Kansas; Mexico.

**P. inornatum** Bd., 1858, l. c., 256.

Nebraska.



- P. skiltonianum** B. & G., 1852, Stansbury's Rep., 349.  
California.
- P. septentrionalis** Bd., 1858, Pr. Phil. Ac., 256.  
Texas; Minnesota.
- P. egregius** Bd., l. c.  
Florida.
- P. tetragrammus** Bd., l. c.  
Lower Rio Grande.
- P. leptogrammus** Bd., l. c.  
Nebraska.
- P. multivirgatus** Hallow., 1857, Pr. Phil. Ac., 215.  
Texas; Nebraska.
- P. anthracinus** Bd., 1849, Jour. Phil. Ac., I, 294.  
Pennsylvania; Mississippi.
- P. longirostris** Cope, 1861, Pr. Phil. Ac., 313.  
Bermudas.
- Mabouia brevirostris** Gthr., 1860, Pr. Z. S. Lond., 316.  
Oaxaca.
- Euprepes lynxæ** Wieg., 1834, Herp. Mex., 36.  
Guanaxuato.
- Lamprosaurus guttulatus** Hallow., 1853, Sitgreaves Rep., 113.  
Arizona.
- Eumeces onocrepis** Cope, 1869, Rep. Peab. Ac., 82. (?).
- E. hallowelli** Boc., 1879, Miss. Sci. Mex., Rept., 435, pl. 22 e, f. 7.  
California.
- E. obtusirostris** Boc., 1881, l. c., 441.  
Texas.
- (?) **Diploglossus millepunctatus** O'Shaug., 1874, Ann. Mag., 301.  
N. W. N. America.

## IGUANIDAE.

- HOLBROOKIA** Grd., 1850-51, Pr. A. A. A. S., 201.
- H. maculata** Grd., l. c.  
Texas; Dakota; Sonora.
- (B) **H. approximans** Bd., 1858, Pr. Phil. Ac., 253.  
Tamaulipas.
- (C) **H. propinqua** B. & G., 1852, Pr. Phil. Ac., 126.  
Texas.
- (D) **H. affinis** B. & G., l. c., 125.  
Sonora.
- Cophosaurus texanus** Trosch., 1850 (1852), Arch. f. Natg. 389, Tab. VI.  
Texas.

**U. graciosa** Hallow., 1854, Pr. Phil. Ac., 92.  
California.

**U. elegans** Yarr.

La Paz, Cal.

**Phymatolepis bicarinatus** Dum., 1856, Arch. Mus., VIII, 549.

Puebla, Mexico.

**Phymatolepis (Uta) irregularis** Fisch., 1881, Abh. Nat. Ver.

Brem., VII, 232.

Mexico.

**SCELOPORUS** Wiegman, 1828, Isis, 369.**Agama torquata** Peale & Green, Jour. Phil. Ac., VI, 231.

Texas; Mexico.

**Stellio undulatus** (Bosc.) Latr., 1801, Rept., II, 40.

Pennsylvania to Florida and California.

(B) **S. occidentalis** B. & G., 1852, Pr. Phil. Ac., 175.

California; Washington Territory.

(C) **S. thayeri** B. & G., l. c., 127.

Texas to Sonora.

**S. scalaris** Wiegman, 1828, Isis, 369.

Mexico; Sonora.

**S. couchii** Bd., 1858, Pr. Phil. Ac., 254.

New Leon.

**S. ornatus** Bd., 1859, Mex. Bound., Rept., 5.

Sonora.

**S. poinsetti** B. & G., 1852, Pr. Phil. Ac., 126.

Texas; Sonora.

**S. garmani** Blgr., 1882, Pr. Z. S. Lond., 761, pl. 56.

Southern Dakota; Nebraska.

**S. marmoratus** Hallow., 1852, Pr. Phil. Ac., 178.

Southern California.

**S. biserialatus** Hallow., 1859, P. R. R. Rep., X, Williamson, 6.

Mexico.

**S. consobrinus** B. & G., 1854, Marcy's Exp., 208.

Utah; California.

(B) **S. gratiosus** B. & G., 1852, Pr. Phil. Ac., 69.

Utah.

**S. Clarkii** B. & G., 1852, l. c., 127.

Arizona; Sonora.

(B) **S. zosteromus** Cope, 1863, Pr. Phil. Ac., 105.

Cape St. Lucas.

**S. horridus** Wiegman, 1834, Herp. Mex., 50.

Vera Cruz; Colima.

**S. formosus** Wiegman, l. c.

Colima.

- S. microlepidotus** Wiegman, l. c., 51.  
Puebla; Colima.
- S. floridanus** Bd., 1858, Pr. Phil. Ac., 254.  
Florida.
- S. spinosus** Wiegman, 1828, Isis, 369.  
Mexico.
- S. dugesi** Boc., 1874, Miss. Sci. Mex., 188, p. 18, f. 7.  
Colima.
- S. jarrovi** (Cope) Yarr., 1875, Wheeler's Rep., V, 569.  
Arizona.
- S. smaragdinus** Yarr., l. c., 572.  
Utah; Nevada.
- S. tristichus** Yarr., l. c.  
Taos, New Mexico.
- S. rufidorsum** Yarr., 1882, Pr. Nat. Mus., 442.  
La Paz, California.
- S. utiformis** Cope, 1864, Pr. Phil. Ac., 177.  
Colima, Mexico.
- S. gracilis** B. & G., 1852, Pr. Phil. Ac., 75.  
California.

**PHRYNOSOMA** Wiegman, 1828, Isis, 367.

- Lacerta orbicularis** Linn., 1758, Syst., I, 206.  
Mexico.

- Agama douglassi** Bell, 1829, Trans. Linn. Soc., XVI, 105, pl. 10.  
Dakota; Arizona.

- (B) **Tapaya ornatissima** Grd., 1858, Wilkes Exp., Rept., 396.  
Arizona; Mexico.

- (C) **P. pygmaea** Yarr., 1882, Pr. U. S. Mus., 443.  
Oregon.

- Tapaya hernandesi** Grd., 1858, Wilkes Exp., 395.  
Mexico.

- P. regale** Grd., l. c., 406.  
Arizona; New Mexico.

- P. modestum** Grd., 1852, Stansb. Rep., 365.  
Texas; Arizona; New Mexico.

- P. platyrhinum** Grd., l. c., 361.  
Utah; Arizona; Nevada.

- Agama (Phrynos.) coronata** Blainv., 1835, Nouv. Ann., 284, pl. 25, f. 1.  
California.

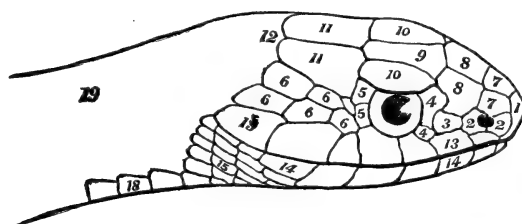
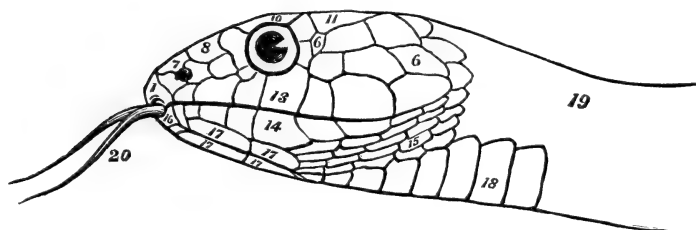
- P. blainvillei** Gray, 1839, Rept. Beechey's Voy., 96, pl. 29, f. 1.  
California; Arizona.

- Agama cornuta** Harl., 1825, Jour. Phil. Ac., IV, 299, pl. 20.  
Texas; Mexico;
- Anota mc'calli** Hallow., 1852, Pr. Phil. Ac., 182.  
Arizona; Nevada.
- Tapaya boucardi** Boc., 1874, Miss. Sci. Mex., 225, pl. xi, f. 4.  
Mexico plateau.
- P. braconnieri** Boc., l. c., 233, pl. 7.  
Oaxaca.
- P. taurus** Duges, 1869, Cat. Vert. Mex.  
Mexico.
- P. planiceps** Hallow., 1852, Pr. Phil. Ac., 178.  
Western Texas.
- P. asio** Cope, Pr. Phil. Ac., 178.  
California; Mexico.
- CYCLURA** Harl., 1825, Jour. Phil. Ac., IV, 242.
- Lacerta acanthura** Shaw, 1802, Zool., III, 216.  
Mexico; California.
- C. teres** Harl., l. c., 246.  
Vera Cruz; California.
- C. pectinata** Wieg., 1834, Herp. Mex., 42, pl. 2.  
Colima.
- Ctenosaura cycluroides** Wieg., 1828, Isis, 371.
- C. (Ctenosaura) hemilopha** Cope, 1863, Pr. Phil. Ac., 105.  
Cape St. Lucas.
- ANOLIS** Daud., 1802, Rept., IV, 50.
- Lacerta principalis** Linn., 1754, Mus. Ad., — 1758, Syst., I, 201.  
North Carolina to Texas.
- A. sericeus** Hallow., 1856, Pr. Phil. Ac., 227.  
Jalapa, Mexico.
- A. cooperi** Bd., 1858, Pr. Phil. Ac., 254.  
California.
- A. tropidonotus** Pet., 1863, Mb. Brl. Ak., 135.  
Orizaba.
- A. cymbos** Cope, 1864, Pr. Phil. Ac., 173.  
Vera Cruz.

## AMPHISBAENIDAE.

- CHIROTES** Cuv., 1817, R. An., Ed. 1, 57.
- Bipes canaliculatus** Bounat., 1789, Erpetol., 68.  
California; Mexico.
- LEPIDOSTERNON** Wagler, 1824, Spix Serp. Brazil, 70.
- L. floridanum** Baird, 1858, Pr. Phil. Ac., 225.  
Florida.

## OPHIDIA.



## COLUBER CONSTRICTOR.

- |                                    |                  |
|------------------------------------|------------------|
| 1 Rostral.                         | 11 Parietals.    |
| 2 Nasals.                          | 12 Occipitals.   |
| 3 Loreal.                          | 13 Labials.      |
| 4 Preoculars or Anteorbitals.      | 14 Infralabials. |
| 5 Postoculars or Postorbitals.     | 15 Gulars.       |
| 6 Temporals.                       | 16 Mental.       |
| 7 Internasals.                     | 17 Submentals.   |
| 8 Prefrontals.                     | 18 Ventrals.     |
| 9 Frontal.                         | 19 Dorsals.      |
| 10 Supraciliaries or Supraoculars. | 20 Tongue.       |

## SCOLECOPHIDIA.

## TYPHLOPIDAE.

## TYPHLOPINAE.

**TYPHLOPS** Schneid., 1801, Amph., II, 339.

**Ophthalmidion longissimum** D. & B., 1844, Erp., VI, 263.

Texas; "North America."

**T. perditus** Pet., 1869, Mb. Brl. Ak., 435.

Orizaba.

**T. basimaculatus** Cope, 1866, Pr. Phil. Ac., 320.

Cordova; Orizaba.

**T. emunctus** Garman, 1883, Mem. Mus. Comp. Zool., Rept., 3.

Central America.

## STENOSTOMINAE.

**ANOMALEPIS** Jan, 1861, Arch. Zool., 185.

**A. mexicanus** Jan, l. c.

Mexico.

**STENOSTOMA** Wagl., 1824, Spix Serp. Braz., 68.

**Rena dulcis** B. & G., 1853, Serp., 142.

Texas.

**R. humilis** B. & G., l. c., 143.

Vallieetas, California.

**S. rubellum** Grmn., 1883, Mem. M. C. Z., Rept., 130.

Uvalde, Texas.

**S. tenuiculum** Grmn., l. c., 5.

San Luis Potosi, Mexico.

**S. myopicum** Grmn., l. c., 6.

Tampico, Mexico.

**SIAGONODON** Pet., 1881, Gesellsch., 71.

**S. dugesi** Boc., 1882, Miss. Sci. Mex., Rept., 507, pl. 29, f. 9.

Colima.

## ONYCHOPHIDIA.

## ERYCIDAE.

**CHARINA** Gray, 1849, Cat. Snakes, 113.

**Tortrix bottae** Blainv., 1835, Nouv. Ann. Mus., 289, pl. 26, f. 1.

California to Mexico.

**Wenona plumbea** B. & G., 1853, Serp., 154.

California to Puget Sound.

**Lichanura trivirgata** Cope, 1861, Pr. Phil. Ac., 304.

Lower California; Mexico.

(B) **L. myriolepis** Cope, 1868, Pr. Phil. Ac., 2.

## BOIDAE.

**BOA** Linn., 1758, Syst., I, 214.

**B. imperator** Daud., 1802, Rept., V, 150.

Central America; Mexico.

**B. mexicana** Rapp.

Mexico.

**CHILABOTHRUS** D. & B., 1844, Erp., VI, 562.

**Boa inornata** Reinh., 1843, Dansk. Vid. Selsk., pl. 21-23.

West Indies; Central America; Mexico.

## ACACOPHIDIA.

### COLUBROIDEA.

#### DIPSADIDAE.

**LEPTOGNATHUS** Dum., 1852, Mem. Acad., XXIII, 467.

**Tropidodipsas fasciata** Gthr., 1858, Cat. 181.

Mexico.

**L. dumerili** Jan, 1863, Sist., 101.

Mexico.

**Coluber nebulatus** Linn., 1754, Mus. Ad., 32, pl. 24, f. 1.

Brazil to Mexico; West Indies (Gthr.).

**L. dimidiatus** Gthr., 1872, Ann. Mag., 31.

Mexico.

**L. brevis** Dum., 1852, Mem. Acad., 23, p. 467.

Mexico.

**SIBON** Fitz., 1826, Neue Class., 60.

**Dipsas biscutata** D. & B., 1854, Erp., VII, 1153.

Central America to Mexico.

(B) **Dipsas biscutata** var. **latifascia** Pet., 1869, Mb. Brl. Ak., 877.

Pueblo, Mexico.

**Coluber annulatus** Linn., 1754, Mus. Ad. Fridr., pl. 8, f. 2.

Mexico to Brazil.

(B) **Dipsas septentrionalis** Kenn., 1859, Mex. Bound., II, 16, pl. viii, f. 1.

Texas; Arizona; Mexico.



**Leptodeira torquata** Gthr., 1860, Ann. Mag.  
Nicaragua.

(B) **L. pacifica** Cope, 1868, Pr. Phil. Ac., 310.  
Mazatlan, Mexico.

(C) **L. personata** Cope, l. c.  
Mazatlan.

**L. discolor** Gthr., 1860, Pr. Zool. Soc., 317.  
Oaxaca.

#### DENDROPHIDAE.

**LEPTOPHIS** Bell, 1825, Zool. Jour., 329.

**L. mexicanus** D. & B., 1854, Erp., VII, 536.  
Mexico.

#### NATRICIDAE.

**TROPIDONOTUS** Kuhl, 1826, Isis, 205.

(**CHILOPOMA.**)

**C. rufipunctatum** Yarr., 1875, Wheeler's Exp., V, 543, pl. xx,  
f. 1.

Southern Arizona.

(**EUTAENIA.**)

**Coluber saurita** Linn., 1766, Syst., I, 385.  
Mississippi valley to Atlantic.

(B) **Eutaenia faireyi** B. & G., 1853, Serp., 25.  
Minnesota and Wisconsin southward.

(C) **E. Sackenii** Kenn., 1859, Pr. Phil. Ac., 98.  
Florida.

(D) **Coluber proximus** Say, 1823, Long's Exp., I, 187.  
Arkansas and Texas to Mexico.

(E) **E. radix** B. & G., 1853, Serp., 34.  
Wisconsin; Illinois.

**Coluber sirtalis** Linn., 1758, Syst., I, 222.  
Nova Scotia to Mississippi valley.

(B) **C. ordinatus** Linn., 1766, Syst., I, 379.  
Coast from Nova Scotia to Georgia and Alabama.

(C) **E. marciana** B. & G., 1853, Serp., 36.  
Kansas to Texas and Mexico.

(D) **Coluber parietalis** Say, 1823, Long's Exp., I, 186.  
Missouri basin to Utah.

(E) **E. vagrans** B. & G., 1853, Serp., 35.  
Rocky mountains to Sierras; Sonora.

(F) **Trop. collaris** Jan, 1863, Sist., 69.  
Southern Mexico; Panama.

- (G) **E. leptcephala** B. & G., 1853, Serp., 29.  
Oregon.
- (H) **Coluber infernalis** Blainv., 1835, Nouv. Ann. Mus.,  
291, pl. 26, f. 3.  
California to Mexico.
- (I) **E. atrata** Kenn., 1860, P. R. R. Rep., XII, 296.  
California.
- (J) **Trop. quadriserialis** Fisch., 1879, Verh. Nat. Ver.  
Hamb., 82.  
Mazatlan.
- Atomarchus multimaculatus** Cope, 1883, Am. Nat., 1300.  
New Mexico.
- (NERODIA.)
- Coluber sipedon** Linn., 1758, Syst., I, 219.  
Mississippi valley to Maine.
- (B) **C. fasciatus** Linn., 1766, Syst., I, 378.  
Southern States.
- (C) **C. erythrogaster** Holbr., 1838, Herp., II, 91, pl. 19.  
Southeastern States.
- (D) **Trop. rhombifer** B. & G., 1852, Pr. Phil. Ac., 177.  
Mississippi valley to Wisconsin.
- Trop. taxispilotes** Holbr., 1842, Herp., IV, 35, pl. 8.  
Southeastern States.
- T. cyclopion** D. & B., 1854, Erp., VII, 576.  
Ohio to Florida.
- Nerodia compressicauda** Kenn., 1860, Pr. Phil. Ac., 335.  
Florida.
- (REGINA.)
- Coluber leberis** Linn., 1758, Syst., I, 216.  
Michigan to Texas.
- (B) **C. rigidus** Say, 1825, Jour. Phil. Ac., 239.  
New York, southward and westward.
- (C) **Regina clarkii** B. & G., 1853, Serp., 48.  
Texas to Mexico.
- (D) **R. grahamii** B. & G., l. c., 47.  
Michigan to Texas.
- (E) **R. valida** Kenn., 1860, Pr. Phil. Ac., 334.  
California to Mexico.
- R. kirtlandi** Kenn., 1856, Pr. Phil. Ac., 95.  
Illinois to Ohio.
- STORERIA** B. & G., 1853, Serp., 135.
- Tropidoclonium storerioides** Cope, 1865, Pr. Phil. Ac., 190.  
Mexico.

**Tropidonotus occipitomaculatus** Storer, 1839, Rept. Mass. 230.

Mississippi valley and eastward.

**Trop. dekayi** Holbr., 1842, Herp., IV, 53, pl. 14.

Maine to Mexico.

**Adelophis copei** Cope, 1879, Pr. Am. Phil. Soc., 265.

Guadalaxara.

**Microps lineatus** Hallow., 1856, Pr. Phil. Ac., 241.

Texas to Kansas.

**HELICOPS** Wagler, 1830, Amph., 170.

**H. alleni** Grmn., 1874, Pr. B. N. H. Soc., 92.

Florida.

**HYDROPS** Wagl., 1830, Amph., 170.

**Coluber erythrogrammus** Latr., 1802, Rept., IV, 141.

Illinois and Virginia southward.

**C. abacurus** Holbr., 1836, Herp., I, 119, pl. 23.

North Carolina to Texas.

**Homalopsis quinquevittatus** D. & B., 1854, Erp., VII, 975.

Mexico; Central America.

**Calopisma septemvittatum** Fisch., 1879, Verh. Nat. Ver. Hamb., 84.

Mexico.

## COLUBRIDAE.

**SALVADORA** B. & G., 1853, Serp., 104. (Not preoccupied among animals.)

**S. grahamii** B. & G., l. c.

California to Mexico; Utah to Texas.

(B) **S. bairdii** Jan, 1861, Icon., livr. 1, pl. 3, f. 2.

Mexico.

(C) **Phymothya hexalepis** Cope, 1866, Pr. Phil. Ac., 305.

Arizona.

**Phym. decurtata** Cope, 1868, Pr. Phil. Ac., 310.

Lower California.

**CYCLOPHIS** Gthr., 1858, Cat. Serp., 119.

**Coluber vernalis** (De K.) Harl., 1827, Jour. Phil. Ac., 361.

Nova Scotia to Rocky Mountains.

**PHYLLOPHILOPHIS** Grmn., 1883, Mem. M. C. Z., Rept., 40, 146.

Maryland to Mexico.

**Coluber aestivus** Linn., 1766, Syst., I, 387.

**COLUBER** Linn., 1748, Syst., p. 34, —1758, Syst., I, 216, —1766, Syst., I, 375 (Part.).

(**BASCANIUM.**)

**Coluber constrictor** Linn., 1758, Syst., I, 216, —1766, Syst., I, 385.

Nova Scotia to Texas.

(**B**) **C. flaviventris** Say, 1823, Long's Exp., I, 185.

Mississippi valley west to Pacific.

**Coryphodon mentovarius** D. & B., 1854, Erp., VII, 187.

Mexico.

(**MASTICOPHIS.**)

**Coluber flagellum** Shaw, 1802, Zool., III, 475.

(**B**) **C. testaceus** Say, 1823, Long's Exp., 248.

Dakota to Texas and the Pacific.

(**C**) **Drymobius aurigulus** Cope, 1861, Pr. Phil. Ac., 301.

Lower California.

**Zamenis mexicanus** D. & B., 1854, Erp., VII, 695.

Mexico.

**Masticophis spinalis** Pet., 1866, Mb. Brl. Ak., 91.

Mexico.

**Leptophis taeniata** Hallow., 1852, Pr. Phil. Ac., 181.

Plains to the Pacific.

(**B**) **Masticophis bilineatus** Jan, Sist., 40.

Mexico.

**SPILOTES** Wagler, 1830, Amph., 179.

(**GEORGIA.**)

**Coluber couperi** Holbr., 1842, Herp., III, 75, pl. 16.

Gulf States.

**C. obsoletus** Holbr., l. c., 61, pl. 12.

Florida to Texas.

(**SPILOTES.**)

**Coluber corais** (Cuv.) Boie., 1827, Isis, 537.

Brazil to Mexico.

**C. variabilis** Max., 1825, Beitr., 271.

Mexico to Brazil.

(**B**) **Spilot. pullatus** var. **auribundus** Cope, 1861, Pr.

Phil. Ac., 300.

Mexico.

**S. melanurus** D. & B., 1854, Erp., VII, 224.

Mexico.

**S. poecilonotus** Gthr., 1858, Cat. Serp., 100.

Mexico.

**PITYOPHIS** Holbr., 1842, *Herp.*, IV, 7.**Coluber melanoleucus** Daud., 1803, *Rept.*, VI, 409.

East of the Mississippi, Ohio and Pennsylvania southward.

**C. catenifer** Blainv., 1835, *Nouv. Ann. Mus.*, IV, 290, pl. 26, f. 2.  
Oregon to Mexico.(B) **C. sayi** Schleg., 1837, *Ess.*, II, 157.  
Rocky Mountains to Illinois.(C) **P. mexicanus** D. & B., 1854, *Erp.*, VII, 236.  
Mexico.(D) **Elaphis deppei** D. & B., 1854, *Erp.*, VII, 268.  
Arizona to Mexico.(E) **Churchillia bellona** B. & G., 1852, *Stansb. Exp.*, 350.  
Utah basin.(F) **C. vertebralis** Blainv., 1835, l. c., 293, pl. 27, f. 2.  
Lower California.**ELAPHIS** Aldrov., 1640, *Serp. Drac.*, 267, —1765, reprint; Bonap., 1831, *Saggio*.

## (SCOTOPHIS.)

**Coluber obsoletus** Say, 1823, *Long's Exp.*, I, 140.  
Mississippi valley.(B) **C. alleghaniensis** Holbr., 1842, III, 219.  
New England to Alabama.(C) **S. lindheimeri** B. & G., 1853, *Serp.*, 74.  
Illinois to Texas.(D) **C. bairdi** Yarr., 1880, *Bull. U. S. Mus.*, 41.  
Fort Davis, Texas.(E) **S. confinis** B. & G., 1853, *Serp.*, 76.**C. guttatus** Linn., 1766, *Syst.*, I, 385.  
Virginia to Louisiana.(B) **S. vulpinus** B. & G., 1853, *Serp.*, 75.  
Massachusetts to Nebraska.**C. quadrivittatus** Holbr., l. c., 80, pl. 20.**DROMICUS** Bibr., 1843, *Rept. Cuba, Sagra*, 221.**D. laureatus** Gthr., 1868, *Ann. Mag.*, 419.  
City of Mexico.**D. flavilatus** Cope, 1871, *Pr. Phil. Ac.*  
Florida to North Carolina.**Herpetodryas margaritiferus** Schleg., 1837, *Ess.*, I, 151, II, 184.

Mexico; Central America.

**D. putnamii** Jan, 1863, *Sist.*, 67.  
Southern Mexico.

## CORONELLIDAE.

**TACHYMENIS** Wiegman, 1834, Act. Acad. Caes. Leop., 252.

**Tomodon lineatum** D. & B., 1854, Erp., VII, 936.  
Mexico.

**Taeniophis imperialis** B. & G., 1855, Gilliss' Exp., II, 215.  
Texas and Mexico.

**Coniophanes lateritia** Cope, 1861, Pr. Phil. Ac., 524.  
Guadalajara.

**Coniophanes proterops** Cope, 1860, Pr. Phil. Ac., 249.  
Mexico; New Granada.

**Coronella fissidens** Gthr., 1858, Cat. Serp., 36.  
Mexico.

**Coronella bipunctata** Gthr., l. c.  
Mexico.

**T. melanocephala** Pet., 1869, Mb. Brl. Ak., 876.  
Mexico.

**ERYTHROLAMPRUS** Boie, 1826, Isis, 981.

**E. guentheri** Grmn., 1883, Mem. M. C. Z., Rept., 63.  
= **E. venustissimus** var. **D** Gthr., 1858, Cat., 48.  
"Mexico."

**OPHIBOLUS** B. & G., 1853, Serp., 82.

**Coluber doliatus** Linn., 1766, Syst., 1, 379.  
Southeastern States.

**Osceola elapsoidea** B. & G., 1853, Serp., 133.  
Southern States east of Mississippi river.

**C. triangulus** Boie, 1827, Isis, 537.  
Mississippi valley eastward to Canada.

(B) **C. calligaster** Harl., 1835, Med. Res., 122.  
Northern Mississippi valley.

(C) **O. triang.** var. **mexicanus** Grmn., 1883, Mem. M. C. Z., Rept., 66.  
San Luis Potosi.

(D) **O. doliatus** B. & G., 1853, Serp., 89.  
Nebraska and southward.

(E) **O. gentilis** B. & G., l. c., 90.  
Arkansas to Utah.

(F) **C. (Zacholus) zonatus** Blainv., 1835, Ann. Mus., IV, 293.  
California.

(G) **Lampropeltis annulata** Kenn., 1860, Pr. Phil. Ac., 329.  
Mexico.

- (H) **Coronella rhombomaculata** Holbr., 1842, *Herp.*, III, 103, pl. 23.

Southeastern U. S.

**Coluber getulus** Linn., 1766, *Syst.*, I, 382.

Southern States to Texas.

- (B) **Coronella sayi** Holbr., 1842, *Herp.*, III, 99, pl. 22.

Mississippi valley, Illinois to Texas.

- (C) **O. boylii** B. & G., 1853, l. c., 82.

California to Mexico.

- (D) **O. splendidus** B. & G., l. c., 83.

Arizona and southern California to Mexico.

- (E) **O. pyrrhomelanus** Cope, 1866, *Pr. Phil. Ac.*, 305.

Arizona; Sonora.

**LIOPHIS** Wagl., 1830, *Amph.*, 187.

**Pliocercus elapoides** Cope, 1860, *Pr. Phil. Ac.*, 253.

Mexico.

**DIADOPHIS** B. & G., 1853, *Serp.*, 112.

**Enicognathus annulatus** D. & B., 1854, *Erp.*, VII, 335, pl. 80, f. 1-3.

Mexico.

**Coronella decorata** Gthr., 1858, *Cat. Serp.*, 35.

Southern Mexico.

**Rhadinea fulvivitta** Cope, 1875, *Jour. Phil. Ac.*, 139.

Southern Mexico.

**Coluber punctatus** Linn., 1766, *Syst.*, I, 376.

Southern and Eastern States to Nova Scotia.

- (B) **D. arnyi** Kenn., 1859, *Pr. Phil. Ac.*, 99.

Illinois to Arkansas.

- (C) **D. docilis** B. & G., 1853, *Serp.*, 114.

Texas to Mexico.

- (D) **D. amabilis** B. & G., l. c., 113.

Arizona to California.

**D. regalis** B. & G., l. c., 115.

Mexico.

**RHINOCEILUS** B. & G., 1853, *Serp.*, 120.

**R. lecontei** B. & G., l. c., 120, 161.

Texas to California.

- (B) **R. lecontei** var. **tesselatus** Grmn., 1883, *Mem. M. C. Z.*, Rept., 74.

Mexico.

**HETERODON** (Pal. de Beauv., 1799) Latr., 1802, *Rept.*, IV, 32.

**H. platyrhinus** Latr., l. c., 32, pl. 28, f. 1-3.

Eastern, Middle and Southern States.

- (B) **H. niger** Troost, 1836, Ann. N. Y. Lyc., 186.  
Southern States east of Mississippi river.
- Coluber simus** Linn., 1766, Syst., I, 375.  
Mississippi valley to the Atlantic.
- (B) **H. nasicus** B & G., 1852, Stansb. Exp., 352.  
California to Texas and Nebraska.
- (C) **H. kennerlyi** Kenn., 1860, Pr. Phil. Ac., 336.  
Sonora.
- CEMOPHORA** Cope, 1860, Pr. Phil. Ac., 244.
- Coluber coccineus** Blumenb., 1788, Licht. & Voigt. Mag.,  
pl. V.  
Southern States east of Texas.
- (B) **C. copei** Jan, 1863, Sist., 45.  
Tennessee.
- XENODON** Boie, 1827, Isis, 541.
- X. bertholdi** Jan, 1863, Arch. Zool., II, 108.  
Mexico.
- HYP SIGLENA** Cope, 1860, Pr. Phil. Ac., 246.
- H. ochrorhynchus** Cope, l. c.  
Lower California.
- (B) **H. chlorophaea** Cope, l. c.  
Arizona to Sonora.

#### CALAMARIDAE.

- FICIMIA** Gray, 1849, Cat. Serp., 80.
- Toluca frontalis** Cope, 1864, Pr. Phil. Ac., 167.  
Colima.
- Gyalopion canum** Cope, 1860, Pr. Phil. Ac., 243, 310.  
Arizona.
- Conopsis nasus** Gthr., 1858, Cat., 6.  
California.
- Toluca lineata** (Kenn.) Bd., 1859, Mex. Bound., II, Rept., 23,  
pl. 21, f. 2.  
Mexico.
- Oxyrhina maculata** Jan, 1862, Arch. Zool., II, 54, 61.  
Mexico.
- Amblymetopon variegatum** Gthr., 1858, Cat. Serp., 7.  
Mexico.
- F. olivacea** Gray, 1849, Cat. Serp., 80.  
Mexico.



**CHEILORHINA** Jan., 1862, Arch. Zool., II, 57.

**C. villarsii** Jan., l. c.

Western Mexico.

**STENORHINA** D. & B., 1854, Erp., VII, 865.

**S. freminvillei** D. & B., l. c., 868.

Central America and Mexico.

**Microphis quinquelineatus** Hallow., 1854, Pr. Phil. Ac., 97.  
Mexico.

**TANTILLA** B. & G., 1853, Serp., 131.

**T. gracilis** B. & G., l. c., 132, 161.

Texas.

(B) **T. hallowelli** Cope, 1860, Pr. Phil. Ac., 77.

Kansas.

(C) **T. calamarina** Cope, 1866, Pr. Phil. Ac., 320.

Guadalajara.

**T. nigriceps** Kenn., 1860, Pr. Phil. Ac., 328.

Texas; New Mexico.

**T. coronata** B. & G., 1853, Serp., 131.

Gulf States.

(B) **Homalocranion wagneri** Jan, 1862, Arch. Zool., II,  
50.

Florida.

**Coluber planiceps** Blainv., 1835, Ann. Mus., IX, 294, pl. 27, f. 3.

California.

**ELAPOMORPHUS** (Wieg.) Fitz., 1843, Syst., 25.

**E. mexicanus** Gthr., 1862, Ann. Mag., pl. 9, f. 1 (Extr., p. 6).

Mexico.

**CONTIA** B. & G., 1853, Serp., 110.

(SONORA.)

**S. semiannulata** B. & G., 1853, Serp., 110.

Sonora.

**Rhinostoma occipitale** Hallow., 1854, Pr. Phil. Ac., 95.

Arizona.

(B) **Lamprosoma annulatum** Bd., 1859, Mex. Bound.,

II, 22.

Arizona.

**C. isozona** Cope, 1866, Pr. Phil. Ac., 304.

Arizona to Utah.

(PROCINURA.)

**P. aemula** Cope, 1871, Pr. Phil. Ac., 223. (?Position).

Mexican plateau.

**(CONTIA.)**

**C. mitis** B. & G., 1853, Serp., 110.

California.

**Lamprosoma episcopum** Kenn., 1859, Mex. Bound., II, Rept., 22, pl. 8, f. 1.

Texas.

**LODIA** B. & G., 1853, Serp., 116.

**Calamaria tenuis** B. & G., 1852, Pr. Phil. Ac., 176.

Oregon and Washington Territory.

**NINIA** B. & G., Serp., 49.

**Chersodromus liebmanni** Reinh., 1860, Vid. Medd. Kjobenh., 35, pl. IV, f. 10, 11.

Vera Cruz; Mexico.

**Streptophorus sebae** D. & B., 1854, Erp., VII, 515.

Mexico.

**S. sebae** var. **collaris** Jan, 1865, Icon., livr. 12, pl. 3, f. 6.

Mexico.

**Elapoides sieboldi** Jan, 1862, Arch. Zool., II, 21.

Mexico.

**N. dimidiata** B. & G., 1853, Serp., 49.

Mexico.

**VIRGINIA** B. & G., 1853, Serp., 127.

**Coluber striatulus** Linn., 1766, Syst., I, 375.

Virginia to Texas.

**V. inornata** Grmn., 1883, Mem. M. C. Z., Rept., 97.

Texas.

**V. elegans** Kenn., 1859, Pr. Phil. Ac., 99.

Southern Illinois.

**V. valeriae** B. & G., l. c., 127.

Maryland to Georgia and Illinois.

**(B) Carphophis harperti** D. & B., 1854, Erp., VII, 135.

Georgia to Texas.

**CARPHOPHIS** Gerv., 1843, D'Orb. Dict. N. Hist., III, 191.

**Chilomeniscus stramineus** Cope, 1861, Pr. Phil. Ac., 33.

Lower California.

**Chilom. cinctus** Cope, l. c., 303.

Guaymas.

**Celuta helenae** Kenn., 1859, Pr. Phil. Ac., 100.

Illinois to Mississippi.

**Carphophis amoena** Gerv., 1843, l. c., 191.

Massachusetts to Illinois and southward.

**(B) Celuta vermis** Kenn., 1859, Pr. Phil. Ac., 99.

Missouri and southward.

**GEOPHIS** Wagler, 1830, Amph., 342.

**Rabdosoma semidoliatum** D. & B., 1854, Erp., VII, 93.  
Mexico.

**G. bicolor** Gthr., 1868, Ann. Mag., 413.  
Valley of Mexico.

**G. latifrontalis** Grmn., 1883, Mem. M. C. Z., Rept., 103.  
San Luis Potosi.

**G. unicolor** Fisch., 1881, Abh. Nat. Ver. Brem., VII, 227, pl.  
xv, f. 1-3.  
Mexico.

**Sympholis lippiens** Cope, Pr. Phil. Ac., 524.  
Guadalajara.

## TOXICOPHIDIA.

## PROTEROGLYPHA.

### CONOCERCA.

### ELAPIDAE.

**ELAPS** Schneid., 1801, Amph., 289.

**Coluber fulvius** Linn., 1766, Syst., I, 381.  
Southern States east of the Mississippi.

(B) **E. nigrocinctus** Grd., 1854, Pr. Phil. Ac., 226.  
Central America to Mexico.

(C) **E. affinis** Jan, 1859, Rev. and Mag. Zool., 6, 14, pl. B,  
f. 2.  
Mexico.

(D) **E. bipunctiger** D. & B., 1854, Erp., VII, 1227.  
Mexico; Florida.

(E) **E. tenere** B. & G., 1853, Serp., 22, 156.  
Texas.

(F) **E. apiatus** Jan, 1859, l. c., pp. 6, 11, pl. A, f. 4.  
Vera Cruz.

(G) **E. epistema** D. & B., 1854, Erp., VII, 1222.  
Mexico.

(H) **E. diastema** D. & B., l. c., 1222.  
Mexico.

(I) **E. cerebripunctatus** Pet., 1869, Mb. Brl. Ak., 877.  
Pueblo.

**E. euryxanthus** Kenn., 1860, Pr. Phil. Ac., 337.  
Arizona to Mexico.

**E. maregravii** var. **laticollaris** Pet., 1869, Mb. Brl. Ak.  
Pueblo.

**E. decoratus** Jan, 1859, l. c., pp. 7, 14, pl. B, f. 5.  
Mexico.

**E. elegans** Jan, l. c., pp. 6, 13, pl. B, f. 1.  
Mexico.

## PLATYCERCA.

### HYDROPHIDAE.

**PELAMIS** Daud., 1803, Rept., VII, 357.

**Anguis platyra** Linn., 1766, Syst., I, 391.

West coast of Mexico and Central America to East  
Indies and China.

## SOLENOGLYPHA.

### BOTHROPHERA.

#### CROTALIDAE.

**CROTALUS** Linn., 1754, Mus. Ad. Fridr., 39.

**C. durissus** Linn., 1758, Syst., I, 214.

Brazil to Mexico.

(B) **C. molossus** B. & G., 1853, Serp., 10.

North Mexico; Arizona; New Mexico.

(C) **Caudisona basilisca** Cope, 1864, Pr. Phil. Ac., 166.

Western Mexico.

**C. adamanteus** Beauv., 1799, Trans. Ann. Phil. Soc., IV, 368.

Texas to North Carolina.

(B) **Caudisona scutulatus** Kenn., 1861, Pr. Phil. Ac., 207.

Arizona; Mexico.

(C) **Crotalus atrox** B. & G., l. c., 5, 156.

Texas to Mexico.

**C. confluentus** Say, 1823, Long's Exp., II, 48.

Dakota to Texas.

(B) **Caudisona pyrrha** Cope, 1866, Pr. Phil. Ac., 308, 310.

Arizona.

**C. oregonus** Holbr., 1842, III, 21, pl. 3.

Oregon to California.

(B) **C. lucifer** B. & G., 1852, Pr. Phil. Ac., 177.

California to Mexico.

(C) **C. lucifer** var. **cerberus** Coues, 1875, Wheeler's Rep.,  
V, 607.

Arizona.

(D) **Caudisona mitchellii** Cope, 1861, Pr. Phil. Ac., 293.  
Lower California.

(E) **Caud. enyo** Cope, l. c., 293.  
Lower California.

**Crotalus exsul** Grmn., 1883, Mem. M. C. Z., Rept., 114.  
Cedros Island.

**C. horridus** Linn., 1758, Syst., I, 214.  
New England to Texas.

**C. cerastes** Hallow., 1854, Pr. Phil. Ac., 95.  
California; Arizona; Mexico.

?**Caudisona lepida** Kenn., 1861, Pr. Phil. Ac., 206.  
Mexico.

**Crotalus tigris** (Kenn.) Bd., 1859, Mex. Bound., II, Rept., 14,  
pl. 4.

Mexico.

**C. triseriatus** Wieg., 1828, Mus. Berl.  
Mexico.

(B) **C. jimenezii** Duges, 1879, La Naturelleza, IV, 23.  
Mexico.

**SISTRURUS** Grmn., 1883, Mem. M. C. Z., Rept., 110, 118, 176.

**Crotalinus catenatus** Raf., 1818, Am. Month. Mag., IV, 41.  
Ohio and Michigan to the Plains and south to Missis-  
sippi.

(B) **Crotalophorus consors** B. & G., 1853, Serp., 12.  
Texas.

**Crotalus miliarius** Linn., 1766, Syst., I, 372.  
Southern States.

(B) **Crotaloph. edwardsii** B. & G., l. c., 15.  
Texas; Arizona; Sonora; Mexico.

(C) **Crotalus ravus** Cope, 1865, Pr. Phil. Ac., 191.  
Mexican plateau.

**Crotalus intermedius** Fisch., 1881, Abh. Nat. Ver. Brem.,  
VII, 230, pl. XIV, f. 1-4.  
Mexico.

**ANCISTRODON** Pal. de Beauv., 1799, Trans. Am. Phil. Soc., IV,  
381.

**Coluber contortrix** Linn., 1758, Syst., I, 216.  
Mississippi valley to New England.

(B) **Acontias atrofuscus** Troost., 1836, Ann. N. Y. Lyc.,  
181. Mountains from Virginia southward.

**Crotalus piscivorus** LaC., 1789, Quad. Ovip. Serp., II, pp.  
130, 424.

South Carolina to Texas.

- (B) **Toxicophis pugnax** B. & G., 1853, Serp., 20, 156.  
Texas.
- A. bilineatus** Gthr., 1863, Ann. Mag., 364.  
West Mexico; Tehuantepec.

## BATRACHIA.

### APODA.

#### CAECILIIDAE.

- DERMOPHIS** Pet., 1879, Mb. Brl. Akad., 937.
- Siphonops mexicanus** D. & B., 1841, Erp., VIII, 284.  
Mexico.

## CAUDATA.

### SIRENIDAE.

- SIREN** Linn., 1766, Act. Acad. Upsal. (dissert. auct. Osterdam), 15.  
**S. lacertina** Linn., 1766, l. c.  
North Carolina to Illinois and Mexico.
- PSEUDOBANCHUS** Gray, 1825, Ann. Phil., 216.  
**Siren striata** LeC., 1824, Ann. Lyc. N. Y., I, 54, pl. 4.  
South Carolina; Georgia; Simahmoo Bay, Washington  
Territory (Yarrow).

### PROTEIDAE.

- NECTURUS** Raf., 1819, Jour. Phys., Vol. 88, 417.  
**N. maculatus** Raf., l. c.  
Mississippi valley and eastward; Canada.
- Menobranchus punctatus** Gibbes, 1853, Jour. B. N. H. Soc.,  
369.  
North Carolina; South Carolina.

### AMPHIUMIDAE.

- AMPHIUMA** Linn., Garden, 1821, Linn. Corresp., Smith, 333.  
**A. means** Linn., 1821, l. c., 333, 532, 599.  
North Carolina to Louisiana.
- A. tridactyla** Cuv., 1828, Mem. Mus., XIV, pl. 1.

**CRYPTOBRANCHUS** Leuck., 1821, Isis, 257.

**Salamandra alleghaniensis** Latr., 1802, Rept., II, 253 (index).  
New York to Missouri.

**Menopoma fusca** Holbr., 1842, Herp., V, 99, pl. 33.  
Pennsylvania to Louisiana.

**SALAMANDROIDEA.****AMBLYSTOMATIDAE.****AMBLYSTOMA** Tschudi, 1838, Batr., 57.

**Salamandra opaca** Gravenh., 1807, Ueb. Zool. Syst., 431.  
New Hampshire to Mexico.

**S. talpoidea** Holbr., 1842, Herp., V, 73, pl. 24.  
South Carolina to Louisiana.

**S. tigrina** Green, 1825, Jour. Phil. Ac., V, 116.  
Mississippi valley to New Jersey.

(B) **A. bicolor** Hallow., 1857, Pr. Phil. Ac., 215.  
New Jersey.

(C) **A. mavortium** Bd., 1849, Jour. Phil. Ac., I, 292.  
Dakota to Mexico.

(D) **A. californiense** Gray, 1853, Pr. Z. S. Lond., 11, pl. 7.  
California.

(E) **A. trisruptum** Cope, 1867, Pr. Phil. Ac., 194.  
Colorado to New Mexico.

(F) **A. xiphias** Cope, 1867, l. c., 192.  
Ohio.

(G) **A. obscurum** (Bd.) Cope, l. c., 192.  
Iowa.

**Lacerta punctata** Linn., 1766, Syst., 370.  
Maine to Texas.

**A. macrodactylum** Bd., 1849, Jour. Phil. Ac., 292.  
Oregon.

**A. paroticum** (Bd.) Cope, 1867, Pr. Phil. Ac., 200.  
Oregon; Puget sound.

**A. aterrimum** Cope, 1867, Pr. Phil. Ac., 201 (s. d.).  
Rocky mountains.

**A. tenebrosum** B. & G., 1852, Pr. Phil. Ac., 174.  
Oregon.

**A. conspersum** Cope, 1859, Pr. Phil. Ac., 123.  
Carlisle, Pennsylvania.

**Salamandra texana** Matthes, 1855, Alg. Deutsch. Nat. Zeit.,  
266.(?)

- S. jeffersoniana** Green, 1827, Cont. Macl. Lyc., 4.  
New England and Canada to Illinois.
- (B) **A. laterale** Hallow., 1858, Jour. Phil. Ac., III, 352.  
Canada to Wisconsin.
- (C) **A. platineum** Cope, 1867, Pr. Phil. Ac., 198.  
Ohio.
- (D) **A. fuscum** Hallow., 1858, l. c., 355.  
Indiana; Virginia.
- A. cingulatum** Cope, 1867, Pr. Phil. Ac., 205 (s. d.).  
South Carolina.
- A. microstomum** Cope, 1867, l. c., 206.  
Louisiana to Ohio.
- Gyrinus mexicanus** Shaw, 1800, Nat. Misc., 343.  
Mexico.
- Axolotes maculata** Owen, 1844, Ann. Mag., XIV, 23. (?)  
Mexico.
- DICAMPTODON** Strauch, 1870, Mem. Acad. Imp. St. Petersb.  
(4), XVI, 68.
- Triton ensatus** Eschsch., 1833, Zool. Atlas, pt. 5, p. 6, pl. 22.  
California.

## PLETHODONTIDAE.

- ANAIDES** Bd., 1849, Icon. Encycl., II, 256.
- Salamandra lugubris** Hallow., 1848, Jour. Phil. Ac. (2), I, 126.  
California.
- A. ferreus** Cope, 1869, Pr. Phil. Ac., 109.  
Oregon.
- PLETHODON** Tschudi, 1838, Batr., 92.
- Heredia oregonensis** Grd., 1856, Pr. Phil. Ac., 235.  
Oregon; California.
- P. flavipunctatus** Strauch, 1870, Salamand., 71.  
California.
- Salamandra glutinosa** Green, 1818, Jour. Phil. Ac., I, 357.  
Louisiana to Wisconsin and east.
- P. croceator** Cope, 1867, Pr. Phil. Ac., 210.  
Fort Tejon, California.
- P. intermedius** (Bd.) Cope, l. c., 209.  
Vancouver's island.
- S. erythronota** Green., 1818, Jour. Phil. Ac., 356.  
Wisconsin to Canada.
- (B) **S. cinerea** Green, l. c., 356.  
Indiana; Pennsylvania; Canada.



(C) **P. dorsalis** Baird.

Kentucky.

**P. iecanus** (Cope) Yarrow, 1883, (?)

**HEMIDACTYLIUM** Tschudi, 1838, *Batr.*, 59, 94.

**Salamandra scutata** Schleg., 1838, *Fauna Japon.*, *Amph.*, 119.  
Canada to Texas.

**Salamandrina attenuata** Eschsch., 1833, *Zool. Atl.*, pt. V, 1,  
pl. 21.

California.

**H. pacificum** Cope, 1865, *Pr. Phil. Ac.*, 195.

California.

**Batrachoseps nigriventris** Cope, 1869, *Pr. Phil. Ac.*, 98.

California.

**GEOTRITON** Bonap., 1831, *Saggio*, 84 (*Spelerpes* Raf., 1832).

**Salamandra rubra** Latr., 1802, *Rept.*, IV, 305.

Missouri to Florida.

(B) **Pseudotriton montanus** Bd., 1849, *Jour. Phil. Ac.*

(2), I, 293.

New York to South Carolina.

(C) **Spelerpes sticticeps** Baird.

Mexico.

**Salam. longicauda** Green, 1818, *Jour. Phil. Ac.*, I, 351.

Ohio to Georgia.

**Sal. guttolineata** Holbr., 1842, *Herp.*, V, 29, pl. 7.

Ohio to Georgia.

**Sal. bilineata** Green, 1818, *Jour. Phil. Ac.*, I, 352.

Florida to Ohio.

**Sal. variegata** Gray, 1831, *Synops.*, 107.

City of Mexico to Central America.

**Spelerp. multiplicatus** Cope, 1869, *Pr. Phil. Ac.*, 106.

Arkansas.

**S. lineolus** Cope, 1865, *Pr. Phil. Ac.*, 197. (?)

Vera Cruz; Orizaba.

**S. chiropterus** Cope, 1863, *Pr. Phil. Ac.*, 54. (?)

Mexico.

**S. cephalicus** Cope, 1865, *Pr. Phil. Ac.*, 196.

Mexico.

**S. leprosus** Cope, *Pr. Phil. Ac.*, 105.

Vera Cruz; Oaxaca; Orizaba.

**S. belli** Gray, 1859, *Batr. Grad.*, 46.

Mexico.

**Oedipus rufescens** Cope, 1869, *Pr. Phil. Ac.*, 104.

Vera Cruz.

- O. morio** Cope, l. c., 103.  
Mexico.
- Pseudotriton marginatus** Hallow., 1856, Pr. Phil. Ac., 130.  
Georgia.
- Salam. porphyritica** Green, 1827, Macl. Lyc., I, 3, pl. 1, f. 2.  
Ohio to Massachusetts and Georgia.
- Spelerp. laticeps** Broc., 1883, Miss. Sci. Mex., Batr., 110, pl. 18, f. 1.  
Vera Cruz.
- Bolitoglossa mexicana** D. & B., 1854, Erp., IX, 93, pl. 104, f. 1.  
Mexico.
- MANCULUS** Cope, 1869, Pr. Phil. Ac., 101.
- Salamandra quadrigitata** Holbr., 1842, Herp., V, 65, pl. 21.  
North Carolina to Florida.
- M. remifer** Cope, 1869, Rep. Peab. Ac., 84.  
Florida.

## DESMOGNATHIDAE.

- DESMOGNATHUS** Bd., 1849, Jour. Phil. Ac. (2), I, 282.
- Triturus fuscus** Raf., 1820, Ann. of Nat. (Bd.).  
New York to Louisiana.
- (B) **S. auriculata** Holbr., l. c., 47, pl. 12.  
Ohio to Georgia.
- Salam. nigra** Green, 1818, Jour. Phil. Ac., I, 352.  
Illinois to Georgia.
- \* **S. quadrimaculata** Holbr., 1842, Herp., V, 49, pl. 13.  
Florida to New York.
- D. ochrophaea** Cope, 1859, Pr. Phil. Ac., 124.  
New York to Georgia.
- THORIUS** Cope, 1869, Am. Nat., 222.
- T. pennatulus** Cope, l. c.  
Mexico.

## SALAMANDRIDAE.

- DIEMYCTYLUS** Raf., 1820, Ann. Nat., No. 22.
- Triturus (Notophthalmus) miniatus** Raf., l. c.  
Canada to Texas.
- (B) **T. (Diemyctylus) viridescens** Raf., l. c.  
Canada to Texas.
- Triton torosus** Eschsch., 1833, Zool. Atlas, V, 12, pl. 21, f. 15.  
Oregon; California.

## ECAUDATA.

## RANIDAE.

**RANA** Linn., 1735, Syst., —1758, Syst., I, 210, —1766, Syst., I, 354.

**R. catesbeiana** Shaw, 1802, Zool., III, 106.

Mississippi valley to the Atlantic.

(B) **R. horiconensis** Holbr., 1842, Herp., IV, 83, pl. 19.

New York; Canada.

**R. clamitans** Latr., 1801, Rept., II, 157.

New England to Texas.

(B) **R. septentrionalis** Bd., 1854, Pr. Phil. Ac., 61.

Canada to Montana.

**R. montezumae** Bd., 1854, Pr. Phil. Ac., 61.

City of Mexico.

**R. virescens** Kalm, 1761, Resa N. Amer., III, 46 (*halecina* auct.).

Mexico; United States and northward.

(B) **R. berlandieri** Bd., 1859, Mex. Bd. Surv., Rept., 27, pl. 26, f. 7-10.

Mississippi valley; Dakota to Mexico.

(C) **R. nigricans** Hallow., 1854, Pr. Phil. Ac., 96.

El Paso creek, California.

(D) **R. areolata** B. & G., 1852, Pr. Phil. Ac., 173.

Texas.

(E) **R. capito** LeC., 1855, Pr. Phil. Ac., 425, pl. 5.

Illinois to Florida.

(F) **R. sinuata** Bd., 1854, Pr. Phil. Ac., 61 (*circulosa* Jord.).

New York to Michigan.

(G) **R. lecontei** B. & G., 1853, Pr. Phil. Ac., 301.

**R. palustris** LeC., Ann. Lyc. N. Y., I, 282.

Missouri to the Atlantic.

**R. silvatica** LeC., l. c., 282.

Mississippi valley to Atlantic.

(B) **R. cantabrigensis** Bd., 1854, Pr. Phil. Ac., 61.

Canada to Saskatchewan; New England.

(C) **R. aurora** B. & G., 1852, Pr. Phil. Ac., 174.

California; Oregon.

**R. pretiosa** B. & G., 1853, Pr. Phil. Ac., 378.

Puget sound.

**R. maculata** Brocchi, 1876, Bull. Soc. Philom. (7), I, 178. ?

Mexico.

**R. adtrita** Trosch., 1865, Wirbelth. Mex., 82 ?  
Mexico.

**R. pachyderma** Cope ?

#### ENGYSTOMATIDAE.

**ENGYSTOMA** Fitz., 1826, Neue Class., 65.

**E. carolinense** Holbr., 1838, Herp., I, 83, pl. 2.  
South Carolina to Missouri and Florida.

**E. ustum** Cope, 1866, Pr. Phil. Ac., 131.  
Mexico.

**E. elegans** Blgr., 1882, Cat. Batr. Sal., 162.  
Cordova, Mexico.

**E. rugosum** D. & B., 1841, Erp., VIII, 744.  
Mexico.

#### CYSTIGNATHIDAE.

**HYLODES** Fitz., 1826, Neue Class., 38.

**H. ricordii** D. & B., 1841, Erp., VIII, 623.  
Southern Florida.

**Lithodytes latrans** Cope, 1878, Amer. Nat., 186 ?  
Texas.

**Syrrhophus marnockii** Cope, l. c., 253. ?  
Texas.

**H. berkenbuschii** Pet., 1869, Mb. Berl. Akad., 879.  
Mexico.

**Batrachyla longipes** Bd., 1859, Mex. Bd. Surv., II, pl. 37.?  
California to British America.

#### BUFONIDAE.

**BUFO** Laur., 1768, Syst., 25.

**Rana lentiginosa** Shaw, 1802, Zool., III, 173.  
North Carolina to Colorado and Florida.

(B) **B. americanus** (LeC.) Holbr., Herp., V, 17.  
Nova Scotia to Dakota, and southward.

(C) **B. fowleri** Putnam, Rep. Peab. Ac.

This is an **americanus** of moderate size and with frontal ridges low, close together, and nearly or quite parallel.  
Voice peculiar.

Manitoba to Winnipeg; Massachusetts.

(D) **B. cognatus** Say, 1823, Long's Exp., II, 190.  
Arkansas; Colorado; Dakota.

(E) **B. frontosus** Cope, 1866, Pr. Phil. Ac., 301.  
Colorado; Utah; New Mexico.

- (F) *B. dorsalis* Hallow., 1852, Pr. Phil. Ac., 181.  
New Mexico.
- (G) *B. speciosus* Grd., 1854, Pr. Phil. Ac., 86.  
Texas; New Mexico.
- (H) *B. microscaphus* Cope, 1866, Pr. Phil. Ac., 301.  
Colorado; Utah; California.
- (I) *B. pictus* Yarr., 1875, Wheeler's Rept., V, 522.  
Utah.
- (J) *B. mexicanus* Broc., 1879, Bull. Soc. Philom. (7), III,  
23.  
Mexico.
- B. punctatus* B. & G., 1852, Pr. Phil. Ac., 173.  
Texas; Mexico; Arizona.
- B. debilis* Grd., 1854, Pr. Phil. Ac., 87.  
Tamaulipas.
- B. halophila* B. & G., 1853, Pr. Phil. Ac., 301.  
California.
- B. columbiensis* B. & G., 1853, l. c., 378.  
Oregon and Washington Territory.
- B. valliceps* Wieg., 1833, Isis, 657.  
Louisiana to Mexico.
- B. compactilis* Wieg., l. c., 661       ?  
Texas; Mexico; Peru.
- B. dipternus* Cope, 1879, Am. Nat., XIII, 437       ?  
Montana.
- B. monksiae* Cope, 1879, Pr. Am. Phil. Soc., 263       ?
- B. copeii* Yarr. & Hensh., 1878, Rept. & Batr., W. 100 Merid., 4.  
Selkirk and James bay, British America.
- B. beldingii* Yarr., 1882, Pr. U. S. Mus., 441.  
La Paz, California.
- B. quercicus* Holbr., 1842, Herp., V, 13.  
North Carolina to Florida.
- B. occipitalis* Camerano, ———, Atti Ac. Torin, 889, XIV       ?  
Mexico.
- B. bocourti* Broc., 1876, Bull. Soc. Philom. (7), I, 186.  
Totonicapam, Mexico.
- B. argillaceus* Cope, 1868, Pr. Phil. Ac., 138       ?  
Western Mexico.

## HYLIDAE.

**CHOROPHILUS** Baird, 1854, Pr. Phil. Ac., 60.

*Hyla triseriata* Wied., 1839, Reise N. Amer., I, 249.  
New Jersey; Colorado.

- (B) **Helocaetes clarki** Bd., 1854, Pr. Phil. Ac., 60.  
Texas.
- (C) **C. triseriatus** subspecies *corporalis* Cope, 1875, Check-list ?  
New Jersey.
- Rana nigrita** LeC., 1824, Ann. N. Y. Lyc., I, 282.  
South Carolina; Florida.
- Cystignathus ornatus** Holbr., 1842, Herp., IV, 103, pl. 25.  
South Carolina; Georgia.
- Hylodes ocularis** Holbr., l. c., 137, pl. 35.  
South Carolina; Georgia.
- C. copii** Blgr., 1882, Cat. Bat. Sal., 334.  
Georgia.
- C. septentrionalis** Blgr., l. c., 335, pl. 23, f. 1.  
Great Bear lake.
- C. verrucosus** Cope, 1877, Pr. Am. Phil. Soc., 87 ?  
Florida.
- ACRIS** D. & B., 1841, Erp., VIII, 506.
- Rana gryllus** LeC., 1824, Ann. N. Y. Lyc., I, 282.  
Illinois; North Carolina to Florida.
- (B) **A. crepitans** Bd., 1854, Pr. Phil. Ac., 59.  
Maine to Dakota and Texas.
- (C) **A. achetae** Bd., l. c., 59.  
Key West, Florida.
- (D) **A. bufonia** Blgr., 1882, Cat. Bat. Sal., 337.  
New Orleans.
- HYLA** Laur., 1768, Rept., 32.
- Calamita cinerea** Schn., 1799, Amph., I, 174.  
This is the *H. carolinensis* of authors, = the cinereous frog of Pennant, 1792, Arct. Zool., II, 331.  
North Carolina to Florida.
- (B) **H. semifasciata** Hallow., 1856, Pr. Phil. Ac., 306.  
South Carolina; Texas.
- H. affinis** Bd., 1854, Pr. Phil. Ac., 61. ?  
Sonora.
- H. gratioiosa** LeC., 1856, Pr. Phil. Ac., 146, pl. VI.  
Georgia; Florida.
- H. versicolor** LeC., 1824, Ann. Lyc. N. Y., I, 281.  
Texas; Wisconsin; Massachusetts.
- H. femoralis** Daud., 1803, Rainettes, 15, pl. 1, f. 1.  
Georgia; Florida.
- H. squirella** Daud., l. c., pl. 14, f. 3.  
South Carolina; Florida.

- H. andersoni** Bd., 1854, Pr. Phil. Ac., 61.  
Maryland; South Carolina.
- H. eximia** Bd., l. c., 61.  
New Mexico; Mexico.
- H. regilla** B. & G., 1852, Pr. Phil. Ac., 174.  
Mexico; Oregon; Nevada.
- H. baudinii** D. & B., 1841, Erp., VIII, 564.  
Texas; Central America.
- H. nigropunctata** Blgr., 1882, Cat. Batr. Sal., 366.  
Cordova; Jalapa; Vera Cruz.
- H. crassa** Broc., 1876, Bull. Soc. Philom. (7), I, 130.  
Mexico.
- H. plicata** Broc., l. c.  
Mexico.
- H. cadaverina** Cope, 1866, Pr. Phil. Ac., 84 ?  
California.
- H. arenicolor** Cope, l. c.  
Utah; Sonora.
- H. curta** Cope, l. c., 313.  
Lower California.
- H. miotympanum** Cope, 1863, Pr. Phil. Ac., 47 ?  
Jalapa, Mexico.
- H. gracilipes** Cope, 1865, l. c., 195 ?  
Northeastern Mexico tableland.
- H. bistincta** Cope, 1877, Pr. Am. Phil. Soc., 87 ?  
Vera Cruz.
- Hylodes pickeringii** Holbr., 1842, Herp., IV, 135, pl. 34.  
Maine; Illinois; South Carolina.

**PHYLLOMEDUSA** Wagl., 1830, Syst. Amph., 201.

- P. dacinicolor** Cope, 1864, Pr. Phil. Ac., 181.  
Colima.

**PELOBATIDAE.**

**SCAPHIOPUS** Holbr., 1838, Herp., I, 85.

- S. solitarius** Holbr., l. c., 85, pl. 12.  
Massachusetts; Florida; Mississippi.
- (B) var. **albus** Garman, 1877, Pr. A. A. A. S., Buffalo meeting, 194.

Average size less than that of preceding. Brown of the back lacks the red or chocolate tinge. Readily distinguished by the great amount of white on back, flanks and upper surface of limbs. The white forms spots or vermiculations which coalesce into bands of irregular shape and extent.

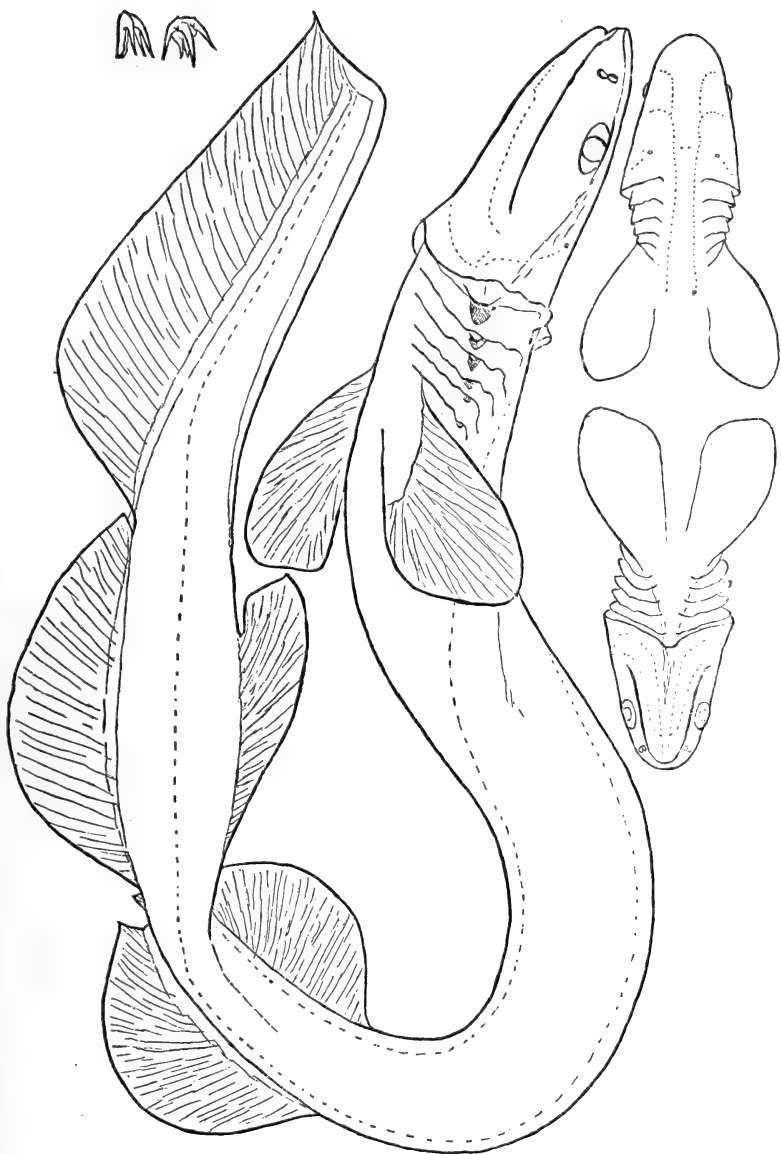
Key West, Florida.

- S. couchii** Bd., 1855, Pr. Phil. Ac., 52.  
Texas; Utah; California.
- (B) **S. varius** Cope, 1863, Pr. Phil. Ac., 52.  
Utah; Lower California.
- (C) **S. rectifrenis** Cope, l. c., 52.  
Tamaulipas; Coahuila.
- S. multiplicatus** Cope, l. c.  
Mexico.
- S. hammondi** Bd., 1859, P. R. R. Rep., X, pt. 4. 12, pl. 27, f. 2.  
California.
- S. bombifrons** Cope, 1863, Pr. Phil. Ac., 53.  
Missouri; Nebraska; Texas.
- S. dugesi** Broc., 1879, Bull. Soc. Philom. (7), III, 23.  
Mexico.
- Spea stagnalis** (Cope) Yarr., 1875, Wheeler's Rep., V, 525, pl. 25, f. 6-8.  
New Mexico.
- Scaphiop. intermontanus** (Cope) Yarr., 1883, Checklist, 26. ?



# AN EXTRAORDINARY SHARK.

BY SAMUEL GARMAN.



CHLAMYDOSELACHUS ANGUINEUS.

*Measurements.*—Total length 59.5; snout to angle of mouth 4.5, to back of skull 4.25, to occipital pores 3.9, to end of gill covers 7., to end of pectorals 14.25, to vent 35.5, to base of ventrals 32., to end of ventrals 38.6, to base of anal 39.75, to end of anal 47.6, to base of dorsal 42.25, to end of dorsal 47.75, to base of caudal 48.5; greatest width across ventrals 7., greatest width across caudal 5., greatest width across dorsal and anal 6.5, greatest circumference of body 11.5, width of head across eyes 3.5, width of teeth between the outer prongs (length of longest prong little less) .25 inches.

Rows of teeth  $\frac{1}{3}$  · 9 ·  $\frac{1}{3}$ .

Rays on hyomandibular and ceratohyal (first branchial arch) 22, on second arch 15, third 14, fourth 12, fifth 9, sixth 6, and on the seventh none.

Hab., Japanese seas.

*Description.* Body very long, slender, eel-like, increasing in size comparatively little anteriorly, compressed near and behind the vent, which is in the posterior half of the total length. Head broad, wider than high. Crown slightly convex forming a rather sharp angle with the snout and sides of the head, from the eyes forward. Skull with an anterior foramen, beginning a short distance in front of a vertical from the front edge of the orbit, resembling that of *Raja*. Behind this, midway between the eyes, there is an elongate depression on the crown as of a second foramen, while on the occiput a little distance in front of the occipital pores a deep rounded depression indicates what is commonly called the second, the posterior foramen. Snout broad, rounded, hardly extending in front of the jaws, rather acute-angled or shovel-shaped at the top. Nostril moderate, vertical, separated by a fold from each side into an upper opening looking forward and a lower one looking backward, situated about midway from eye to end of snout and near the middle of the space from top of head to mouth. Eye moderately large, orbit elongate, near a vertical from the middle of the length of the mouth. Spiracle very small, over the hyomandibular; its distance behind the eye equal to that from eye to

end of snout. Mouth cleft very deep, slightly curved, extending as far back as the skull. Roof and floor of mouth covered with sharp scales, the former curving upward very strongly behind the teeth between the nostrils. Upper and lower jaws about equal in length. Lips without a groove or labial fold. Glossohyal cartilage (basihyal) prominent above the floor of the mouth and free at its extremity about half an inch, forming a tongue. Teeth small, similar in both jaws, several in each row in function at the same time, each with three long, smooth, curved, backward directed, slender, very sharp cusps — each of which bears some resemblance to a serpent's tooth. A small cusp on the base at each side of the central. Bases of teeth broad, extending inward about the length of the cusps, terminating in two prongs (see fig.) which, extending beneath the base of the next tooth, prevent the possibility of reversion or turning the cusps forward. Fourteen rows of teeth on each side on the upper jaws, no median series. A median row on the symphysis of the lower jaws, its teeth similar in size and shape to those of the thirteen rows on each side of it. Hyomandibular and ceratohyal closely and somewhat firmly connected with the jaws at the hinge or hinder angle of the latter. Branchial arches long, very slender, with sharp small scales on their inner edges. Without dissecting, twenty-two branchial rays can be counted on the hyomandibular and ceratohyal (the first arch) and on the succeeding six arches, in order, 15, 14, 12, 9, 6, and 0 respectively. In most cases the outer extremities of the rays are produced in a sharp flexible point beyond the adjacent margin of the gill covers. Gill openings very wide, oblique, the opposite series very narrowly separated on the throat, the fourth in front of a vertical from the pectoral and the fifth and sixth extending back above the shoulder. A broad opercular flap covers the first

branchial aperture and is continuous and free across the isthmus, forming a frill or ruffle ; it is held in place and prevented from turning forward by a thin fold or wall of membrane, near an inch in height, attached immediately beneath the middle of the basihyal. The external distribution of slime-canals is about as follows : starting above the nostril in front of the eye a line turns backward along each side of the skull and, after receiving a branch from behind the eye, continues along the middle of each flank to the extreme end of the vertebral column in the tail, where it makes an abrupt turn downward for about a quarter of an inch ; under the chin on each side, a line runs along the mandible and curving upward disappears behind the angle of the mouth ; a branch of this, beginning nearly on a vertical beneath the middle of the space between eye and nostril, runs farther from the mouth and turning upward near the margin of the opercular flap after receiving a short branch behind the angle of the mouth, continues to a point a very short distance behind the spiracle, a small branch coming into it near the end from the direction of the corner of the mouth. Pectorals moderate, broad, rounded. Dorsal comparatively small, its posterior extremity extending as far back as that of the anal, angle blunt. The upper margin of the dorsal is armed with a series of enlarged, compressed, chisel-shaped scales, which extends forward on the back to a vertical from the vent, a few of the anterior being horizontally flattened. Ventrals large, broad—a little broader than long, rounded, posterior angle acute. Anal broad, long, rounded, acute-angled posteriorly. Caudal long, very broad, rounded anteriorly, posterior angle acute—produced into a filamentary point, margin very thin or membranaceous. Above the muscular vertebral portion of the tail there is a narrow expanse of fin, widening backward, the edge of which is armed by a

sharp series of chisel-shaped scales, and extended downward behind the end of the vertebral column, where it becomes about three-sixteenths of an inch in width. That it is the dorsal portion of the fin which descends is proved by the change in the direction of the points of the scales and of the mucus canal. The dorsal portion of the fin is plainly indicated on the hinder margin of the tail about half-way down to the filamentary point. The chisel-shaped scales are in reality formed from two series (one belonging to each side of the body) which have coalesced. Though small and harsh to the touch the scales on the body are not sharp; they offer about the same resistance from whatever direction the finger may be passed over them. On the tail, however, they are very sharp and the points are directed backward. Along the edges of the canals on both body and tail the scales are compressed and flattened; they form the only cover or protection for these organs, which in the specimen described have the appearance of long seams or grooves. On the skull these canals do not stand open as on the rest of the body. Near the mouth and especially toward its angle the scales are larger and more prominent. Under the middle of the belly, the skin forms two closely approximated rolls or ridges separated by a groove, and inside of these the muscle is thicker than towards the flanks. Intestine very small, valve spiral. Abdominal pores opening behind the vent, protected by a fold. Cartilages soft and flexible as those of *Somniosus* or *Selache*. Uniform brown, darker at the thin margins of the fins. Specimen described, a female, apparently adult, purchased by the Museum of Comparative Zoology from Professor H. A. Ward, who gives Japan as the locality.

The accompanying outlines are taken from the animal as it lies on the belly showing the back of the middle of the

body and the sides of the head and tail. The smaller sketches show the upper and lower surfaces of the head. The smallest figures give the outlines of a tooth viewed from above and from the sides.

From the foregoing it appears that there is neither genus nor family to which the species described may properly be assigned. The characters given below are selected for provisional diagnoses.

**CHLAMYDOSELACHUS.** Branchial apertures six. Opercular flap broad, free across the isthmus. Teeth similar in both jaws, with slender subconical cusps and broad backward produced bases. No teeth in the middle in front above ; a row on the symphysis below. Mouth wide, anterior ; no labial fold. No nictitating membrane. Fins broad, pectorals far in advance of the others. Caudal without a notch posteriorly. Gill arches slender, long, basihyal not wide. Intestine small.

**CHLAMYDOSELACHIDÆ.** Body much elongate, increasing in size very little anteriorly. Head depressed, broad. Eyes lateral, without nictitating membrane. Nasal cavity in skull separate from that of mouth. Mouth anterior. Snout broad, projecting very little. Cusps of teeth resembling teeth of serpents. Spiracles small, behind the head. One dorsal, without spine. Caudal without pit at its root. Opercular flap covering first branchial aperture free across the isthmus. Intestine with spiral valve.

*Remarks.* Such an animal as that described is very likely to unsettle disbelief in what is popularly called the "sea serpent." Though it could hardly on examination be taken for anything but a shark, its appearance in the forward portion of the body, particularly in the head, brings vividly to mind the triangular heads, deep-cleft mouths, and fierce looks of many of our most dreaded snakes. In view of the possible discoveries of the future, the fact of the existence of such creatures, so recently undiscovered, certainly calls for a suspension of judgment in regard to the non-existence of that oft-appearing but elusive creature, the serpent-like monster of the oceans.

Generally the attitude of ichthyologists in respect to the belief in unknown sea monsters is much the same; they are inclined to accept it but are waiting more definite information. A couple of years ago Professor Baird in a conversation on the subject drew a sketch of a strange creature, captured and thrown away by a fisherman on the coast of Maine, which might be readily considered by the ordinary observer as a form of "the serpent." It was some twenty-four feet in length, ten inches in diameter, eel-like in shape, possessed of a single dorsal placed near the head, and had three gill openings. The question was "is it a shark?" In several respects it resembled an eel rather more. An outline and the correspondence in relation to it have recently been published in the Proceedings of the Fish Commission.

Notwithstanding the possession of peculiarities which prevent its entrance into any of the known families of the order, the subject of the present communication is a veritable shark. A diameter of less than four inches to a length of five feet marks one of the slenderest of the tribe. Whether it attains much greater length we can only judge,

from the structure and apparent age of the specimen, to be probable. The delicate margins and filaments of the fins are those of an inhabitant of the open sea or considerable depths. Bottom feeders are provided with larger spiracles and the fins usually show signs of wear. Rapidity of movement is suggested by the large amount of surface in the posterior fins. It is probable, however, that the large fins, being so far back, are of importance as support for the body when the anterior portion is quickly plunged forward to seize the prey; that is, they secure a fulcrum from which the animal may strike like a snake. The anterior fins (pectorals) being only of moderate size are yet ample for balancing or directing the body when in motion however rapid.

There is a correspondence between the size of the gill openings and that of the mouth; no matter how widely the latter may be opened when rushing upon the prey, the immense branchial apertures allow the water to pass through without obstruction. Favoring the idea of rapidity of movement still further are the peculiarities in the structure of the nostrils. By means of a fold from each side of the vertically elongated nostril it is divided into what appears to be two nasal apertures. Of these the upper looks forward and catches the water as it is met turning it into the cavity upon the membranes of the interior; while the lower opens backward allowing the water to escape after passing over the olfactory apparatus. In case of the upper opening it is the hinder margin that stands out farthest from the head and in the lower aperture it is the forward edge that is prominent. In fact the structure is such that the slightest forward movement will send a current of water in at the upper portion of the nostril and out at the lower while a move backward will simply reverse



the order making the current enter below and escape above. In most Selachians this current is secured by means of the nasal valve, which covers about half of each nostril.

The teeth are constructed for grasping and from their peculiar shape and sharpness it would seem as if nothing that once came within their reach could escape them. Even in the dead specimen the formidable three-pronged teeth make the mouth a troublesome one to explore. Points of teeth in perfect preservation, shape of the cusps, and the structure of the small portion of the intestine left by the captor, leave little room for doubt that the food of the creature was such as possessed comparatively little hardness in the way of the mail or other armature.

No other shark of which we know has the opercular flap free across the throat. In this particular it recalls the fishes. There is a certain embryonic look about the species, as others who have seen it also remark, that calls for a comparison with fossil representatives of the Selachians. Among them I have been unable to find anything which might be considered at all near. In *Cladodus* of the Devonian there is a form with teeth somewhat similar, a median and two lateral cones on each tooth, but the cones are straight instead of curving backward, and the enamel is grooved or folded instead of smooth. However, the type is one which produces the impression that its affinities are to be looked for away back, probably earlier than the Carboniferous, when there was less difference between the sharks and the fishes.

## A SPECIES OF HEPTRANCHIAS SUPPOSED TO BE NEW.

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BY SAMUEL GARMAN.

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### HEPTRANCHIAS PECTOROSUS.

Total length 16, snout to caudal 10.375, snout to anal 8.25, snout to dorsal 7.1, snout to vent 6.75, snout to end of pectoral 5, snout to angle of mouth 2, and snout to mouth 0.8 inches.

Hab., Patagonia.

*Description.* Body elongate, compressed posteriorly, heavy and broad in the anterior third of its length, chest broad. Head broad, short, somewhat depressed, snout and facial angles rounded, blunt. Nostril, anterior, more than half-way from the eye to the end of the snout, in the upper half of the distance between top of head and mouth. Eye moderate, without a nictitating membrane, situated about the middle of the length of the head. Spiracle very small, in front of the upper angle of the first gill opening, half-way to a vertical from the eye. Mouth very large, inferior, with a thin labial fold which extends along the lower jaw nearly half-way to the symphysis. Teeth compressed, unlike in the upper and lower jaws, which both have teeth on the symphysis. Roof and floor of mouth with compressed usually five-cusped scales, like shagreen. The tooth between the series of the upper jaws is sharp pointed, slightly oblique and resembles those on its left, as it is on that side the small notch appears at its base. On each side of this tooth there is a series of seven, the medial of which bears a small cusp at the forward portion of

the base which is followed by a long sharp one and this in turn by one or two smaller ones. Behind the seven, toward the angle of the jaws, there are a number of very small ones. On the lower jaws the teeth are much broader, that on the symphysis is small and bears most of its notches on the left side; on each side of it there is a series of six, each of which has one to two small, followed by four moderate sized, cusps, the anterior of the four being little if any longer than the other three; and, in cases, there is also a small cusp on the posterior portion of the base. As in the upper series there are very small teeth in the hinder portion of the series. Gill openings seven, wide, all in front of the pectoral, the series separated on the throat by a space nearly as wide as that between them back of the head; the width of the openings, and of the spaces between them decreases toward the pectoral. Pectorals nearly as broad as long, angles rounded, posterior margin slightly indented. Width across both ventrals less than their length. The posterior inner portion of each ventral is a strong fold, opening toward the body, and in it is hidden the clasper. Dorsal rather small, beginning above the posterior extremity of the ventral and extending a little beyond a vertical from the middle of the anal, posterior margin indented, lower angle produced, blunt. Anal smaller than the dorsal, beginning under the middle of the length of the latter. Tail long without a pit at the root, armed on the upper edge by three series of enlarged (thickened and broadened) scales. Caudal rather narrow, widest anteriorly. Scales carinate, where they have not been rubbed, with a long sharp central point and, on each side of this, one or two small ones.

Brownish, more or less faintly blotched with darker on back and flanks. Type in Mus. Comp. Zool., Cambridge, Mass.



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### PIGEONS AND THE PIGEON FANCY.

BY WM. G. BARTON.

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THE pigeon family, in the widest sense, includes a multitude of species, many living in the tropics and displaying the gorgeous colors characteristic of the birds of hot climates. But the wild species of pigeons which inhabit Old and New England are few in number. In the former, we find *four* species, viz. : the Blue Rock Dove, which we shall speak of again, the Ring Dove, which is the commonest wild pigeon of England, the Stock Dove — once considered the stock whence all domestic pigeons — and the Turtle Dove. In New England are *two* species only : the common Wild or Passenger Pigeon, and the Carolina Dove. The beautiful little Collared Turtle Dove, called also Ring Dove and Laughing Dove, common in both countries as a pet, is not to be confounded with these.

Science has turned her scrutinizing eye sharply upon pigeons ; and Mr. Darwin took the domestic pigeon for his chief typical illustration of the variability of domestic animals, and made them contribute a surprising

array of facts toward the support of his grand and audacious theories of animal life. His opinion that all the varieties of tame pigeons have descended from one species, finds acceptance I believe with most scientists, although it has not lacked warm contestants, and certainly, to superficial observers, may well appear absurd. Those who are interested in the question should read that one of the several monuments of the great naturalist's patience and concentration, "The Variation of Animals and Plants under Domestication." The wild species assigned this post of honor is the one first mentioned—the Blue Rock Pigeon (*Columba livia*). This bird is very similar in appearance to that variety of our common pigeon which is slaty-blue with two well-defined dark bars across each wing. It is still found in Great Britain, particularly along the rocky shores of Scotland. Wild rock pigeons in other parts of the world, as in India and Italy, differing somewhat in appearance from the British bird, are classed as the same species. It is interesting to notice how often the light bluish wing with the two bars appears among the fancy breeds. This marking is especially common in the offspring of crosses between two varieties.

The Blue Rock pigeon's nearest brother, and a variety which required neither the cunning interference of man nor long ages to produce, is the common Dove-house pigeon, with which, mingled in some degree with other blood, Salem and other cities are, in the words of a Salem clergyman, "infested." But, if we follow Mr. Darwin, we must also consider as *Columba livia*, birds so mutually diverse as the pouter, the tumbler, and the fantail. Our common pigeon is found all over Europe, and is the kind used in the cruel shooting-matches, which should be prohibited. It is so abundant that the swiftness of its flight and the general beauty of its plumage,

especially in the "iris" of its burnished neck, are apt to escape our notice.

Pigeons have been associated with mankind for uncounted ages. Noah's dove and the frequent references to pigeons in the Scriptures are familiar to us all. The earliest record of the domestic pigeon refers to the Fifth Egyptian Dynasty or 3,000 B. C. But, leaving that out of account, the ode to the carrier by Anacreon, written in the fifth century, B. C., and the complaints of Varro who was born 116 B. C., and of Columella, living about the year 1 A. D., regarding the extravagant prices paid for fancy pigeons by their contemporaries, are allusions to pigeons old enough to make the brownest crumbling document in this building seem a thing of yesterday. And there may be somebody here who, learning that £100 is paid for a pair of carriers at the present day, and that long lists of pigeon genealogy are printed, would shake hands with old Pliny across eighteen centuries, and lament as he did when he said: "Many are mad with the love of these birds; they build towers for them on the tops of their roof, and will relate the high-breeding and ancestry of each, after the ancient fashion. Before Pompey's civil war, L. Axius, a Roman knight, used to sell a single pair of pigeons *denariis quadringentis*." This sum has been estimated £12 18s. 4d.

Among the Orientals, pigeons have always been favorite pets. There are thirty Sanscrit names for them, and half as many Persian. India and China are old pigeon countries. In fact, we believe that all civilized, and many half-civilized, peoples have prized the pigeon. Besides the countries mentioned, there come readily to mind, as associated with this fancy, Egypt, Morocco, Turkey, Austria, Italy, Spain, France, Russia, the United States, and preëminently Germany, Belgium, Holland and Great

Britain. The dove which whispered into the Great Prophet's ear has endeared this bird to Mussulmans ; Russians feel at this late day a practical affection toward them because of the service rendered at the Deluge ; and the many associations of the dove with Scripture have kept alive a sentiment at least in their favor throughout Christendom. Large numbers are publicly fed every day in the great square of Venice ; flocks soar across the smoky sky of London ; the streets of St. Petersburg, Cairo, and Constantinople abound in them, tame and fearless. Among the rafters in the dock-sheds of New York City live hundreds of pigeons, protected and cherished by salt and stevedore ; and the spillings from the nose-bags of the horses in Boston are devoured by denizens of loft, cornice, and church-tower ; while amid the smoke and din of the railway station in Salem doves rear their young.

In feudal days the barons only were allowed to keep pigeons, which they suffered to prey upon the crops of their tenantry, who had no redress. So that, in France especially, we find hard words spoken against the dove-cotes — those towers of masonry in which these birds were lodged. These dovecote pigeons were no doubt at first the "blue rocks," which had been captured in their native haunts.

The pigeon fancy must be considered strictly *a fancy*. Many men make it a business, of course, and a pigeon pie is a pleasing incident ; but the bald questions "Does it pay?" and "Do you eat them?" are considered almost insulting by the true fancier, and are a sign that the questioner must experience, in respect to this subject, a sort of new birth before he can be enlightened. The fancy, then, is æsthetic, allied to that for roses, dahlias and tulips ; and I will venture to assert, that in grace of form, and beauty of color and marking, those flowers have in



pigeons formidable rivals. To the boy the pigeon is a pretty pet; to the man it becomes the object of deep thought, of persevering training, and of patient experiment.

Yes! to the boy, pigeons are the royal pets; and thereafter, the caged squirrel, the penned-up toad, the tethered tortoise, lose their charm. Captives are they — yet at liberty, and such a liberty — not of the earth, but of the heavens. They wander, not to catch grasshoppers in the mowing lot, but to soar with exultant freedom into the skies, still, as their proud owner knows, bound fast to the loft by the ties of home. To the urchin everything winged and hard to catch has especial charms, whether butterfly, bat, or bird. And the craving for possession grows so strong, that the black-barred, blue-checked, brick-red-checkered, white, or variously pied, common pigeons of our streets and yards are enticed into the noose or under the sieve, if only for the short-lived pleasure of holding in the hand that throbbing form which just now cleaved the air, or of pressing to the cheek or lips the soft wing which has whistled so often overhead. The rapture felt, when the coop is being prepared; when the first live pigeons are owned; at the discovery of the first white egg; or at the return of the birds after their taste and test of liberty,—only those who have felt it know. The speaker recalls the time when, although then opposed as now both from inclination and principle to early rising, he hastened to his loft at five in the morning, where seated on a hard box he spent an hour or two in watching the indoor habits of his pigeons. Sometimes I carried on evening observations by lantern light. Even now, I occasionally see in dreams such ideal pigeons as are figured in the books, and with that light upon their feathers which never was on sea or land.

Pigeons pair, like the singing-birds ; but, instead of mating for the season, remain paired year after year, even, as a rule, for life. I say *as a rule* because there are frequent exceptions ; and the constancy of the dove has been greatly exaggerated, as they occasionally desert one another to choose more congenial mates, and are by no means *always* faithful to the vows made at billing, even when the partnership is continued. So are their meekness and gentleness largely imaginary. It is, I fear, the soft, plaintive voice of the pigeon that has done much for its reputation. There could scarcely be a more striking illustration of a quarrelsome disposition, prone to pick up a row whenever possible, than is afforded by some cock pigeons. Such a bird will take up his station at the entrance of a loft, and do his best to prevent the passage in or out of any inmate, rushing to and fro with malicious cooing and vicious strokes of his bill. Such a pigeon often takes possession of the whole side of the room, comprising many more nests than he can possibly use, and maintains his position until actually whipped in a free fight with some other cock. A pigeon frequently acts to perfection the dog in the manger, perching upon the food box or the bath solely to keep other pigeons away. This is hardly exceptional, unless in degree. No bird is more jealous of his rights and privileges, and they are all greedy and all will fight — or run. I have watched with some excitement fights over a nesting place, which lasted for many minutes. They approach one another sidewise, holding on high the off wing in a threatening way, and striking with the one next their rival, and also with their beak. It is highly amusing to see two that are about equally matched, in a nesting box, wrestling, each trying to pitch his antagonist out and not to be pitched out himself, so that they turn round and round

or stand as still as a Rogers group, tightly braced with outspread wings and legs. That they are seldom much injured in these fights is only because they are poorly armed. A squab which has tumbled to the floor is not unfrequently terribly lacerated—sometimes even killed by old birds; and a sick pigeon is invariably persecuted with vehement malice. I regret to disturb any long cherished notion in the minds of my hearers, but am thus in the fashion in these iconoclastic times. You will find very much in these birds to compensate for a character often so unlovely; and their habit of generally mating for life, and always very fondly, remains a remarkable fact.

The perpetuation and improvement of existing varieties and the formation of new ones depend upon the fact that pigeons very kindly accept mates chosen by their owners, so that they may be made to mate according to the points possessed by the proposed parents and desired in the offspring. Many pages of tedious detail have been written as to what birds should be mated to produce a given result. As the French in roses, the Dutch in bulb flowers, so, for example, have the Germans shown marvellous skill in the production of variously marked and colored pigeons.

A cock and hen pigeon placed in a cage together, will generally mate in a day or two, unless the hen whip the cock. In which case, a few days sole possession of the cage will commonly furnish him with sufficient courage to bring the hen to submission. Two cock pigeons may mate, when males are too numerous, and, if given eggs, rear young; and females have been known to do the same, each laying two eggs in the nest, on which they sit with amusing patience. The nest is generally the choice of the cock, if not of the fancier. He flies into it, scratches about or crouches perfectly motionless and calls softly, louder and louder, to his mate, peeping out now

and then to see if she responds. Probably she soon flies into the nest, coos softly in reply, and caresses his head gently with her bill in the most affectionate and delicate manner. Perhaps she has brought a stick or straw. But, at any rate, he soon flies off to fetch building material to her, which she arranges with great care, often taking it directly from his beak. These meetings are always accompanied by short, confiding coos. The nests vary greatly. Some pairs work with great industry, and build a toppling dangerous structure ; others are content with a dozen sticks, and deposit the eggs upon the bare board or earthen nest pan. Two eggs only are laid, the great fecundity of pigeons depending altogether upon the number of the broods, which among good breeders may amount to ten or eleven a year. For several days before the eggs are laid, the cock follows the hen from place to place, giving her little peace except when she is on the nest. The first egg is laid in the late afternoon, and after two nights and a day have passed, the second one is placed by its side, probably in the forenoon. Then begins incubation in earnest, more and more assiduous as the days go on. In all these matters, the cock takes an affectionate and unaffected interest, perching near by, communicating frequently, and assuming an important share in the labor of incubation. He goes on to the nest in the middle of the forenoon, is cordially welcomed by the hen, who carefully gets off the nest and seeks for food, recreation, and exercise, while he as carefully adjusts himself with an air of great comfort to await his mate's return, which will be in four or five hours. This time may vary slightly, but at night the nest is always occupied by the female. In about eighteen days after the second egg, the "golden couplets are disclosed," thinly covered with a yellow down, blind, and as helpless as young mice or sparrows. Now

we behold a marvel which distinguishes pigeons from other birds, and makes the old joke about pigeon's milk no joke at all. As in mammals the lacteal glands secrete milk at the birth of the young, so, at the hatching of the young pigeons, or rather at the time when they should hatch, the crops of both parents become thickened in structure, and secrete a milky liquid, which coagulates or curdles into something resembling curdled milk; and the young pigeon has his beak taken into the side of that of his parent, and receives this curdy nourishment, ejected by a sort of vomiting, against his wide under mandible. For this, his appetite is excellent, and such remarkable nutritive power does it possess, that squabs grow at a wonderful rate. For a while they are covered closely by the parents, and fed exclusively upon this "soft meat." But in a few days, they are left uncovered longer and longer, and the soft meat becomes mingled with half-digested food; and, after eight or ten days, it disappears altogether, the food being then merely softened by maceration in the crop of the parent. Later on, the old one, after eating heartily, directly swallows a copious draught of water and throws up his whole cropful into the maw of the young one, who is now fully feathered, perhaps flying from roof to roof, or running with outspread wings and a whistling note in pursuit of his father,—for the mother has probably weaned him, and is devoting her whole attention to a second pair of eggs.

Fanciers are in the habit of shifting eggs from one pair to another to afford valuable young the benefit of good nursing, and a large proportion of the highest bred birds are reared by foster-parents of a common sort. Young ones are sometimes given to several different pairs of nurses in succession, so as to be afforded more than one course of soft meat. Pigeons, like infants, may be brought

up by hand, and many a one, deserted after a week or so by his parents, has flourished, first on chewed cracker, then on grain and water (which they soon learn to take deftly from the human mouth) ; or has been fed literally by hand with soaked peas or corn. A large number of the pigeons sold for food in the London market have been stuffed by professional feeders, who charge a penny a dozen squabs for feeding them with millet or tares and water from their mouth. The crop is blown full in an instant and a whole meal thus given the astonished bird in almost the twinkling of an eye. The increase in weight of a young pigeon is thus given by an English clergyman. It was a young barb, and weighed at hatching one-half oz.

The following are its weights on the respective days :—

6th day	4½ oz.
7th “	5¾ “
9th “	8¼ “
12th “	10 “
18th “	11½ “
20th “	11¾ “
1mo.	12¼ “ or a little more

than the mother. In four or five weeks the bird is flying about, and in six months or so is anxious to find a mate of his own.

Pigeons are great bathers, and common ones are often seen squatting in the puddles. During a shower, they sprawl about upon the roof, lying upon the side with one wing uplifted, that the drops may fall beneath it ; and they sometimes remain out until completely drenched.

In their manner of drinking they resemble horses, sucking all they wish — a hearty pull — without raising the head, and, when very thirsty, immersing the beak nearly to the eyes.

They are fond of salt, and gather around a bit of salt fish, or peck day after day at the gravel where salt has been shaken from the table cloth.

Their fondness for hemp seed is like the greed of children for candy; and the wildest specimens may generally be quickly tamed by it, and made to eat from the hand and fly upon the head and shoulders of the feeder.

They are as individual as men. I can recall the faces and coos of certain pigeons, and have often recognized one among a flock of thirty by the voice alone. Some are docile, intelligent, less greedy; others pugnacious, stupid, and the very embodiment of selfish gluttony. Some, easily tamed, look trustingly at you; others of the same variety, have the eye of a wild Texas bull and refuse to come near, unless they are sure of hemp seed.

There are very many obstacles to successful pigeon-keeping. Hawks may catch them on the wing; cats bring bloody havoc into the loft, or snap up your choicest darling under your very nose; rats may eat eggs and young; lice in five or six species infest them; or disease ravage like Asiatic cholera. Some refuse to lay, others allow their young to starve. You may be surprised some fine day to find that your best yellow fantail has fallen down a chimney. Several pigeons have tumbled down two different chimneys in my house, and I was once obliged to rise at midnight to remove the fireboard in my chamber and admit a tumbler in this Santa Claus fashion, a *tumbler* indeed.

The homes of pigeons are of every kind, from the soap-box of the ten year old boy, to the elaborately furnished, heated, and daily swept apartments of the wealthy fancier. The best lofts in England, Scotland, and the United States would doubtless greatly surprise most of us by their beauty, costliness, and adaptation.

Many pigeon or columbarian societies, for the promotion of the fancy, exist in this country and in Europe. In London, at the present day, there is the National Peristeric Society, which consists of one hundred members, and which holds an annual exhibition at the Crystal Palace. Of course there are multitudes of local societies.

The premiums and the notoriety offered by exhibitions afford the special inducements to fanciers to breed for points of excellence. The prizes are awarded by judges ; and upon the standards adopted by the society, and the discretion of the judges depends, in some degree, what characteristics shall be demanded in certain varieties. So that, while the general character of a variety remains the same year after year, requirements as to minor points are constantly being modified. This subject sometimes gives rise to controversy.

[In describing the principal varieties of fancy pigeons, the speaker referred to the pictures upon the stage, and was not confined to manuscript. His remarks, somewhat abridged, were as follows.]

The Pouter is, in my opinion, the king of fancy pigeons, although this term has been applied to the carrier. The unsophisticated are apt to call him ugly, and at first sight he does bear a top-heavy look. But when we learn that his huge ball is simply inflated with air, he seems the lighter for it. Pouters are more cosseted and petted than any fancy pigeon. They are made very tame, handled often, stroked upon the back, and taught to "blow," and trip about or "play" as it is called, when addressed by the peculiar call which pouter fanciers utter. He is the most human pigeon, often assuming a nearly erect position, is intelligent, responsive, social, good-natured, comical. One comes to consider him a playful, sly rogue, ready for a frolic. If he does not swell up when



you want him to, it is an easy matter to put his bill into your mouth and blow him up, as a boy does a football. He will retain this air when set down, and strut about with as much satisfaction as if he did it himself. This habit of inflating the crop is in some degree common to all pigeons and affords them unmistakable pleasure, although once in a while the pouter may have a difficulty in discharging the air, perhaps even fall over backwards. They generally fly with much wing clapping and often with their crops fully inflated. When very hungry they are apt to gorge themselves, and all the pigeon books give instructions for hanging up a gorged pouter in a stocking leg. The pouter should be very tall and slender, with long legs that are properly feathered, long wings and tail, and a full round crop. He should be as perfectly marked as possible. There are blue-pied, black-pied, yellow-pied, red-pied, white, and other colors. Indeed most varieties of fancy pigeons are found of different colors. There is a small or "bantam" variety called the "pigmy" pouter. The Scotch are noted for their fine pouters. £300 has been paid for three pairs, and \$135 for a yellow-pied hen, and probably even larger prices have been realized. Prices like these are not rare among rich and enthusiastic fanciers, and figures as astonishing may be quoted for all the more important varieties of fancy pigeons.

The Carrier is by many fanciers placed at the very head of the fancy, but it is not a favorite of mine. It has beauty, because it is a pigeon, and is very curious, but requires a high degree of culture to fully appreciate it. One must "be educated up to it," as the old saw-sharpener said to the man who objected to the music of his file. The carrier is now poorly named because, although its ancestors were undoubtedly used for the purpose which the name suggests, this fancy carrier is, by the highly devel-

oped eye and beak wattles, totally unfitted for long flights, its sight being so much obstructed that the best specimens cannot pick up scattered kernels of corn, but must be fed from a box. So the term "Homing Pigeon" or "Homer" has been applied to the actual carrier. The fancy carrier calls for more points of perfection than any other pigeon, and it is stated that twice as much money is annually spent for them as for any other variety. He is not tame nor petted like the pouter, but is naturally wild. He is large, powerful, and bold-looking. His neck should be long, slender but not tapering. His beak-wattles, eye-wattles, beak, head, legs, outline, must approximate to a given standard. His main distinguishing feature is his abnormally large beak-wattle, which looks as if a small cauliflower had been impaled upon his bill.

The Dragoon, often called the "Dragon," resembles the carrier, but has a smaller wattle which grows upon the upper mandible only. He is, I think, a much handsomer bird, being very symmetrical in form. They are good fliers and good nurses.

The Antwerp is a name given to an important variety of "Homing" pigeon, but there is also a sort called the "Show Antwerp," which is a fine bird, with lines to charm a sculptor, but with no very remarkable peculiarity.

The Barb was perhaps named from the country of Barbary. All the "wattled" pigeons are probably of Oriental origin. A Turkish pigeon called the Scandaroon much resembles the carrier. The barb has a broad square head, with a bright red surface of wattle around the eye, and a short, thick, bullfinch beak. It is highly prized, and is, like the foregoing and most of those to follow, of various colors.

The Mahomet is similar to the barb, but has a crest.

The Tumbler is so called because he tumbles ; yet some

do not. In fact, tumblers may be divided into two classes : the Flying Tumblers, prized for their aerial performing, and Short-faced Tumblers, which are bred solely for certain peculiarities of appearance, without regard to their manner of flight. Tumbling, strictly speaking, is the turning of one or more complete backward somersaults during flight, so rapidly as not to impede progress, and often during an upward course. Good birds will tumble thirty or forty times a minute, and go over so quickly as to escape the notice of a person not used to watching them. The better spirits they are in, the more they tumble, appearing to take great pleasure in the act. But it is also true that among those called "House Tumblers," which tumble in the loft and are seldom let out, some individuals tumble if they rise a foot from the floor, and seem to dread the action ; while occasionally an out-of-door tumbler loses control of himself and falls to the ground. But the term tumbling does not mean falling, though some poor performers, especially young birds, do drop for some distance instead of going over. There is, however, a variety among tumblers called "Rollers," which drop through the air while rolling rapidly over and over. Collections or "kits" of flying tumblers are carefully trained to fly high in a compact flock. There is no more beautiful sight than a flock of these birds dashing off a roof, tumbling, rolling, and circling about higher and higher until almost or quite lost to sight. These flocks are often started off by flag waving, and called down by a whistle. They will remain aloft for hours, for seven hours even, never going out of sight, unless *upward*.

The Short-faced Tumblers are bred very small and plump, with a round head, and an exceedingly short beak. They are of very many colors, and among them are the Baldheads with a white head, and the Beards with a white

chin. All tumblers have short "faces," but the difference between the coarsest, "mousy," flying-tumbler and the high-bred, delicate, short-face is very great, and there are all grades between. The Almond Tumbler should be of a dark, rich yellow color (difficult to describe—it might be called a very light brown), dotted with small black spots, while the flight and tail feathers should each show distinct marks of yellow, black, and white. Some of the finest specimens remind one of a tulip. The almond birds often have young of other colors, which are used in breeding other almonds.

The Fantail or "Fan" is the best known fancy pigeon. It probably originated in India, and many have been brought home from Calcutta in Salem vessels. Ladies always admire the fantail; and a flock of pure white ones strutting over a lawn, or a collection of various colors, white, black, blue, yellow, red, pied, saddle-backed, feeding in a dense cluster like a bouquet of fine flowers, is worth going some distance to see. The old name for them is Broad-tailed Shaker. The term shaker is on account of the peculiar quivering motion of their necks when they strut. The tail of the common pigeon contains twelve feathers while that of the fantail has been known to carry forty. But erect carriage and symmetry of form are more to be desired than a great number of feathers, and most tails contain only between twenty and thirty.

[Only short notes had been written about the following varieties which were more or less fully described.]

The Frilled Pigeons, with a frill on the breast like a ruffled shirt-front, variously crested or plain-headed, include the following, with many sub-varieties of color, etc. : Turbit, Turbiteen, Satinette, Brunette, Bluette, Blondiette, and Owl.

The Jacobin, or "Jack," is apt to be poor, but when

good, is a most beautiful bird. Its distinguishing feature is an ample hood of colored feathers closely curving over its pretty white head.

The Trumpeter has a "shell" crest, a strange tuft of feathers at the base of the upper mandible, and very heavily feathered legs. He is named for his remarkable, long-continued, very amusing coo.

The Runt is the largest variety. It is bred solely for size. They weigh, per pair, between four and five pounds, and a single runt has weighed two pounds nine ounces.

The pigeons which are usually called "Toy Pigeons," are mostly of German origin. Most of them are included in the following list. It should be remembered that of many of these, there are several sub-varieties of differing colors: Magpie, Nun, Spot, White-spot, Helmet, Swallow or Tern, Fairy, Priest, Brunswick, Starling, Swiss or Crescent, Shield, Letz, Archangel, Ice, Fire, Suabian, Hyacinth, Porcelain, Victoria, Frill-back, Stork, Black-backed Gull.

The following varieties are Oriental: Swift, Lahore or Martin, Burmese or Florentine, Scandaroon, Damascene, Capuchin, Mookee, Goolee, Sherajee.

The Homing Pigeon, or the "carrier pigeon" of *literature*, must be distinguished from the carrier of the *fancy*. Pigeons have undoubtedly been used for many centuries to carry messages, and they are still used for that purpose; but at present, where one is used for carrying a message, thousands are flown in matches for a trial of speed. In considering them, it should be remembered that they fly only *to* their loft, being influenced solely by their desire to get home, and that they accomplish long distances only after a prolonged course of training. In the opinion of most persons who have carefully weighed the facts, their

wonderful feats may be altogether accounted for by their acute eyesight, good memory, and great power of endurance and speed. Cases have been cited which were thought to prove that they possess some mysterious power of divining the way home, but the weight of the evidence is decidedly against this notion. Fog and darkness invariably interfere with their return, and even a light fall of snow, which changes the appearance of the landmarks, has thwarted them. Journeys of three or four miles have been made on moonlight nights ; but the offer made by Mr. Tegetmeier of £10 for any pair of pigeons which would fly twenty-five miles on a dark night (although thousands will fly two hundred and fifty miles in a day) was not met. The same gentleman took a pigeon, which had often flown fifty miles, a distance of five miles in a fog, and the bird very wisely remained upon a housetop until the fog cleared away.

The mystery of this homing power is lessened in some degree, when it is considered that a pigeon's power of vision is probably much greater than that of man, and that Mr. Glaisher, from a balloon one-half mile high over London, could see the River Thames all the way from Richmond to the Nore, and when a mile high, the cliffs at Dover seventy miles away. There can be little doubt that the very best-bred pigeon would certainly be lost if taken one hundred miles away for its first flight. Some birds which were twenty hours upon a journey of eighty-three miles flew over the same ground the second time in two. Even old ones, which have flown in races the previous season hundreds of miles in length, are never sent upon the longest journeys without being, in some degree, re-trained that year to refresh their memory.

Dragoons, Tumblers, Owls, and other varieties, have

been used as carriers ; but the birds used for this purpose are prized solely for their flying, are generally the product of several judicious crosses, and so are of every variety of color. They must be muscular, close-feathered, with broad overlapping flight-feathers. Probably ninety-nine one-hundredths of the pigeons flown as carriers look much like common pigeons, being somewhat larger and stronger, stouter in build and beak, and having a sharp, intelligent look. When a pigeon, destined to be a homer, is two or three months old, he is taken a half mile or a mile away from his home and allowed to fly back. Then he is taken two miles, then say four, eight, sixteen and, perhaps, by this time ten, twenty, or thirty miles farther at each stage. Many birds are lost while being trained, thus carrying out the principle of the survival of the fittest.

A most remarkable opportunity for the use of carrier pigeons was afforded by the siege of Paris. Pigeons whose home was in that unfortunate city were sent out in balloons and subsequently loosed to make their way back as bearers of valuable official and private despatches. By paying a high rate of postage any person could send a message to a friend in Paris limited to a certain number of words. A very large number of despatches were set up in type, making a page as large as that of a newspaper. This was reproduced on a much reduced scale by photography upon a small piece of paper. One such piece, which was probably a fair sample, measured one and one-fourth inches by two and one-fourth, and contained two hundred and twenty-six despatches, the postage on which aggregated £100. This scrap of paper was placed within a bit of quill, which was securely attached to the shaft of one of the tail feathers of the appointed messenger. If the brave little pigeon safely ran the gauntlet of hawks, storms, fog, and German

sharpshooters, upon its arrival the despatches were interpreted with a microscope, distributed, or publicly displayed.

During the siege, sixty-four balloons came out of Paris containing ninety-one persons and three hundred and sixty three pigeons. Of the pigeons, only seventy-three found their way back ; a few of them, however, two or three times, while one bird made six trips. A pigeon which was captured by the Germans and sent by Prince Frederick Charles to his mother, upon escaping from her loft after four years' confinement, returned to its Parisian home. Is it to be wondered at that the governments of France and Germany at the present time breed and keep in training great flocks of homing pigeons as a military measure ?

Pigeon *racing* is now practised to some extent in this country. The English are moderately fond of it, but the headquarters for this sport is Belgium. Pigeon-flying is there the national sport. The King favors it and the government subsidizes it. There are said to be more of these pigeons in Belgium than there are inhabitants, or over 5,000,000. Every town, every village, has its society, and flights of three, four, and five hundred miles are common. Upon a single day there were sent 200,000 pigeons from Belgium into France, all to be liberated in races or for training. Sometimes the wonderful sight is afforded of 2000 or 3000 pigeons being liberated together. They are shipped in willow panniers or baskets, each containing about thirty. On Saturday, May 11, 1878, two special trains of seventy-three cars left Belgium for different stations in France, carrying 1740 hampers containing about 70,000 pigeons to be liberated the following day, Sunday. And, upon Sunday, May 19, 125,000 pigeons were loosed, 24,000 in one French city alone.

The races are generally flown under the direction of a



society. The distance from the starting point to each owner's loft is determined, and on the eve of the race, the birds, marked with their owners' name or number, are sent to the rooms of a committee, and there again marked with a cipher unknown to the owners. They are sent by rail with attendants to the starting point. When they are released the time is carefully taken, and various means are adopted to ascertain and verify the time of each bird's arrival at its home. In regard to the speed of these birds, Tegetmeier maintains that they can fly at the rate of three miles a minute. A pigeon has been known to make a journey in eight hours at an average speed of forty-five miles an hour. A French writer chose from the official reports of 300 great races the times of twenty-one birds, the circumstances of whose flight were particularly favorable for his purpose. The slowest of these, according to his estimate, flew 867 yards per minute, the three next to the fastest about 1440 yards, the very fastest 1780 yards. The journey of the latter occupied four and three fourths hours. A mile a minute for nearly five hours! Even this speed is greatly exceeded in short flights.

In 1865, thirty birds were flown from Liverpool to Ghent, 300 miles; they were liberated at 5.30 A. M., the first arriving at 5.50 that evening, after twelve hours and twenty minutes, averaging twenty-five miles an hour. Eight returned the same day; eight never returned.

In 1868, 1507 birds were liberated, July 18, 5 A. M. at Agen, about 500 miles from Brussels. The prizes, including those offered by the king, amounted to 19,000 francs. The following morning at 6.04, the first pigeon arrived, and the 216th came in at 10.30 the day after.

The longest race ever flown was from Rome to Belgium in 1868. 200 pigeons were liberated on July 22, at 4.30

A. M. All of them had flown home from the south of France but none had ever been farther. No bird reached home that month, nor on the first of Aug., nor the second, but on the third there arrived, at a town near Liege, the first messenger from the Eternal City, at 1.55 in the afternoon. If this pigeon had flown in a straight line, it must have crossed the Apennines and the Alps at an altitude of at least 7000 feet ; but it is thought probable that it kept to the west of these mountains, skirting the coast and entering France by the way of Nice. The second bird came in on the same day at evening ; the third, the day following, Aug. 4 ; the fourth, Aug. 6 ; the fifth and sixth, Aug. 10 ; seventh, Aug. 11 ; eighth, Aug. 12 ; ninth, Aug. 18, nearly a month after starting ; and the tenth on Sept. 11, to Maestricht. Of the 200 birds liberated, 180 never returned.

The following facts, selected from a mass of material, may be interesting. Mr. Van Opstal, a Belgian, living in New York City, writes me that the longest distance flown in the United States is about 725 miles. The pigeon which performed this feat was owned in Cleveland, O., and was bred from a pair imported from Brussels. A Newark bird has flown about 700 miles, but the time occupied was about four weeks. In the summer of 1883, pigeons flew from Columbus, O., and arrived home at Newark, N. J., 460 miles away, on the same day they were liberated. Mr. Van Opstal writes that a distance of more than 550 or 600 miles seems to be too much for homing pigeons, from one to six weeks being spent in accomplishing that distance, and 75 per cent of the pigeons getting lost ; while they often return 500 to 525 miles in a single day, and only 12 per cent get lost. They have flown from Steubenville, O., over the Alleghanies to

N. Y. City, 350 miles, in eight hours. A homer called Jupiter had a record substantially as follows :

Hatched in Antwerp	Aug. 1874.
Brought to America	Jan. 1875.
Philadelphia to New York	1875.
“ “ “ “ (silver cup)	1876.
Chester, Pa. to N. Y. (1st prize)	1877.
Elkton, Md. to N. Y.	“
Baltimore to N. Y.	“
Newark, N. J. to N. Y. (1st prize among 69)	1878.
Tamaqua, Pa. to N. Y. (1st “ “ 40)	“
Sunbury, Pa. to N. Y. (1st “ “ 28)	“

This bird afterward won first prize from Altoona, Pa., 235 miles, and third prize from Steubenville, O., 355 miles.

In a sale of Homing Pigeons in Brussels in 1877, No. 4 on the catalogue sold for 170 francs.

It had flown from—

Valencienne, 50 miles. Several prizes.

Arras, 100 “ “ “

Orleans, 280 “ A prize.

Chateauroux, 325 “ “ “

Langon, 600 “ (in 1876) 6th prize among 2000.

Lectoure, 600 “ 201st prize among 2468.

Such is the wonderful travelling these birds perform.

In closing, let me say, that to any one of you, whether lady, gentleman, or child, in search of a hobby, I can heartily recommend the Pigeon Fancy. You may keep pigeons merely as delightful pets, breed them for prize points, or fly them as tumblers or racers.

## ANNUAL MEETING, MONDAY, MAY 19, 1884.

THE annual meeting this evening at 7.30 o'clock: The PRESIDENT in the chair. Records of the last annual meeting were read and approved.

The reports of the Secretary, Treasurer, Auditor, Librarian and the Curators and Committees were read and duly accepted, and ordered to be placed upon file.

The committee on nominations reported the following list of officers, which was duly elected.

### PRESIDENT:

HENRY WHEATLAND.

### VICE-PRESIDENTS:

ABNER C. GOODELL, JR.  
FREDERICK W. PUTNAM.

DANIEL B. HAGAR.  
ROBERT S. RANTOUL.

### SECRETARY:

GEORGE M. WHIPPLE.

### TREASURER:

GEORGE D. PHIPPEN.

### AUDITOR:

RICHARD C. MANNING.

### LIBRARIAN:

WILLIAM P. UPHAM.

### CURATORS:

*History*—HENRY F. WATERS.

*Manuscripts*—WILLIAM P. UPHAM.

*Archæology*—FREDERICK W. PUTNAM.

*Numismatics*—MATTHEW A. STICKNEY.

*Geology*—B. F. MCDANIEL.

*Botany*—GEORGE D. PHIPPEN.

*Zoölogy*—EDWARD S. MORSE.

*Horticulture*—JOHN E. PEABODY.

*Music*—JOSHUA PHIPPEN, JR.

*Painting & Sculpture*—T. F. HUNT.

*Technology*—EDWIN C. BOLLES.

### COMMITTEES:

#### *Finance:*

The PRESIDENT, *Chairman ex off.*

HENRY M. BROOKS.

GEO. R. EMMERTON.

DAVID PINGREE.

The TREASURER, *ex off.*

#### *Library:*

CHARLES W. PALFRAY.

HENRY F. KING.

WILLIAM NELSON.

WILLIAM D. NORTEND.

THEODORE M. OSBORNE.

The LIBRARIAN, *ex off.*

*Publication:*

EDWARD S. ATWOOD.      ABNER C. GOODELL, JR.      EDWIN C. BOLLES.  
B. F. MCDANIEL.    H. F. WATERS.    JAMES A. EMMERTON.    T. F. HUNT.

*Lecture:*

ROBERT S. RANTOUL.      FREDERICK W. PUTNAM.      AMOS H. JOHNSON.  
FIELDER ISRAEL.      ARTHUR L. HUNTINGTON.

*Field Meeting:*

The SECRETARY, *Chairman ex off.*

GEORGE A. PERKINS, Salem.	GEORGE D. PHIPPEN, Salem.
GEORGE COGSWELL, Bradford.	FRANK R. KIMBALL, Salem.
FRANCIS H. APPLETON, Peabody.	EBEN N. WALTON, Salem.
NATHANIEL A. HORTON, Salem.	WINFIELD S. NEVINS, Salem.
EDWARD S. MORSE, Salem.	JOHN H. SEARS, Salem.

## THE RETROSPECT OF THE YEAR

compiled from the several reports read at the meeting, and the remarks of several members in relation thereto, presents the work of the Institute in its various departments since the last annual meeting.

**MEMBERS.**—Changes occur in the list of our associates by the addition of new names and the withdrawal of some by resignation, removal from the county or vicinity, or by death.

We have received information of the death, during the year, of twenty-four persons, who have been resident members.

GARDINER LEONARD CHANDLER, son of Gardiner L. and Lucretia C. (Green) Chandler, born in Boston, 9 April, 1806; artist; died in Salem, 27 May, 1883. Admitted a member 4 May, 1859.

CHARLES TIMOTHY BROOKS, son of Timothy and Mary (Mason) Brooks; born in Salem June 20, 1813; graduated at Harvard College in 1832, Harvard Theological

School in 1835; pastor of the Unitarian Church at Newport, R. I., from 1838 to 1871; died at Newport, 12 June, 1883. Admitted a member 12 Oct., 1859.

ERNEST BRUNO DE GERSDORFF, son of Ernest von Gersdorff, a judge of the court of Saxe Weimar; born in Elsenach, Germany, 18 July, 1820; graduated in medicine at Leipsic, 1846, and immediately came to this country, residing at Bethlehem, Penn.; then Andover; in 1849, Salem; in 1865, he removed to Boston; a physician; died at Pleasantville, N. Y., 28 June, 1883. Admitted a member 4 May, 1853.

CHARLES COTESWORTH BEAMAN, son of Ephraim and Rebecca (Greenleaf) Beaman; born in Boston, 12 Aug., 1799; in early life engaged in business pursuits; then entered Andover Theological Seminary, and graduated in 1837; pastor of the Howard Street Church in Salem from 1857-1864, having previously occupied other pulpits; died in Boston, 4 July, 1883. Admitted a member 28 Jan'y, 1858.

HORACE BROWN, son of Haydn and Harriet (Emery) Brown; born at West Newbury, 31 Aug., 1851; graduated at Harvard College, 1872, the Harvard Law School in 1874; lawyer in Salem; died at West Newbury, 5 July, 1883. Admitted a member 5 April, 1875.

SAMUEL H. NICHOLS, son of Samuel H. and Sarah (Burdett) Nichols; born at Wakefield, N. H., 31 Jan'y, 1830; clerk; died in Salem, 9 July, 1883. Admitted a member 22 July, 1868.

JOHN M. IVES, son of William and Mary (Bradshaw) Ives; born in Salem, 8 July, 1799. In early life he was in the book business, and at the same time kept a circulating library; afterwards interested in horticultural pursuits; died in Salem, 29 July, 1883. An original member.

STEPHEN BRADSHAW IVES, a brother of the preceding ; born in Salem, 12 April, 1801 ; known for many years as a bookbinder and bookseller under the firm of W. & S. B. Ives ; established the Salem Observer in 1823 ; died 31 July, 1883. Admitted a member 15 Feb., 1852.

WILLIAM SEWALL CLEVELAND, son of William and Mary (Hiller) Cleveland ; born in Lancaster, 28 Feb., 1810 ; bookkeeper, secretary of the Commercial Insurance Company, treasurer of the Salem Turnpike and Chelsea Bridge Corporation, etc. ; was for a long time a clerk with Charles S. Nichols & Co. ; died in Salem, 3 Aug., 1883. An original member.

WILLIAM HUNT, son of William and Mary (Dean) Hunt ; born in Salem, 25 April, 1804 ; a merchant, and with the late Robert Brookhouse was largely engaged in the west coast of Africa trade ; died at Salem, 3 Aug., 1883. Admitted a member 25 Jan'y, 1854.

THOMAS S. JEWETT, son of Thomas and Lucy (Pinder) Jewett ; born in Ipswich, 18 Jan'y, 1812 ; came to Salem when a boy and learned the carpenter's trade ; followed this trade for many years ; the past twenty-three years one of the assessors of Salem ; died 13 Aug., 1883. Admitted a member 28 Jan'y, 1856.

WILLIAM LEAVITT, son of Joshua and Eunice (Richardson) Leavitt ; born in Hingham, 15 April, 1801 ; came to Salem with his parents in 1801 ; in early life a clerk or salesman in a hardware store, afterwards a teacher in the grammar schools of Salem ; many years an instructor in navigation and bookkeeping ; interested in the local history of Salem and has compiled several communications for the Historical Collections of the Essex Institute ; died at Salem, 3 Sept., 1883. Admitted a member 25 Nov., 1863.

JAMES C. STIMPSON, son of Thaddeus and Hannah (Cook) Stimpson; born at Salem, 9 July, 1799; one of the oldest tanners in Salem, and was for many years prominent in the leather business; for several years a member of the City Government, either in the Council or Board of Aldermen, and also for many years a director of the First National Bank. Died 11 Sept., 1883. Admitted a member 28 July, 1864.

ENOCH K. NOYES, son of Enoch and Sarah Noyes; born at West Newbury, 11 Nov., 1820; a trader in Salem; died 11 Sept., 1883. Admitted a member 26 Aug., 1857.

JOSEPH SHATSWELL, son of Moses and Sarah (Lord) Shatswell; born in Ipswich, 2 Sept., 1801; merchant in Salem; for many years engaged in the West India trade; died 2 Oct., 1883. Admitted a member 20 Dec., 1854.

PETER SILVER, son of James and Susanna (Howard) Silver; born in Salem, 2 Nov., 1811; in early life a master mariner, afterwards a retired merchant; died in Salem, 6 Oct., 1883. Admitted a member 6 July, 1864.

BENJAMIN OSGOOD PEIRCE, son of Benjamin and Rebecca (Orne) Peirce; born in Beverly, 26 Sept., 1812; and died there 12 Nov., 1883; graduated at Colby University, 1835; a teacher in several colleges and academies; since 1849 engaged in business pursuits. Admitted a member 19 July, 1880.

JOSEPH W. CHAMBERLAIN, son of John and Mary (Silver) Chamberlain; born in Salem, 25 Nov., 1830; druggist in Salem; died 10 Dec., 1883. Admitted a member 21 Sept., 1859.

HENRY W. PERKINS, son of Henry W. and Dolly (Webb) Perkins; born in Salem, 1 March, 1832; cashier



of the Mount Vernon National Bank, Boston; died in Salem, 19 Jan., 1884. Admitted a member 16 Dec., 1873.

WILLIAM C. C. MOULTON, son of Hiram and Mary (Batchelder) Moulton; born in Newport, Vt., 14 Oct., 1839; a trader in Salem; died 17 Jan'y, 1884. Admitted a member 14 July, 1864.

STEPHEN BRADSHAW IVES, son of Stephen Bradshaw and Mary (Perkins) Ives; born in Salem, 8 March, 1827; graduated at Harvard College in 1848; admitted to Essex Bar in 1851. He did not hold many official positions, but was a celebrated and well-known advocate in the courts of the state; died at Salem, 8 Feb., 1884. Admitted a member 4 Jan'y, 1854.

JAMES MOORE CALLER, son of John and Mary (Southwick) Caller; born in Pleasant Valley, N. Y., 11 Jan'y, 1813; came to South Danvers at an early age; for many years was largely engaged in the leather business as a tanner and currier; died in Salem, 13 Feb., 1884. Admitted a member 30 March, 1859.

JOHN ARCHER, son of Jonathan and Rachel (Woodman) Archer; born in Salem, 4 July, 1796; in early life went to sea, and was privateering in the war of 1812-15; after the peace had a ship chandlery store on Derby street; for many years retired from active business; died 5 Mar., 1884. Admitted a member 26 May, 1858.

OTIS PHILLIPS LORD, son of Nathaniel and Eunice (Kimball) Lord; born in Ipswich, 11 July, 1812; graduated at Amherst College, 1832; admitted to the Essex Bar, Dec., 1835; practised in Ipswich until 1844, when he removed to Salem where he has since resided; Associate Justice of the Superior Court from 1859 to 1875, and Associate Justice of the Supreme Court from 1875

to Dec., 1882, when he resigned in consequence of failing health; died 13 March, 1884. Admitted a member 5 Oct., 1874.

**FIELD MEETINGS.** Five meetings have been held as follows:

*First*, on Tuesday, June 12, 1883, at "Oak Dell," South Georgetown, situated in a very delightful part of the county. Delegations from Georgetown, Groveland, Boxford, Topsfield and West Newbury joined those from Salem and its vicinity. After a ramble in the forenoon, and the lunch, the meeting was called to order, the president in the chair. Mrs. C. M. S. Horner, of Georgetown, spoke of the "Flora," Rev. Messrs. McDaniel, of Salem, and Alcott, of Boxford, on "Mineralogy and Geology," Messrs. Sidney Perley, of Boxford, and Henry M. Nelson, of Georgetown, on "Historical Matters of Local Interest;" there were also remarks from Messrs. M. W. Bartlett, of West Newbury, B. F. Stevens, of Boxford, and others.

*Second*, on Friday, June 29, 1883, at Dodge's Mill in Rowley, owned by Mr. Ignatius Dodge. The speakers at the afternoon session held in the old mill, where comfortable seats were improvised, were Messrs. John H. Sears, F. W. Putnam, John Robinson, Alfred Osgood and N. A. Horton. The remarks were mainly on archæological subjects, especially those of Messrs. Putnam, Robinson and Osgood.

*Third*, on Thursday, July 26, 1883, at Linebrook Parish, a rural country village in the western part of Ipswich. The afternoon session was held in the church. Mr. John H. Sears gave an account of the "Flora," Messrs. M. V. B. Perley and Sidney Perley spoke on "Historical Mat-

ters ;" there were also remarks from Rev. B. F. McDaniel, Messrs. J. J. H. Gregory, A. C. Perkins, N. A. Horton, and others.

*Fourth*, on Wednesday, Aug. 15, 1883, at Balch's Grove, Groveland, by invitation of the Groveland Flower Mission. At the afternoon session, Miss Harriet E. Paine spoke on "The Plants of the Vicinity," Dr. George B. Loring on "Forestry ;" there were also remarks from N. A. Horton and Dr. G. Cogswell.

*Fifth*, on Wednesday, Sept. 19, 1883, at West Peabody, by invitation of the Farmers' Club of that place. The forenoon was spent in visiting the farms of Messrs. Henry Saltonstall, and F. H. Appleton, and other places of interest. At the afternoon session, the speakers were Messrs. J. H. Sears, George Dixon, W. P. Upham, J. H. Ingraham, Willard Spaulding, James P. King and J. S. Kingsley.

MEETINGS.—Regular meetings occur on the first and third Monday evenings of each month. Special and adjourned meetings occasionally. At these meetings papers have been presented by the following persons and referred to the publication committee :

*Edward A. Silsbee*, on "Criticism of Poetry."

*William G. Barton*, on "Pigeons and the Pigeon Fancy."<sup>1</sup>

*Rev. B. F. McDaniel*, on "The Literature and History of Bells."

*J. Ritchie, jr.*, and *Charles Toppan*, on "A New Process of Bleaching."

*F. L. Capen*, on "Catastrophic Planetary Tidal Action of the Globe."

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<sup>1</sup> Bulletin, Essex Inst., Vol. XVI, p. 59.

*Samuel Garman*, on "The North American Reptiles and Batrachians, a list of the species occurring north of the Isthmus of Tehuantepec, with references."<sup>2</sup>

*Samuel Garman*, on "An Extraordinary Shark (*Chlamydoselachus anguineus*)."<sup>3</sup>

*Samuel Garman*, on "A Species of *Heptranchias* supposed to be New."<sup>4</sup>

*John H. Sears*, on "Weeds of Essex County."<sup>5</sup>

*F. W. Putnam*, on "The First Notice of the Pine Grove or the Forest River Shellheap."<sup>6</sup>

*Herbert B. Adams*, on "The Great Pastures of Salem."<sup>7</sup>

*J. A. Emmerton*, on "Dr. Bentley's East Parish Deaths; some Notes and Corrections."<sup>8</sup>

*Wellington Pool*, "Inscriptions from Gravestones in the Old Burying Ground in Wenham."<sup>9</sup>

*Leverett Saltonstall*, "Memoir of Oliver Carlton."<sup>10</sup>

*John T. Moulton*, "Inscriptions from the Old Burying Ground in Lynn."<sup>11</sup>

*Memorial of C. T. Brooks*: "Birth and Boyhood," by E. B. Willson<sup>12</sup>; "His Life at Newport," by Charles W. Wendte<sup>13</sup>; "Letter from W. P. Andrews<sup>14</sup>;" Remarks of R. S. Rantoul.<sup>15</sup>

*Luke Brooks*, "Genealogical Notes Respecting Henry Brooks and Some of his Descendants."<sup>16</sup>

*Edward S. Atwood*, "Memoir of John Bertram."<sup>17</sup>

LECTURES.—A course of seven lectures, under the di-

<sup>2</sup> Bulletin, Essex Inst., Vol. XVI, p. 3.

<sup>3</sup> Bulletin, Essex Inst., Vol. XVI, p. 47.

<sup>4</sup> Bulletin, Essex Inst., Vol. XVI, p. 56.

<sup>5</sup> Bulletin, Essex Inst., Vol. XV, p. 93.

<sup>6</sup> Bulletin, Essex Inst., Vol. XV, p. 85.

<sup>7</sup> Hist. Coll., Essex Inst., Vol. XX, p. 161.

<sup>8</sup> Hist. Coll., Essex Inst., Vol. XX, p. 209.

<sup>9</sup> Hist. Coll., Essex Inst., Vol. XX, pp. 232 and 297.

<sup>10</sup> Hist. Coll., Essex Inst., Vol. XX, p. 241.

<sup>11</sup> Hist. Coll., Essex Inst., Vol. XX, p. 273.

<sup>12</sup> Hist. Coll., Essex Inst., Vol. XXI, p. 1.

<sup>13</sup> Hist. Coll., Essex Inst., Vol. XXI, p. 13.

<sup>14</sup> Bulletin, Essex Inst., Vol. XV, p. 81.

<sup>15</sup> Bulletin, Essex Inst., Vol. XV, p. 78.

<sup>16</sup> Hist. Coll., Essex Inst., Vol. XXI, p. 24.

<sup>17</sup> Hist. Coll., Essex Inst., Vol. XXI, p. 81.

rection of the lecture committee, has been delivered as follows: *First*, Alban Andren, of Beverly, "Sweden by a Swede," Wednesday, Nov. 28, 1883. *Second*, Ephraim Emerton, "Martin Luther," Wednesday, Dec. 19, 1883. *Third*, Arthur M. Knapp, "Greek Art," Wednesday, Jan'y 9, 1884. *Fourth*, George M. Towle, "Carlyle," Wednesday, Jan'y 30, 1884. *Fifth*, George B. Loring, "Nathaniel Hawthorne," Wednesday, Feb. 6, 1884. *Sixth*, George M. Towle, "Charles Dickens," Wednesday, Feb. 13, 1884. *Seventh*, Edward S. Morse, "First Impressions of China," Wednesday, March 5, 1884.

In addition to the above, the following lectures have been delivered in the rooms of the Institute.

*George H. Hosmer*, "Martin Luther," illustrated, Saturday, Nov. 10, 1883.

*Matthew Arnold*, Friday, Nov. 30, 1883, "Science and Literature."

*Raymond Lee Newcomb*, Tuesday, Dec. 4, 1883, "The Story of the Jeannette."

*John G. Wood*, "Whales," Monday, Dec. 10, 1883.

*J. C. Welwood*, "On the Rhine" (illustrated), Thursday, Jan'y 10, 1884.

*John G. Wood*, a course of four afternoon lectures: "Ants of the Temperate Zone," Friday, Feb. 15, 1884; "Ants of the Tropic Zone," Tuesday, Feb. 19; "Pond and Stream," Thursday, Feb. 21; "The Horse," Tuesday, Feb. 26.

*Alban Andren*, "An Evening in Sweden," Tuesday, March 18, 1884.

*Morton Prince*, "On the Anatomy and Physiology of the Vocal Organs," Monday, April 7, 1884.

PUBLICATIONS have been issued as heretofore. The exchange list, with few exceptions, continues the same as last year.

**LIBRARY.**—The additions to the Library for the year (May, 1883 to May, 1884) have been as follows :

*By Donation.*

Folios,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11
Quartos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	68
Octavos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	827
Duodecimos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	519
Sextdecimos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	98
Octodecimos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	25
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Total of bound volumes,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1,548
Pamphlets and serials,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6,407
																			<hr/>
Total of donations,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7,955

*By Exchange.*

Folios,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11
Quartos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	68
Octavos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	827
Duodecimos,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	519
																			<hr/>
Total of bound volumes,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	526
Pamphlets and serials,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2,492
																			<hr/>
Total of exchanges,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3,018
Total of donations,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7,955
Total of exchanges,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3,018
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Total of additions,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10,973

Of the total number of pamphlets and serials, 2,722 were pamphlets, and 6,177 were serials.

The donations to the Library for the year have been received from one hundred and seventy-eight individuals and fifty departments of the General and State Governments and Societies. The exchanges from three individuals, and from one hundred and sixty-three societies and incorporate institutions of which ninety-six are foreign ; also from editors and publishers.

The annual examination of the Library has been made. Of the thirteen volumes that were missing last year, ten

have been returned; seven others are now missing from their places.

Donations or exchanges have been received from the following:

	Vols	Pam.
Adelaide, Royal Society of South Australia, . . . .		2
Agassiz, Alexander, Cambridge, . . . . .		1
Allen, Nathaniel T., West Newton, . . . . .		1
Almy, James F., . . . . .	26	22
Almy, S. H., . . . . .	1	4
Alnwick, Eng., Berwickshire Naturalists' Club, . .		1
American Association for the Advancement of Science, .	2	
American Library Association, . . . . .		1
American Ornithologists' Union, . . . . .		1
Ames, George L., . . . . .		18
Ames, Sons of Oakes, . . . . .	2	
Amherst College Library, . . . . .	1	1
Amiens, Société Linnéenne du Nord de la France, .	1	13
Anagnos, M., So. Boston, . . . . .		1
Andover, Theological Seminary Library, . . . . .		1
Andrews, Charles H., . . . . .		2
Andrews, Mrs. James H., . . . . .		1
Andrews, William P., . . . . .		50
Appleton, F. H., Peabody, . . . . .		1
Archæological Institute of America, . . . . .		1
Auckland, N. Z., Auckland Institute, Newspapers, Maps,	31	24
Augsburg, Naturhistorischer Verein, . . . . .		1
Baltimore, Maryland Historical Society, . . . . .	2	
Baltimore, Md., Johns Hopkins University, . . . .		15
Baltimore, Md., Peabody Institute, . . . . .		1
Bancroft, Rev. C. F. P., Andover, . . . . .		1
Barnes, George William, San Diego, Cal., . . . .		1
Barton, Edmund M., Worcester, . . . . .	1	
Bassett, Samuel, Chelsea, . . . . .	1	
Batavia, Natuurkundige Vereeniging in Nederlandsch India, . . . . .		1
Belfast, Naturalists' Field Club, . . . . .		2
Bell, Charles H., Exeter, N. H., . . . . .	1	
Bergen, Bergens Museum, . . . . .	1	
Berlin, Gesellschaft Naturforschender Freunde, . .		1
Berlin, Verein zur Beförderung des Gartenbaues, .		12
Bern, Naturforschende Gesellschaft, . . . . .		1

	Vols.	Pam.
Bolles, Rev. E. C., D.D., . . . . .	2	138
Bologna, Accademia delle Scienze, . . . . .		1
Bonn, Naturhistorischer Verein, . . . . .	2	
Bordeaux, Académie des Sciences, Belles-Lettres et Arts,	3	4
Boston, American Academy of Arts and Sciences, .	1	1
Boston, Appalachian Mountain Club, . . . . .		3
Boston Art Club, . . . . .		1
Boston, Board of Health, . . . . .		12
Boston, Bostonian Society, . . . . .		1
Boston, City of, . . . . .	4	
Boston, City Hospital, . . . . .	1	
Boston, Massachusetts General Hospital, . . . . .		1
Boston, Massachusetts Historical Society, . . . . .	1	
Boston, Massachusetts Horticultural Society, . . . . .		1
Boston, Massachusetts Medical Society, . . . . .		1
Boston, National Association of Wool Manufacturers, .		3
Boston, New England Historic Genealogical Society, .	1	5
Boston, Overseers of the Poor, . . . . .	1	
Boston Public Library, . . . . .		4
Boston Society of Natural History, . . . . .		21
Boston, State Board of Health, Lunacy and Charity, .	2	
Boston, State Library of Massachusetts, . . . . .	18	1
Boston Zoölogical Society, . . . . .		3
Boutwell, F. M., Groton, . . . . .		1
Bradlee, Rev. C. D., Boston, . . . . .		1
Braunschweig, Archiv für Anthropologie, . . . . .	1	1
Bremen, Naturwissenschaftlicher Verein, . . . . .		1
Bristol, Eng., Naturalists' Society, . . . . .		2
Brooklyn, N. Y., Brooklyn Library, . . . . .		2
Brooklyn, N. Y., Long Island Historical Society, .		1
Brooks, Mrs. Henry M., . . . . . Newspapers,		
Brown, Henry A., . . . . .	145	573
Browne, A. G., Jr., New York, N. Y., . . . . .		3
Brünn, Naturforschender Verein, . . . . .	1	3
Brunswick, Me., Bowdoin College Library, . . . . .		9
Bruxelles, Académie Royale des Sciences, des Lettres et des Beaux Arts de Belgique, . . . . .	9	
Bruxelles, Société Belge de Microscopie, . . . . .	1	10
Bruxelles, Société Entomologique de Belgique, . . . . .	2	
Bruxelles, Société Royale de Malacologie, . . . . .	1	12
Buenos Aires, Sociedad Científica Argentina, . . . . .	1	11
Buffalo, N. Y., American Society of Microscopists, .		1
Buffalo, N. Y., Historical Society, . . . . .		2



	Vols.	Pam.
Buffalo, N. Y., Society of Natural Sciences, . . . .		1
Caen, Académie des Sciences, Arts et Belles-Lettres, . .	1	
Calcutta, Geological Survey of India, . . . .	2	16
Cambridge, Harvard University Library, . . . .		3
Cambridge, Museum of Comparative Zoölogy, . . . .		11
Cambridge, Nuttall Ornithological Club, . . . .		3
Carpenter, Rev. C. C., Mt. Vernon, N. H., . . . .		1
Cassel, Verein für Naturkunde, . . . .		1
Chamberlain, James, . . . . Maps, . . . .	26	58
Chauncy, Elihu, New York, N. Y., . . . .	1	
Chicago, Ill., Historical Society, . . . .	2	1
Chicago, Ill., Inter Ocean Publishing Company, . . . .		1
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Lee, William, Boston, . . . . .	2	
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Saltonstall, Leverett, Boston, . . . . Newspapers, Maps,	558	349
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Tuckerman, L. S., . . . . . Maps,		512
Twyman, Joseph, Chicago, Ill., . . . . .		11
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American Journal of Science.	Lawrence American.
Bay State Monthly.	Lynn Bee.
Cape Ann Bulletin.	Manifesto.
Chicago Journal of Commerce.	Mansill's Signal.
Danvers Mirror.	Marblehead Messenger.
Essex County Statesman.	Medical Register.
European Mail.	Musical Herald.
Fireside Favorite.	Musical Record.
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Ipswich Chronicle.	Nation.
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Nature.  
 Newton Transcript.  
 Our Dumb Animals.  
 Peabody Press.  
 Quaritch's Catalogue.  
 Sailors' Magazine and Seamen's  
 Friend.  
 Salem Evening News.

Salem Gazette.  
 Salem Observer.  
 Salem Register.  
 Stove and Hardware Reporter.  
 Turner's Public Spirit.  
 West Newbury Era.  
 Zoologischer Anzeiger.

THE ART EXHIBITION opened on Wednesday evening, May 23, 1883, the seventh under the auspices of the Institute. These exhibitions of Essex County work have an increasing interest for those who watch them carefully from year to year, as an indication of a growth of art feeling in the community, and of the development of talent whose beginnings we have seen, as well as of the appearance of new aspirants whose early endeavors are full of interest and sometimes of decided promise.

The electric light was put into the hall for the first time, and enabled the visitors in the evening to see the collection to much better advantage than heretofore. Some excellent photographs were made of a portion of the exhibit with this light.

There were on exhibition, from one hundred and forty-four contributors, four hundred and eight specimens in the various departments of art. The arrangement was very effective, and the hall attractive.

The following is the list of contributors :

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**HORTICULTURAL.**—The trustees of the Essex Agricultural Society, having accepted the invitation of the authorities and citizens of Salem to hold their annual Cattle Show and Fair at the “Willows” in Salem, on Tuesday and Wednesday, Sept. 25 and 26, 1883, the Institute deemed it advisable to suspend all operations in that direction and to cordially unite with the trustees of the Agricultural Society in making their undertaking a success.

An account of the exhibition will be found in the “Transactions” of that Society for the year 1883.

**MUSEUM.** The specimens in natural history, including those in archæology, which have been given during the year, are on deposit with the Trustees of the Peabody Academy of Science, in accordance with previous arrangements. Those of an historical character or which possess an artistic interest have been placed in the rooms.

The following may be specified as contributors :

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George M. Whipple.	John Davis.
Miss F. L. Prescott.	

Among the additions to the cabinets during the year, a very interesting historical relic has been received, the inkstand of Wordsworth. A brief account of the manner in which it came into our possession may not be devoid of interest. In August last a letter was received from Mrs. Sarah N. (Pope) Dixon, formerly of Salem, now a resident of Darlington, Eng., dated Aug. 14, 1883, giving an account of her recent visit to Ambleside, in the Lake district, and of a pleasant call at "Stock-Ghyll Force or Falls," the residence of Mr. J. Coward, "who exhibited an inkstand, being the one used by Wordsworth. He said that he had many offers for it, but he would not sell, but would give it to some society or museum. Immediately I spoke a word for the Essex Institute, and he gave his word that he would give it." Ambleside was the home of Wordsworth from 1813 till his death April 23, 1850; the locality teems with memorials of him; there is

scarcely a crag, a knoll, or a rill which he has not celebrated in verse. On Jan'y 25, 1884, a letter was received from Capt. W. T. Hill of the barque "Venice," dated Charleston, S. C., Jan'y 21, 1884, stating that he had, on board, the inkstand of Wordsworth that was put into his hands by Mr. J. Coward, with the request to deliver the same to the Essex Institute; he intended to visit this section on his arrival, but was obliged to return to Liverpool and accordingly sent it by mail. It was duly received in good condition.

The Institute is under deep obligations to Mrs. Dixon, the suggester, to Mr. Coward the donor, and to Capt. Hill the transporter, a worthy trio by whose combined efforts this interesting relic of a well-known and much admired poet of old England has found its way to Plummer Hall, where it will long remain an object of interest to all who delight to study the literature of our fatherland.

**FINANCIAL.**—The Treasurer's Report of the receipts and expenditures of the past year (condensed for printing).

## RECEIPTS.

Balance of last year's account . . . . .		\$54 64
<b>INCOME OF General Account</b> . . . . .		
Assessments of Members . . . . .	\$884 00	
Publications . . . . .	575 36	
Lectures, Excursions, Hall, etc. . . . .	524 77	
Dividend . . . . .	40 21	
Salem Athenæum, Proportion of Expense . . . . .	204 26	
		<hr/>
		\$2228 60
<b>Income of Historical Fund</b> . . . . .		44 00
“ “ <i>Nat. Hist. Soc. Fund</i> . . . . .		36 00
“ “ <i>Davis Fund</i> . . . . .		392 16
“ “ <i>Ditmore Fund</i> . . . . .		180 40
“ “ <i>Manuscript Fund</i> . . . . .		24 94
“ “ <i>Ladies' Fair Fund</i> . . . . .		60 00
“ “ <i>Derby Fund</i> . . . . .		28 72
“ “ <i>Howes Fund</i> . . . . .		1430 00
“ “ <i>Story Fund</i> . . . . .		563 00
<b>Loan on Note of Corporation</b> . . . . .		400 00
		<hr/>
		\$5,442 46

## EXPENDITURES.

<b>PAID ON <i>General Account</i></b>		
Salaries . . . . .	\$1832 00	
Publications . . . . .	1081 80	
Fuel and Gas . . . . .	257 79	
Binding, Printing, Books and Stationery . . . . .	401 81	
Repairs, Express, Postage, etc. . . . .	125 75	
Salem Athenæum, Rent and Labor . . . . .	350 00	
		<hr/>
		\$4049 15
Paid on Historical Account . . . . .	56 26	
“ “ Nat. History “ . . . . .	56 25	
“ “ Ditmore Fund Annuity . . . . .	110 00	
Interest on Manuscript Fund funded in Savings Bank . . . . .	24 94	
“ “ Derby Fund funded in Savings Bank . . . . .	28 72	
“ “ Davis Fund funded at Savings Bank . . . . .	12 16	
“ “ Story Fund, paid to Legatee . . . . .	563 00	
Paid Note \$500 and interest . . . . .	541 04	
Balance on hand . . . . .	94	
		<hr/>
		\$5,442 46
The invested funds are now . . . . .	\$45,832 60	

Examined and approved by the Auditor, May 19, 1884.

The Secretary in concluding his report, says :

The urgent need of room for the shelving and arrangement of donations to the Library and the Museum, forces itself upon the attention of the officers of the Institute daily. In some of the cases books are already piled three deep, and valuable gifts to the Museum are stored away in drawers and other places, practically valueless to visitors for the purposes of examination. During the past year the matter of increased accommodations has been once more agitated, and plans for an addition to the present building have been laid before some of the officers of the Salem Athenæum and of the Institute for their informal consideration. The lack of funds to carry out these improvements appears to be the only reason for delaying a movement in this direction. Thirty thousand dollars, it is believed, would give ample room to both the Athenæum and the Institute. Some relief must be devised and that speedily. The subject is again commended to the attention of the directors.

# BULLETIN

OF THE

## ESSEX INSTITUTE.

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VOL. 16.                      SALEM : JULY TO DEC., 1884.                      Nos. 7-12.

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FIELD DAY AT TOPSFIELD, WEDNESDAY, JUNE 18, 1884.

NOTWITHSTANDING the extreme heat and dusty roads, a party numbering about sixty left Salem in carriages at 9 A. M. for a day in Topsfield. After a pleasant drive through Peabody and Danvers, the party arrived at the country residence of Col. T. W. Peirce, by whose kind invitation three hours were agreeably spent in rambling over the estate and visiting the greenhouses, conservatories, gardens and other places and objects of interest. This farm for some one hundred and fifty years was known as the old "Estey Place," previous to the sale, Sept. 5, 1821, to Hon. Benjamin W. Crowninshield of Salem,<sup>1</sup> by Daniel Estey of Topsfield, who inherited the same, by will, from his father Aaron Estey. The heirs of Mr. Crowninshield, April 21, 1852, sold to Dwight Boyden of Waltham;<sup>2</sup> Mr. Boyden, Sept. 10, 1852, to Frederick Boyden;<sup>3</sup> Mr. F. Boyden, June 2, 1856, to William Hammond Foster of Boston;<sup>4</sup> Mr. Foster, Jan'y 6, 1857, to the present proprietor, Thomas W. Peirce,<sup>5</sup> who has added to the original

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<sup>1</sup> See Essex Reg. Deeds, Lib. 227, fol. 246.

<sup>2</sup> Reg. Deeds, 460-54.

<sup>3</sup> Reg. Deeds, 468-237.

<sup>4</sup> Reg. Deeds, 532-244.

<sup>5</sup> Reg. Deeds, 544-129.

purchase by the annexation of adjoining lands, so that it now contains between four and five hundred acres. It is only within six or eight years that Mr. Peirce has inaugurated and perfected many extensive improvements: substantial and well-built faced stone walls now run all over the estate; low lands have been drained in a thorough and systematic manner, and the whole farm has been brought to a high degree of productiveness. The barn which was built by Mr. Aaron Goldthwaite of Salem, as were most of the other buildings, is an immense structure, the upper portion of which is used for the storage of hay, while the lower floor has accommodations for horses and cattle; the livestock now kept numbers 130 cows (and heifers), 11 working cattle, 8 horses and 4 bulls — Holstein, Ayrshire and Jerseys are the breeds represented; in the rear of the barn is the blacksmith's shop, with a twenty-horse power engine, where the general repairing of the farm tools is done; also the poultry house 100 feet by 15 feet, and other buildings. The Newburyport turnpike runs through the estate; the farmhouse and farm-buildings are located on the southern side, while the mansion house and porter's lodge (a most picturesque little cottage) are across the way on the hillside rising to the north. On the top of the hill in the rear of the house is a fine tower containing a tank with a capacity of 13,000 gallons; at the foot of the hill to the west is a never-failing supply of pure spring water and a pumping station. From the top of the tower is a magnificent view of the surrounding country and towns. Mt. Wachusett in this state, and the waters of Massachusetts Bay from Nahant to Cape Ann, are *always* visible on clear days; and the White Mountains are said to be occasionally seen.

The noonday lunch was partaken of in the large barn, tables and other suitable accommodations being provided.



At 2 P. M. the party drove to the Town Hall in Topsfield, about a mile and a half distant, where the afternoon session was held; the original party having increased to more than thrice its number by accessions from Topsfield, Groveland, Boxford and other towns in the vicinity.

At 2.30 P. M. the meeting was called to order by President Henry Wheatland, who in an opening address said that the exercises of the afternoon were arranged in commemoration of the fiftieth anniversary of the meeting held in Topsfield, on Wednesday, April 16, 1834, to complete the organization of the Essex County Natural History Society, one of the parent societies of the Essex Institute, preliminary meetings having been held at Salem in the December previous. It was intended that this meeting should have been held in April, but owing to the backwardness of the season and the inclement weather it was decided that it should be postponed to a day in June, to be selected by the committee on field meetings. Papers, especially prepared for this occasion, which are appended, were read by Prof. E. S. Morse, Mr. John Robinson, Rev. B. F. McDaniel and Mr. S. P. Fowler.

After the presentation of the papers the following gentlemen were called upon :

Hon. JAMES J. H. GREGORY commenced his remarks by quoting the old saying, "If you require proof of their work look around you," and applied it to what the society has done. One thing, he said, the other speakers had not touched upon,—local Indian antiquities and relics.<sup>6</sup>

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<sup>6</sup> This subject was assigned to Vice President Putnam, who had prepared himself to speak upon it, but was necessarily detained from the meeting.

Thirty-three years ago he deposited with the society the only collection it then possessed ; now it has one of the finest collections owned by any society.

He spoke of the lack of knowledge of natural history and of neighborhood history, urging that those studies be taken up in our public schools. He also spoke of the progress which had been made in arriving at conclusions, formerly by theory which was often at fault, now by science which rarely errs.

Rev. FIELDER ISRAEL spoke of the work and influence of the society, and of the elevating and refining influence of the study of nature, at the same time making appropriate reference to the valuable services of the President, and to the pleasure which Deacon Fowler, the only survivor of those men present at the meeting of fifty years ago, must experience in being with us here to-day. He also alluded to the prospective influence of the society, and closed by offering the following vote which was adopted :

*Voted*, That the cordial thanks of the Essex Institute are due to Col. T. W. Peirce for his very generous hospitality in opening his house and the grounds of his fine estate for the gathering of to-day, and for the abundant and refreshing supplies furnished at lunch.

Also to the gentlemen having in charge the Town Hall for the gratuitous use of said hall for this meeting.

NOTES ON THE CONDITION OF ZOÖLOGY, FIFTY YEARS AGO  
AND TO-DAY: IN CONNECTION WITH THE GROWTH  
OF THE ESSEX INSTITUTE.

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BY E. S. MORSE.

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A most natural and appropriate theme for discourse on this, the fiftieth anniversary of the Essex County Natural History Society, would be a review of the sciences and their progress during the last half century. So wonderful and prodigious has been their growth however, that neither time nor strength has permitted the preparation of such a review. In lieu of this we may with propriety run back to the time of the first organization of this society, one of the first of its kind in the country, and contemplate the condition of affairs then, and the attitude science presents to-day.

At that time the burden of general discourses on zoölogical science was mainly of an apologetic nature. We were invited to steal away from the perplexing cares of life to quiet retreats and soothe ourselves in contemplating the beauties and wonders revealed to us in the products of nature's handiwork. Newton's apple, Young's soap-bubble, and Galvani's frog, as illustrations, were always at hand to show what great fields of research had been opened by the observation of simple facts ; but fifty years have rendered science such a power in the world that its study no longer requires an apology. Indeed, so many and such wonderful results have grown out of the most trivial beginnings that, nowadays, a man might thoughtfully and systematically study the flight of motes in the air and still be regarded as sane.

Every established fact in nature, however insignificant it may seem, is of importance. To-day, as well as fifty years ago, one might indeed find rest and infinite pleasure in turning from the tiresome thoroughfares of activity to a contemplation of nature's marvels. And herein lies the very great difference between the Society of Natural History fifty years ago and similar associations of to-day. The work done by these societies in past times is now relegated to the individual care of those who wish for a relief from the strain of business activities. Hogarth, in a letter to Ellis, portrays very well the spirit that animated many of the workers of the past, as expressed in the prefatory pages of their works. He says: "As for your pretty little seed-cups, or vases, they are a sweet confirmation of the pleasure Nature seems to take in superadding an elegance of form to most of her works, wherever you find them. How poor and bungling are all the imitations of art! When I have the pleasure of seeing you next we will sit down — nay, kneel down if you will — and admire these things." The societies of to-day, if they are to be of any use, must be cared for by trained and salaried specialists. In past times a few genial and pleasant people sauntered leisurely through the cabinets and admiringly examined the graceful shell or curious fossil. Now thousands of eager and critical students throng through the same halls, hungry for the impressive lessons that greet them from every case.

Through the all-embracing doctrines of evolution, man has awakened to the vivid realization that he is part and parcel of the domain of nature, which he had heretofore studied as a matter apart and beneath him. The realms of thought opened by Darwin show how intimately he is connected with the animals below him, and that somehow his welfare, moral and physical, is to be affected by a

more intimate knowledge of the life history of those creatures which he had only regarded with a curious eye.

The record of this society is one that may well excite pride, not only for the great work it has accomplished, but for the dignity of its past history. Its first journal was issued nearly fifty years ago, at about the same time with the journal of the Boston Society of Natural History and its publication had only been anticipated by those of the American Philosophical Society, the American Academy of Arts and Sciences, which dates from the latter part of the last century, the Philadelphia Academy and the New York Lyceum of Natural History. Indeed, these societies had issued but few numbers of their publications, when this institution, as represented by the Essex County Natural History Society, published the first number of its journal, and since that time a continuous series of scientific papers has issued from its councils.

Another matter for congratulation is that this society has always kept true to its name. It has been wholly for the benefit and in the interests of the good old county of Essex. Public meetings to the number of over two hundred in all, have been held in every corporate town in the county, with but one exception; and the enthusiasm of its members has often led it beyond the limits of the county and of the state. These excursions have gone into out-of-the-way places,—little villages, crossroads and hamlets by the sea. In short, the society has met in sixty-eight localities outside the corporate limits of Salem.

To these places has the society induced the celebrated naturalists of the country to bring the results of their researches, and the latest and freshest fruits of science. Agassiz, Wyman, Rogers, Jackson, and the younger generation of naturalists, Putnam, Verrill, Hyatt, Packard, Scudder, Allen, Coues, Dall, Gill, Kingsley, Robin-

son, Emerton and a host of others, have from time to time addressed the citizens of this county on almost every conceivable topic within the domain of natural science, while papers and memoirs from their pens have enriched the pages of your publications.

No better evidence can be adduced of its county character than the fact that its members are by no means confined to Salem, but are found scattered throughout the county, and the further fact that this important anniversary is being celebrated not in its halls at Salem, but here in this beautiful town of Topsfield.

In further evidence of the fact that it is a county society, it has especially aimed at forming a collection of the animals and plants of Essex County, and through the devotion of Putnam, Cooke, Richard H. Wheatland, Robinson, Sears, Emerton, and many others, it has brought together a local collection of the first importance in this country. It can be said, without fear of contradiction, that in no other society in America can so complete and exhaustive a local collection of animals and plants be found, as has been brought together by this society. A general review of this nature will not permit us to point out the numerous species new to science or forms new to the state which have been added by these assiduous efforts.

Let us glance at the first volume published by the society nearly fifty years ago, and catch a glimpse of the poverty of resources with which these early pioneers heroically set out in their task. In this volume was published a catalogue of books, the working tools of a naturalist. A few of our lunch baskets might have held the entire library, and this collection consisted of a few volumes of the transactions of the Philadelphia Academy, and the opening numbers, with pages freshly cut, of one or two other societies, containing the germs of American zoölogy

and botany. This material consisted almost entirely of specific descriptions and the modest establishment of a few new genera. Outside of these publications, with the exception of works by Audubon, Nuttall, Wilson and a few others, there was absolutely nothing to which the student could refer to aid him in his studies. Since that time what wonderful progress! States with their organized scientific surveys, fish commissions, state boards of health, mindful of the germ theory of disease, and above and beyond all, the stupendous achievements of the United States Government Surveys with their great libraries of publications freely distributed throughout the land!

When our venerable president, Dr. Wheatland, first taught the young and ardent naturalist Stimpson the mysteries of dredging from a dory, how little could he have anticipated that within so short a time a United States' steam vessel, fitted with dredges and all the paraphernalia of deep-sea collecting, and attended by a corps of trained naturalists, should visit the county for several successive seasons for the sole purpose of dredging, and that this government and European governments should sustain expeditions for the purpose of dredging in the deepest abysses of the ocean!

At that time there was not a single text-book of zoölogy in our schools; now, nearly every high and classical school in the land has its classes in zoölogy and botany. Then not a college in the land with its special professor of natural science; now, every college with its special instructor in those branches and with rapidly growing museums. At that time not a single popular periodical devoted to these sciences; now, a number of illustrated weeklies and monthlies with large circulation. And here it is a matter of pride to state that the first and among the most important of these magazines, the American Natural-

ist, came into existence under the support and patronage of the Essex Institute, whose name it bore upon its cover during its earliest years, having in reality been founded and edited by one of its members.

At that time the newspapers recognized science by publishing now and then short paragraphs about five-legged kittens, or accounts of the hackneyed drop of water with its myriads of animalcules disporting within. Now, the freshest results of science published in technical language appear side by side with the gossip of the town. A comet appearing then was dismissed with a paragraph of a few lines or an apostrophe in the poet's corner. Now, the daily paper publishes a whole broadside about the subject from the pen of some able astronomer and illustrated by diagrams. It is safe to say that the daily newspapers of the country in a single day publish more strictly scientific matter than could be brought together in all the pages of a scientific library of fifty years ago. At that time a few men with unvarying monotony akin to an inherited instinct were recording the daily winds and temperatures; now, we have an organized meteorological bureau whose weather predictions have excited the admiration of the world.

At that time the science of archæology was not born. Evidences of the high antiquity of man had been brought forward only to be rejected as contrary to Jewish chronology; now, it is the most vigorous and aggressive of all the sciences, and one of Essex County's gifted sons, Mr. Putnam, whose name has been so intimately identified with the work of this society, is at the head of an endowed museum of archæology at Cambridge, and is for the first time teaching the country the proper and only way of exploring the mysterious mounds of the West. His discoveries thus far have revealed such rich fields



of research in our country that one is led to wonder that a single penny should ever be spent abroad for work of this kind while so much remains to be done here.

To come nearer home. At that time the unrivalled ethnological collections of the East India Marine Society could be got access to only by soliciting permission from some one of its members, most of whom at that time were scattered over the world in the interests of Salem's commerce. Now, through the liberality of the great Essex philanthropist, in founding the Peabody Academy of Science, and the wise administration of its trustees, these invaluable collections are open daily, free to all, and a throng of forty thousand people annually pours through the open doors. Liberal provisions are made to augment these collections and the additions in the past ten years have outnumbered the original collection. The biological collections of this society, as well, have been cared for in the same manner and are equally accessible.

As to the growth of the Institute it is a matter of wonder and pride that, until recently without special funds, save what it derived from the annual assessments of its members, it should have obtained the position it holds to-day.

It is almost pathetic to read the first address by Prof. John L. Russell before the society in 1836, and see how meagre were the possessions over which its members were felicitating themselves. Mr. Russell speaks in glowing terms of the "spacious and commodious halls, furnished with elegant and useful cabinets" and the library of one hundred volumes! And this was absolutely all: a few heroic members paying out of their own pockets in disproportionate sums the funds necessary to sustain even this display. How faintly could he have conceived that within fifty years this society should have grown to one of three hundred and forty members, with a library

of thirty-eight thousand volumes and invested funds to the amount of fifty thousand dollars.

While this prosperous growth is due in part to the rich intellectual soil from which it sprang, a very great credit is due to the unselfish and unceasing labors of its one persistent associate, our devoted president, who has been with it from its inception and who as an officer has been intimately connected with it at every stage of its development.

It is not a little remarkable that an organization embracing, as it has for thirty-five years, an historical as well as a natural history society, should have received from this man impartial solicitude and attention. Voluminous papers and memoirs, historical and biological, have been published in its proceedings. Matters pertaining to both subjects have often come up for discussion at the same meetings, and yet there have been no dissensions nor jealousies between the two branches. No factions have developed. The curse of political methods has never entered its councils. Perhaps it augured well for the society that its first act of incorporation was signed by educators and statesmen, by Horace Mann, then President of the Senate and Edward Everett, Governor of the Commonwealth.

Surely such harmony indicates the patience and sagacity with which its work has been guided. Certainly the highest compliment our president could receive is, that during the space of fifty years in which time he has successively held all the offices to the highest, he has been heartily seconded in every effort for its welfare.

With all this vitality and growth, this society is the only one of any age and importance in the country that has never had a home of its own. The Portland Society of Natural History, though twice burned out, has still a

building of its own. The Boston Society of Natural History, the Antiquarian Society at Worcester, not to mention other societies throughout the country, occupy buildings which they possess through the liberality of their patrons. This society, on the contrary, has had to hire rooms from the moment of its inception to the present time. Its name has been carried, on its publications, to the four quarters of the globe, yet it has never had the supreme comfort of seeing permanently wrought in stone over its own door the name which has done the county so much honor and credit at home and abroad.

At present it finds accommodations in rented rooms in a building far from fire-proof where it has stored away portraits and manuscripts of inestimable value, and its shelves fairly groan with the weight of its library accumulations, yet no citizen of the city or county has been prompted to perpetuate his name by securing for this worthy society a permanent habitation suited to its rapidly increasing needs.

In fifty years the society has attained more than its most sanguine friends could have hoped for. May it not be many years before successful efforts shall be made to secure a solid and fire-proof structure over whose portal the name of the Essex Institute shall be wrought in enduring stone, as a memorial of the past, and an inspiration for the days to come !

THE PROGRESS OF BOTANY IN ESSEX COUNTY DURING THE  
LAST HALF CENTURY, ESPECIALLY AS INFLUENCED  
BY THE ESSEX COUNTY NATURAL HISTORY SOCIETY AND  
THE ESSEX INSTITUTE. 1834-1884.

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BY JOHN ROBINSON.

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ONE of our older botanists has said that the careful study of the flora of a very limited region might well occupy the lifetime of any person, and that the result accomplished would contribute more information of real value to science than any general work the same individual would be likely to undertake successfully.

This sentiment applies to the institution as well as the individual. Too often we see the local scientific society striving, not to emulate the spirit, but actually imitating the work of state or national institutions, totally neglecting, all the while, the more important duty of first presenting to the public a complete exhibit of the natural products of the fields, the forests, and the waters of the immediate neighborhood, and of encouraging an earnest study on the part of the people, especially the younger, of the natural objects met in every-day life, with which it is safe to say few are at all well acquainted.

How many persons outside of a scientific class should we be likely to find who could, even to-day, readily and correctly give, in outline, the life-history of a single animal or plant? We find many persons who are familiar with the common field flowers, but how many of these could tell us a word of the grasses or sedges, or, give us even the common names of half the forest trees growing naturally in our own county of Essex? And yet, in the whole course of botanical investigation, there are no plants

so common as grasses or so conspicuous as the forest trees; there are none of more value considered economically and none of greater importance to the practical farmer and mechanic. Happily, however, it cannot be said that the Essex Institute has materially erred in this direction, as may be shown to-day, by the present excellent local herbarium originally begun by the Essex County Natural History Society and the numerous natural history field-clubs, children, so to speak, of the Essex Institute, successfully established in various parts of the county, whose members hold their meetings and collect and study the native plants and animals.

To consider the progress of botany in Essex County for half a century three points present themselves: (1) The condition of botanical knowledge now as compared with that of fifty years ago. (2) The progress made in fifty years' work here, as shown by the increase of libraries, public museums, private herbaria, etc. (3) The practical benefit and general knowledge bestowed upon the people of the county by such increased accurate knowledge of the subject and the facilities for obtaining it.

Prior to 1834, the young zoologist had little in the way of books or collections to aid his studies. Throughout the county but few students of animal life had been developed. No convenient text-book had then been written applicable to this region, and many of the common forms, among the lower animals, had not even been described. The expense and difficulty of preserving specimens prevented the formation of private collections in many departments. In this part of the country, the museum of the East India Marine Society had alone attained any considerable size, and that collection was only open to the public as a special favor and contained but little in the way of specimens illustrating local natural history.

The railroads had not been built, and stage communication was so slow and expensive that the young student could not run to Boston or Cambridge of a holiday to consult libraries and collections even had they existed, as now, in those places.

With the botanist, however, it was somewhat different. Although the life-histories of plants were little known, and the theory of natural selection and evolution from lower forms was comparatively unheard of, and species were more considered than morphological relations; yet, in Dr. Jacob Bigelow's "*Florula Bostoniensis*," first printed in 1814, the second and enlarged edition of which had appeared in 1826, the young botanist had the golden key which should introduce him to an intimate acquaintance with nearly every flower and tree his path might cross, in any ramble, hereabouts, and through this acquaintance with their names and natures lead him to the closer study of their structure and morphology. To those of us who are only familiar with the study of botany to-day it is difficult to realize the importance of Dr. Bigelow's little volume, or the labor and study expended in its preparation. Begun as a sensible recreation from his arduous professional labors, it became the standard for all botanists in this part of the country, and, for more than a third of a century held the ground undisputed, until the larger and more elaborate works of Dr. Asa Gray superseded it.

The study of botany in Essex County, we may say in New England, properly dates from the time of Rev. Manasseh Cutler at the close of the last century. Early writers as Francis Higginson, John Josselyn, William Wood, John Winthrop and others refer to the native fruits and flowers. Josselyn published the well known "*New England Rarities Discovered*," an edition of which

has been prepared in recent years with valuable notes by Professor Tuckerman, and Higginson in a letter written from Salem in 1629-30 (Mass. Hist. Coll., Vol. I, p. 121) speaks of the "Flowering Mulberry," or Raspberry, and "Chervil," or Sweet Cicely, as growing near Salem in places, where certainly, until a very few years, these interesting historical plants still flourished. None of these writers can, however, be considered as Essex County botanists, and it is not until the close of the American Revolution that we find any serious or scientific study of the plants of the county. Manasseh Cutler of Hamilton, after his varied services as revolutionary chaplain, lawyer, pastor, doctor, reformer and pioneer, found time to prepare in 1783-4, as the title of his paper, says: "An account of some of the vegetable productions growing in this part of America, botanically arranged." This was published in the first volume of the "Memoirs of the American Academy of Arts and Sciences" which was printed in 1785, where some three hundred and fifty species of flowering plants were described and several important scientific points suggested which have since been adopted in botanical treatises. It was his intention to extend this work, and several manuscript volumes are now in existence prepared toward this end. Dr. Cutler's paper bears the date of presentation Jan. 26, 1784, and, therefore, we are not only celebrating to-day the semi-centennial anniversary of the first organization formed in Essex County for the study of botany and kindred subjects, but the full centennial anniversary of the presentation of the first work upon the flora of Essex County by the first Essex County botanist.

Following Cutler came Drs. George Osgood and Andrew Nichols: the former contributed notes for Bigelow's "Florula Bostoniensis," and the latter delivered, in 1816,

a series of lectures on botany, the first of such given in this part of the country. Dr. Nichols was later one of the founders of the Essex County Natural History Society and its president, and thus has had an important influence upon local botanical work. In 1823, two young men, both destined to be long remembered on account of their contributions to botanical knowledge, began their work in Essex County. These were William Oakes of Danvers, later of Ipswich, and Charles Pickering, then spending much of his time at the homestead of his grandfather Col. Timothy Pickering at Wenham.

Oakes, disgusted with the law, his chosen profession, became the first critical botanist of the region, and at this time converted Dr. Pickering from conchology, a study he had first chosen, to botany.

Oakes botanized with Pickering extensively in Essex County, particularly in the Great Swamp, Wenham, a region then almost in its pristine wildness. Oakes afterwards prepared a list of Vermont plants for Thompson's history of that state, and had in contemplation a work on the plants of New England, which, owing to the appearance of Beck's Botany, was never completed. His most elaborate work was a folio volume on White Mountain scenery illustrated by Sprague, which, however, was not published until after his death in 1848. Oakes was impulsive and generous, and thoroughly in earnest in his favorite study. Like many men of note he was but little appreciated while living, yet no monument could have been erected to make his memory more cherished and his labors more respected than that which he left behind : an extensive collection of beautifully prepared botanical specimens determined with faultless accuracy, a portion of which formed the nucleus of the present county botanical cabinet now in the hands of the Peabody Academy of Science in Salem.



Dr. Pickering, in 1838, joined the Wilkes Exploring Expedition, of which he had been appointed the naturalist, and from that time until his death in 1881, his entire life was devoted to important works on zoology and botany.

We thus find in 1834, at the time of the foundation of the Essex County Natural History Society, a strong impetus had been given to the study of botany, beginning at Cutler's time and continuing directly to this date, through those who had been the disciples of Cutler himself, and that, developed at the same time, through a different channel, however, Bigelow's Botany had reached its second and enlarged condition.

For the systematic student, therefore, the path was made easy. In the departments of vegetable physiology the works of the older authors were accessible to those who could cope with the Latin, in which language they were chiefly written. Sprengel, the forerunner of Darwin, had, forty years before, published his work on the fertilization of flowers, which, however, was but little known; Andrew Knight had followed in 1800; Hale's experiments with the sunflowers were published and pictured, and the Jussieus, Schacht and Schleiden had swelled the writings on these and kindred subjects.

It is not to be wondered, therefore, at the first meetings of the new society, and later at those of the Essex Institute, that the subject of botany should have absorbed a large share of the time in its consideration, and that horticulture, its close kin, should develop in our midst even to becoming the mainstay of the Institute in its early and less prosperous days by furnishing the attraction to its rooms for the outside public, and through the proceeds of the regularly conducted exhibitions replenish the often scanty exchequer.

But even with the advantages these men thought they

possessed, how should we, to-day, think to accomplish any important results? The microscope furnished by Mr. Cole, the liberal amateur, was too costly a piece of mechanism to be even hoped for, except by few. Drying paper could not then be had, cheaply, at any natural history store. Indeed, no natural history store itself then existed. Horse-cars and steam railroads were not at the doors and street corners to take the collector swiftly to the woods and fields. Yet, patiently and surely, the work proceeded and collections were formed and new truths discovered.

To-day five editions of Asa Gray's Manual of Botany are broadcast over the land and countless variations, by his publishers, of Dr. Gray's other works are with it. Alphonso Wood has scarcely fewer followers, while the publications from innumerable other authors bring up the rear. Works on local floras are abundant. A good compound microscope can be had by almost any thrifty botanical student, and an excellent magnifying glass can at least be owned by all. Drying paper is on sale, as are also regulation size herbarium sheets and genus covers, in almost every city. Herbaria for consultation are everywhere accessible. We can run off in the cars, collect our box of plants, and be back to dinner, or, to Boston or Cambridge for consultation and exchange of ideas as quickly. In fact, we live in an age of such unheard-of advantages and luxury that, doubtless, we do not appreciate our privileges and have not half respect enough for the botanists of fifty years ago. The change is none the less marked to the student of vegetable physiology than to the collector of plants. Charles Darwin has come upon the scene and left it again, but left behind him an impression never to be effaced; he has revolutionized botanical study in many of its branches as much as he has that of zoölogy.

Gray has given us in the text-book of structural botany an almost perfect work, while translations of Sach's great volume are in most libraries, and, besides, almost every mail brings to our table magazines devoted specially to botanical research, filled with the latest information from every quarter of the globe. In short, the study of botany from being looked upon as merely including the collecting and naming of plants, has been shown to be of a widely different nature in its highest aims; the study of the life-history of the individual and its relations to other forms. No longer do we draw an impassable line between the flowering plants and cryptogams; recent study proves that no such line exists. Instead of a mass of disconnected members we are taught to see a graduated line reaching from the humblest one-celled alga to the loftiest and most highly developed monarch of the forest.

And what then are the visible results in Essex County of this fifty years of labor?

The nucleus of the herbarium begun by Oakes and Nichols has grown into a collection including some 4,000 sheets of mounted plants and 200 wood specimens, representing nearly 1,700 species of plants, native or naturalized in Essex County, besides a reference collection of about 10,000 specimens from all parts of the world, all of which is now neatly arranged and properly cared for by the Peabody Academy of Science, at whose rooms it is open for free consultation by any botanist in the county. With this collection are the latest botanical reference books and microscopes for the use of students. Lectures and instruction in botany have formed part of the regular work of the Academy, where classes have regularly been conducted for several years. At the evening meetings of the Essex Institute many papers of value on this subject have been presented, while the influence of the two hun-

dred field meetings, which the Institute has held in all parts of the county, cannot even be approximated. The last important work in this direction was the Catalogue of the Flora of Essex County, a volume of two hundred pages, published by the Institute, in 1880.

Many museums, societies and clubs have sprung up throughout the county, and we frequently see in the local press accounts of the meetings of the "West Newbury Natural History Club," the "Cape Ann Scientific Association," the "Boxford Natural History Club," or those of similar organizations in Lynn, Georgetown, Amesbury, Marblehead and elsewhere. Many of these societies, as well as some of our educational institutions, possess valuable herbaria, and in several instances lists of the floras of the towns have been published. Of private collections it is impossible to speak. Their number is legion; many are confined to special groups, as trees, ferns, grasses, mosses, sea-weeds, etc. Some are more general in character, and many are both extensive and valuable.

We could extend this enumeration to many pages, but the brief outline here given must suffice to indicate these visible results.

Of the influence exerted upon the people, as a whole, and of the increase of students on these subjects it is more difficult to speak accurately.

Fifty years ago, William Oakes, searching on hands and knees for half an hour, to obtain a few capsules of a rare moss, was thought, by a worthy country woman who had watched his movements, to be a harmless insane person, and, in simple kindheartedness, she took him a slice of bread and butter. It is doubtful if such a thing could happen now, although it is not unusual for the botanical collector to be curiously questioned as to the commodity he has on sale in the green box, or to be addressed from

the second story window of some house at which he may called for a drink of water after a dusty walk, being mistaken for a marauding tramp.

There is, however, no doubt that the general information of the people of Essex County, on the subject of botany, has vastly increased. The importance of the relations of certain insects to flowers is now so generally known that it would hardly be possible to find a community so stupidly ignorant as to be jealous of a neighbor's honey bees and almost drive him from the town in consequence, and this did actually happen in Essex County thirty years ago.

The distribution of useful scientific information through the county, and agricultural papers, is now so widely felt, and scientific lectures are so numerous, even in the smaller towns, that notions and superstitions, born of isolation and seclusion, are vanishing as mists before the morning sun. No longer do the former utterances of the lecturer or the writings of the essayist satisfy the growing demand. Mere accounts of habits and classification are still satisfactory to a juvenile audience, but for the maturer mind a deeper and more philosophical theme is required. Scientific books are more read and hence are more extensively purchased by the libraries. The benefits are twofold. Superstition is banished, and observation and rational thought encouraged.

This institution cannot, of course, be credited with all this change and improvement. Other forces have been steadily at work. The labors of our ancient and most excellent Essex Agricultural Society and its farmers' institutes, are an important factor not to be overlooked. The press and the pulpit have grown and developed immeasurably also, and have had their powerful influences brought to bear in the right direction, and natural

history has been introduced as a regular study in our higher grades of schools. Yet this institution has done a lion's share. Beginning before others, it has been as the leaven for the whole lump, preparing the people for all truth and wisdom. It has encouraged those who needed encouragement and offered facilities to those ready to work. Through its publications it has furnished the medium for the expression of ideas and the presentation of the results of scientific investigations, and it has sustained, at home and abroad, a reputation for Essex County as a scientific and intellectual centre. It is an honorable record, and this institution may well be proud of the result of its fifty years of labor. And in connection with this work the names of Cutler, Oakes, Pickering, Osgood, Russell and many other botanists will always be remembered with gratitude. They helped each other, and though all have passed away the result of their work will be a help to every future botanist who shall collect or study in Essex County.

Nor can I close without expressing my personal indebtedness to my old and honored friend, our president. To his belief in the necessity of encouraging the young student is in a great measure due the perpetuation of the institution he helped so ably to begin. He has ever believed that young laborers and new men must be engrafted on the old stock. I feel for myself as I know it has been with others, that what I have enjoyed of botany, of natural history generally, of museum work, is due to the encouragement given and the trust placed in me by him when I was but a boy, and if I have added the least of value to the work of those who have preceded me, it is the result of the stimulus coming of such encouragement and trust.

## GEOLOGY AND MINERALOGY IN ESSEX COUNTY, MASS.

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BY B. F. McDANIEL.

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THE first organized effort in the United States for the study of geology and mineralogy was the "Mineralogical Society," formed in New York city in 1798.

In appealing for aid and sympathy, information was especially desired as to the localities, quantity, and quality of gunflints, brimstone, saltpetre and lead.

Evidently the society meant to justify its existence. The state of the science is forcibly revealed by Professor Silliman, the elder, in 1818. "Notwithstanding the laudable efforts of a few gentlemen," he says, "to excite some taste for mineralogy, so little has been effected in forming collections, in kindling curiosity, and in diffusing information, that only fifteen years since (1803), it was a matter of extreme difficulty to obtain the names of the common stones and minerals; and one might inquire earnestly and long before he could find any one to identify even quartz, feldspar, or hornblende among the simple minerals, or granite, porphyry, or trap among the rocks.

We speak from experience, and well remember with what impatient, but almost despairing curiosity we eyed the bleak, naked ridges which impended over the valleys and plains that were the scenes of our youthful excursions.

In vain did we doubt that the glittering spangles of mica and the still more alluring brilliancy of pyrites gave assurance of the existence of the precious metals in those substances, or that the cutting of glass by the garnet and quartz proved that these minerals were the diamond; but,

if they were not precious metals and diamonds, we in vain inquired of our teachers what they were."

In the next twenty-five years, interest in this science rapidly increased. In 1825 Dr. Samuel Robinson published a "Catalogue of American Minerals," an octavo of 300 pages, giving the localities of all known minerals in the United States and British Provinces. Prof. Parker Cleaveland's "Treatise on Mineralogy and Geology" was first published in 1816, and marked an epoch in American science.

In 1824, North Carolina, the first state to take such action, authorized a geological survey.

In June, 1830, Massachusetts commissioned Prof. Edward Hitchcock to do the same work for this state. Other states followed, until now the whole extent of the country has been or is now being surveyed.

It is here to be noticed that the sciences of geology and mineralogy have made great and important strides away from the comparatively primitive knowledge and methods of the early part of this century. Then the terminology of both sciences was largely based on the external appearances of rocks and minerals. Hence an imperfect classification and many errors. The long and fierce quarrel between the Wernerian or Neptunian, and the Huttonian or Plutonian schools of geology had not yet settled down into the present dispassionate weighing of evidence.

The science of geology was not yet free and independent, but was subjected to tests and made to do duty in foreign fields, where its development was checked.

But the practical study of geology and mineralogy won many minds who cared little for speculative discussion, and who, indeed, did not feel competent to master the abstract principles of either science. The early local scientific societies were not largely made up of scientific men, but



of those whose hearts were touched with the beauties and wonders of nature, and who wished to sit in her school as humble disciples.

They were observers, with the true passion for knowledge,—explorers, whose zeal carried them through many difficulties and hardships, and rewarded them with many brilliant discoveries. Such were the early workers in the field of geology in this county.

The Essex County Natural History Society and its successor, the Essex Institute, have given their attention almost wholly to botany, zoölogy and prehistoric archæology, owing to the bent and profession of their leading members. In these directions they have given the Essex Institute and the Peabody Academy of Science a world-wide reputation. Had the same thorough and continuous work been done in the fields of which this paper treats, I believe that results hardly less brilliant and helpful to science would have been realized.

The geology of Essex County is not rich in metalliferous deposits, nor even as far as we know in valuable minerals; but both Rockport and Newburyport have yielded surprises to the older mineralogists, the former giving two new species to the science. Dana gives but eight towns in our county as mineral localities, one of which, the sodalite of Salem Neck, is only a reminiscence. Other localities have been named by Hitchcock and others, but little has been taken out of them. For instance, the evidence for the existence of the Topsfield copper mine rests at the bottom of the Atlantic. Geological and mineralogical investigation has been pursued here in a desultory way.

In the first three volumes of the Proceedings of the Institute are preserved the accounts of the early labors in this department. I will now briefly review them. Two

of the most eminent mineralogists of that time were Dr. Charles T. Jackson and Mr. Francis Alger. They attended the second field meeting of the Institute at Lynnfield, in July, 1849. The serpentine ledges there, like those in Newbury, then gave promise of a rich output of decorative marble.

It is unfortunate that this promise has not been realized. From an extensive acquaintance with the formation at Newburyport, I am satisfied that the deposit there may yet yield handsome returns for a comparatively small outlay.

The name of Dr. Andrew Nichols, of Danvers, early appears among the earnest and intelligent naturalists in the ranks of the Institute.

In a notice of his death, at the annual meeting, May, 1853, hearty testimony was borne to his noble work in the several departments of natural history prosecuted by the Institute. Nothing in the natural world escaped his questioning mind, and his power of imparting the results of his studies was equally felicitous. To him, it was said, we owe a great deal for the development of natural science in this county.

Dr. William Prescott, of Lynn, afterwards of Concord, N. H., where he died, was another earnest spirit and ready helper. He studied enthusiastically the geology and mineralogy of his neighborhood, and contributed generously of his stores to the cabinets of the Institute.

I was present at the sale of his collections in Concord, which were very large and rich, but like all such things sold at auctions, suffered a grievous slaughter.

The Rev. A. P. Chute, of Lynnfield, was another efficient worker in these fields. At the several meetings held at that place, Mr. Chute showed evidences of earnest and intelligent work. January, 1856, he made a report

to the Institute on the sodalite found on Salem Neck, which Mr. D. M. Balch reported on again more thoroughly in 1864. At a field meeting in Lynnfield, in Oct., 1856, Mr. Chute displayed cabinet specimens of chlorite, epidote, smoky quartz, fluorite (white and purple), feldspar, albite, pyrites, magnetite, siderite, magnesite, serpentine and manganese, the last probably dendritic, that he found in that town.

In 1857, Mr. B. F. Mudge, of Lynn, appears among the Institute workers in the field of geology. At the field meetings in Lynn, Nahant and Lynnfield, Mr. Mudge rendered efficient aid in his department, and in other ways at other times served the Institute. He gave the names of fifteen minerals that he had found in Nahant.

Mr. J. J. H. Gregory, of Marblehead, appears as early as 1858 among the active forces of our society, admirably filling the place made vacant by Mr. Mudge's removal to the west. He has been a faithful attendant and valuable helper ever since, the Proceedings of the Institute bearing witness to the diligence and intelligence of his geological studies. In Sept., 1858, Mr. Gregory read a paper on "The Geology of Marblehead," which, with such additions as more recent research might offer, might profitably appear among the publications of the Institute.

In 1860, Mr. D. M. Balch became curator of mineralogy. The Proceedings of the Institute bear record to his fidelity and competency.

Jan. 7, 1861, Mr. S. S. Mackenzie presented a paper on "The Geology of Topsfield," showing close and careful observation, but offering little of interest to the mineralogist.

Like all of our towns, Topsfield was early agitated by the gold fever, iron pyrites being in nearly all cases the

gay deceiver. One Smith, digging a well in this town, found a lump of what he supposed to be gold, and placed it on the mantle in his house. One day a stranger called and asked for a drink of cider. While Mr. Smith was absent in the cellar drawing the beverage, the visitor departed, taking the tempting mineral with him. A circle drawn with chalk on the floor showed where he had last stood. It is needless to suggest who the stranger was held to be.

In 1861, Rev. Stillman Barden reinforced the ranks of the Institute workers in the field we are now considering, and until his death contributed generously by voice and gifts of specimens to elucidate the geology of the county. Called to live at Rockport, he was the first to develop the mineral treasures of that place.

At field meetings held there in August, 1862, and August, 1863, he won the cordial praise of Dr. Chas. T. Jackson, Mr. Francis Alger and Prof. Alpheus Hyatt for his enthusiastic and intelligent labors in that interesting field; thereby the attention of trained scientists was drawn to the locality, and two new species discovered, besides the more accurate definition given to those already known.

In July, 1867, at a field meeting held in Andover, Prof. C. H. Hitchcock made an address chiefly in explanation of the kames or glacial ridges in that town and section. The study of these formations has since been ably pursued by Rev. George F. Wright, lately of Andover; now of Oberlin, Ohio, and two communications made by him to this society have been published in pamphlet form. This has been the first thorough, systematic work done by an amateur. That it has won the recognition and hearty approval of professionals has been simple justice, for no trained scientist could have more fully met

the conditions of his work than has Mr. Wright. His removal from the county is deeply to be regretted.

Following the meeting of the American Association for the Advancement of Science in Salem in 1869, a number of its members made a visit to Rockport, under the auspices of the Institute. Col. J. W. Foster, the eminent archæologist of Illinois, and Professor T. Sterry Hunt, made interesting and valuable addresses at the meeting there gathered.

The work I have mentioned has been largely done in a desultory way, and by untrained local students. Prof. Alpheus Hyatt and others had given some attention to our local geology, and in May, 1871, Professor Hyatt read a paper before the Institute on this subject.

This marked the beginning of a thorough detailed study of the district. Prof. Edward Hitchcock, in his report and map of 1841, and Prof. C. H. Hitchcock, in his map of 1871, had drawn the substantial geological features of the county; but as scientific views change rapidly and often radically, Professor Hyatt, in his more minute and recent investigations, found reasons for differing from their conclusions. He made a detailed map in colors of the geology of Marblehead Neck, which is now in the Mass. Institute of Technology.

Mr. M. E. Wadsworth, of the Boston Society of Natural History, and Prof. T. Sterry Hunt (see his "Chemical and Geological Essays") deserve mention for valuable, original work on the geology of this region.

Professor Hyatt's work has been taken up, and under his direction carried to greater completeness by Mr. W. O. Crosby, by whom a map and report were prepared under the patronage of the Mass. Commission to the Centennial Exhibition in 1876. In this report we have the first detailed and comprehensive statement of the geology

of Essex County, based on intimate personal study in the field.

But Mr. Crosby did not stop with this brief exposition. He prosecuted his work in the field and laboratory, and in 1880 published an octavo volume of two hundred and ninety-five pages, with an accompanying map, entitled "Contributions to the Geology of Eastern Massachusetts." It appeared under the auspices of the Boston Society of Natural History, with which he is officially connected.

The volume is a worthy monument of years of careful research and study, but its author disclaims any pretensions to completeness. In the nature of the case, it cannot be exhaustive. Large tracts of rocks, that are needed to verify inferences, are covered by drift and water, and future explorations and quarry-workings must be looked to for the explication of some unsolved questions.

It is hoped that an abstract of Mr. Crosby's report, with a geological map of the county, will be published by the Institute for the use of our schools and public libraries.

My report has come to an end, but the work of which it treats may be said to have been just begun, in a way that will need no radical revision. It is a work to which all observing, inquiring minds can contribute.

The intelligent farmer in his fields, the teacher and her scholars in their rambles, whoever has eyes to see, can help the geologist to complete the story of creation written on the great stone leaves of the earth's crust. The rewards of such work lie in the discovered facts, without which man knows not all the beauties and riches of his earthly home, and even the commonest life is not complete.

## AN HISTORICAL SKETCH.

BY SAMUEL P. FOWLER.

THE Essex County Natural History Society was organized on the eighteenth day of December, 1833, in Salem. The officers of the society who were then elected were : Dr. Andrew Nichols of the old town of Danvers, president ; Mr. William Oakes, of Ipswich, and Rev. Gardner B. Perry, of Bradford, vice presidents ; Mr. John M. Ives, of Salem, secretary and treasurer ; Rev. John Lewis Russell, of Salem, librarian and cabinet-keeper ; William Oakes, of Ipswich, John C. Lee, of Salem, Thomas Spencer, of Salem, and Charles G. Page, of Salem, curators.

Andrew Nichols, William Oakes, William Prescott and their associates were made a corporation under the name of the Essex County Natural History Society, February 12, 1836. A circular, dated Jan. 1, 1834, was published and distributed, setting forth the object of the society, which was to promote more generally the study of natural history in the county of Essex.

We may further notice the gallantry of the men who formed this society fifty years ago in inviting ladies to join in their work, not because there was at that time any discussion concerning woman's rights, but because they well knew the fondness of the fair sex for flowers and the beautiful things of nature.

I am an old man, but in the course of my long life I have never yet met with a woman who would say she was not fond of flowers. In this circular they say em-

phatically, "Ladies, you will perceive, are not excluded, and it is anticipated that they will contribute much to the success of the society. Several in Salem have already become subscribers."

These anticipations have been more than realized. Ladies have always taken a deep interest in the society and its work, and have greatly aided us in many ways and by gifts of substantial value. It would be interesting to know who were the ladies who first became members of the society.

The first anniversary address delivered before the Essex County Natural History Society was by Rev. John Lewis Russell, June 15, 1836.

On the sixteenth day of April, 1834, the society held its first field meeting at Topsfield, at the hotel then standing on the line of the Newburyport turnpike.

The company came in carriages, as railroads were then unheard of. I came to the meeting in a chaise with Dr. Ebenezer Hunt. The following persons were present: Dr. Andrew Nichols, of Danvers; William Oakes, Esq., of Ipswich; Rev. Gardner B. Perry, of Bradford; Mr. John M. Ives, of Salem; Mr. Benjamin Hale Ives, of Salem; Rev. John Lewis Russell, of Salem; Dr. Ebenezer Hunt, of Danvers; and Samuel P. Fowler, of Danvers; and perhaps some others whose names may have escaped my recollection. Only one of those then present is now living. Several of the party brought with them specimens of natural history, Mr. William Oakes bringing several of the beautiful plates of Audubon's magnificent work on the Birds of North America. The field meeting which was held fifty years ago was much like those of the present day. Rev. Mr. Russell, when alluding to it in his address, says, "the season, the weather,



the day were auspicious. It seemed as if Nature herself was smiling on our prospects and inviting us to her study and acquaintance, the lovely Hepatica and pure Sanguinaria were blooming under our feet, and assisted to adorn our tables." After dinner a stroll was taken in the woods and fields, and among the plants gathered was a fine specimen of Blood Root (*Sanguinaria Canadensis*) which was taken up with a spade, and upon our return to the hotel it was placed on the middle of the table with a newspaper under it, when we pledged ourselves to sustain the Essex County Natural History Society and promote its interest.

To carry out this intention, the several persons who were known to be interested in the study of any particular branch of natural history were requested to bring forward to the field meetings such specimens as they possessed or might find in their rambles. All through those early days of the society our pledge was well kept, notwithstanding the laughter noticed on the countenances of some persons when told we were posy-seekers and bug-hunters. But neither the sneer of the unthinking nor "the world's dread laugh" for a moment deterred us from going forward in the study of the natural history of the county of Essex. Farmers and gardeners have since derived important knowledge from the labors of entomologists, and in consequence of the constant increase of injurious insects it has now become necessary to make entomology a study for the preservation of our crops.

The love of flowers, their study and cultivation, have greatly increased in these fifty years. Flowers are now used at most public meetings and gatherings and are seen in churches. They are now profusely used at the burial of the dead, when fifty years ago the only plant you would

have seen at a funeral was a handful of tansy gathered from the garden or roadside and thrown upon the coffin.

The Essex County Natural History Society has not become extinct, although its name was given up when it was merged in the Essex Institute, which includes both those who study the wonders of nature and those whose tastes lead them to search out the events of the past.

The Essex Institute was formed by the union of the Essex Historical and the Essex County Natural History Societies. To effect this end the two societies held several meetings during the autumn of 1847. A joint committee was appointed to draft a plan to serve as a basis of organization. The plan offered by the committee was accepted by the societies at a meeting Jan. 14, 1848. An Act of Incorporation, from the Legislature, was obtained in February of the same year; and on the first of March following, by its acceptance, the Essex Institute was organized and the following officers chosen: Daniel A. White, President; John G. King, John Lewis Russell and John C. Lee, Vice Presidents; Henry Wheatland, Secretary and Treasurer; Frederic Howes, jr., Cabinet-keeper; George D. Phippen, Librarian; Frederic Howes, Joseph G. Waters and Matthew A. Stickney, Curators of the Historical Department; William Mack, Henry F. King and Samuel P. Fowler, Curators of Natural History; Benjamin H. Silsbee, Francis Putnam and James Upton, Curators of the Horticultural Department; John C. Lee, Frederic Howes and Ephraim Emmerton, Financial Committee.

My esteemed and somewhat eccentric friend, the Rev. John Lewis Russell, a learned and enthusiastic botanist, when the union of the two societies was under consideration, expressed to me his fears that the subject of natural

history would be deemed of minor importance, and that many of the members absorbed in the subject of genealogy would devote more time to find out who their great-great-grandmothers were than they would to the study of natural history.

I said I thought the subjects of civil and natural history could be studied together to the mutual benefit of the members of the Institute. The fears of Mr. Russell have never been realized as time has proved. The records of our proceedings will show that the study of civil and natural history has continued side by side, to the neglect of neither, but to the advantage of both; and an interest in these subjects has been developed in the county, which I trust will continue and increase. I cannot close without a tribute of respect to those departed friends who were associated with me in the formation of this society, and whose memory I fondly cherish. I well remember their enthusiasm in striving to awaken among the people of Essex County an interest in the study of nature, and I cannot forbear to express my desire and my hope that their laudable examples will be followed by the young men and women of the present day.

## A FIELD DAY AT ANNISQUAM

*Wednesday, July 16, 1884.*

A goodly number of the members and friends of the Institute spent a very pleasant day at this favorite seaside resort on the northern side of Cape Ann. The train made its usual prompt run to Gloucester; at the station, carriages were in waiting and soon the party were safely conveyed to the place of rendezvous, which was the post-office at Annisquam. This building appears to be the centre of the social life of the village. Not only do the U. S. mails arrive and depart with governmental precision, but the usual varieties of a country store are dispensed with courtesy and despatch; in the rear is a small hall in which our baskets, wraps, etc., were deposited and where the noonday lunch was laid. In the second story is a larger hall where the afternoon session was held.

The party spent the forenoon in rambling about the place. Some visited the Laboratory, established by Prof. A. Hyatt, an institution designed to cultivate the study of zoölogy, especially the marine; further reference to what was seen may be gleaned from Mr. Kingsley's remarks at the meeting. Some visited "Sunset rock" upon an eminence near by, which commands an admirable view of the broad Ipswich Bay, Plum Island with its nine miles of length, Agamenticus mountain in Maine and, occasionally, a glimpse of the Isle of Shoals. Some went to Dogtown, about two miles distant, which, many years ago, contained some forty houses, occupied largely by men who served their country during the war of 1812, and afterwards long continued to be the abode of the widows and orphans, especially of those who died on the battle field or who had gone down at sea; the last of them are still remembered

bringing to market the berries and herbs which yielded them a scanty support. They have now all passed away and the dwellings have also disappeared; the old cellars, the grass-grown roads and the traditions of the place impart an interest to this deserted hamlet.

Upon a point on the beach is the "Squam light," which was visited by some; others strolled upon the beach and gathered various specimens of natural history.

This is an interesting locality and its attractions have induced many to pass the heated term in the enjoyment of its cool and refreshing breezes.

The afternoon session was called to order at 2 P. M. by the President who, after a few remarks alluding to the pleasant meeting held at this place in August, 1872, called upon Mr. J. S. Kingsley, who is at present in charge of the Marine Laboratory which was visited in the forenoon, and who gave an interesting account of the history of the institution, the mode of management and its present condition. His remarks are embodied in the communication hereto appended.

Mr. JAMES S. JEWETT, of Gloucester, read a sketch of Annisquam, for which see Historical Collections, Essex Institute, Vol. XXI.

Prof. ALPHEUS HYATT followed. He expressed his pleasure in meeting his old friends, and said that he should always have the kindest feelings toward the Institute. In regard to the Laboratory he spoke of the philosophy of the instruction as distinct from the curriculum adopted in the various schools of learning. He then proceeded to give a short illustrated lecture or talk upon *sponges* which was very interesting and instructive.

A. C. PERKINS, Esq., formerly Principal of Phillips Academy, Exeter, now of Brooklyn, N. Y., Hon. JONAS

H. FRENCH of Gloucester and Hon. JAMES DAVIS of Gloucester, offered interesting remarks. *The first*, after complimenting the Institute upon the value of its work, proceeded to read some extracts of a bright and humorous character from the note book of a zoölogical student. *The second* expressed regret that the Institute could not go farther on the Cape, visit the quarries and accept his invitation to visit his own house and grounds. Referring to the horticulture of the Cape, he said that, while he was prospecting with the view of laying out and embellishing his own grounds, he was visited by Mr. Copeland, a man of experience in such matters, who, after a walk in the woods with the view of discovering what local plants might be found, said that we had more desirable shrubs and other kindred growths than can be found elsewhere. *The third* said that he remembered the circumstance of the meeting held in this place in 1872 and recalled the details of that day's proceedings. He then gave a talk which he considered supplementary to Mr. Jewett's interesting sketch, in which he recalled some of his own early recollections, the changes that had been made in the spelling of the word Annisquam, and the signification of the name as being "Pleasant water," which seemed to him a beautiful designation. He recalled the experiences of his father's days when the principal part of the business of Gloucester was done in this section of the town; the building of vessels was quite extensive and his father had inspected as many as nine thousand barrels of mackerel in a single season.

Hon. N. A. HORTON offered a vote of thanks to Messrs. Alpheus Hyatt and J. S. Kingsley, to Mrs. H. H. Bennett and Mrs. Alpheus Hyatt and also to Hon. Jonas H. French, for attentions and hospitalities rendered or proffered. Vote adopted.

## THE ANNISQUAM LABORATORY.

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BY J. S. KINGSLEY.

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FOR several years Professor Hyatt has invited one or more students to accompany him to Annisquam to spend the summer in the study of the marine forms so abundant here. It seemed from the number of applications that there was a demand for a marine laboratory on the coast near Boston which should be practically free to all. On consultation with some of the managers, the Woman's Educational Society of Boston became interested in the project and advanced the money necessary to fit up the laboratory which you have visited to-day.

The laboratory is under the charge of the Boston Society of Natural History. It was first opened for students in June of 1881 and during that summer twenty-two students availed themselves of the privileges afforded. So successful was the laboratory during its first season that money needed for a windmill was promptly furnished by that society which is doing so much for the education of woman and which has been constant and unfaltering in its support of the laboratory. By the aid of the windmill, salt water is pumped into the building thus supplying a tank on each of the tables besides three large aquaria in the centre of the room. The object of this was to keep the specimens studied alive in confinement, a task of no small difficulty. During the second year (1882) of the laboratory, fifteen students were present and during 1883 the number was nine. During these three years the laboratory has been under the immediate charge of Mr. B. H. VanVleck, a thoroughly competent instructor.

This year the number of students has been fifteen. Dur-

ing June and July, owing to the absence of Mr. VanVleck, I have had charge of the laboratory ; but about the first of August he will resume the position he has so acceptably filled in the past.

The object of the laboratory is to furnish students an opportunity to study animals and plants in the best possible manner. Some of those who come are competent to conduct original investigations and they are left to follow out any line they may choose. The majority, however, come to get a foundation and to fit themselves for teaching. We have nothing to do with species. The common question asked by students at first is what is the name of this and that form. The name is not the most important thing. What we aim to teach are the structure and development of animals and the methods of study best adapted to produce teachers and investigators. Each student, unless previously qualified, dissects a series of types of the larger forms, such as sea anemones, starfish, clams, lobsters, squid, etc. After this comes a drill in the methods of investigating the embryology of marine forms. You all know that a fish comes from an egg, but have you any idea of the way in which that small, simple object becomes converted into the highly organized cod or cunner? To trace these steps of development is the province of embryology and to-day the study of embryology is solving some of the most profound problems connected with life.

All our life here is not spent with the scalpel in hand or in gazing through the microscope. We have to collect the specimens we study. Collecting may seem an easy task but, in reality, it is one which requires experience to meet with much success. On the shores and beaches, when the tide is out, we find some forms ; others may be obtained by turning over stones or by digging in the mud. Still others are found below that zone which is laid bare by the



retreating tide twice in every twenty-four hours. To obtain these forms we have recourse to the dredge, a net with an iron rim, which scrapes the floor of the ocean and brings up the treasures living there.

On the surface of the water exists a fauna far different from that found in the location already mentioned, and to collect these a surface net is employed. This is made of thin cheese cloth and is dragged along the surface; the water readily passes through the tissue but the numberless animals floating at the surface are retained in its meshes. These surface forms are mostly minute, but at the same time they are exceedingly interesting. Among the forms will be found numbers of larvæ which delight the eye of the embryologist, but the vast majority are minute crustaceans as yet all but unknown to science. The myriads of these surface swimmers are beyond all computation. The product of an hour's collecting with the surface net can only be numbered by millions.

FIELD DAY AT ASBURY GROVE, HAMILTON, THURSDAY,  
JULY 31, 1884.

IN the immediate vicinity of the place of meeting is Wenham swamp, which comprises a territory several miles in extent, and with its beautiful ponds and woods and its diversified scenery has long been considered one of the finest localities in this county in which to botanize. Many of our rare and choice plants have here been found; and the collection made, some sixty years since, by William Oakes and Charles Pickering, then young men,<sup>1</sup> have made it well known among botanists. Thither repaired many of those who came to the meeting in the first train, and under the guidance of Mr. John H. Sears were successful in their findings. It is very desirable that at an early day, some of our naturalists should make a careful exploration of this region and publish the results of their researches.

Other members of the party lingered about the grove and took notice of the many improvements that have been made within the past few years, and of the new cottages which have been erected, replacing to a great extent the old tents and cheap structures of the early days of the enterprise.

The noonday lunch was partaken of in the dining hall at the grove.

The afternoon session was held in the chapel, recently erected. It was called to order at 3 P. M., by the

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<sup>1</sup> The one entered upon the practice of the law at Ipswich, which he soon left; the other, as a medical student in the office of Dr. A. L. Peirson at Salem.

PRESIDENT, who said: This is the third time that we have been kindly invited to hold a meeting in this beautiful grove, dedicated to Christ and to the church. The first was on July 6, 1866, and the second Aug. 12, 1877. On all these occasions we have been cordially received and heartily welcomed. This is the third field meeting of the present season: the first, at Topsfield, the geographical centre of the county; the second, at Annisquam, on the borders of the sea.

At the first the land and fresh-water animals and plants were considered; at the second the marine. The first commemorated the fiftieth anniversary of the meeting held in Topsfield on the sixteenth of April, 1834. In this connection the PRESIDENT made brief notice of some of the persons who were the first to place their names on the roll of membership: Ichabod Tucker, Daniel A. White, Andrew Nichols, Thomas Spencer, Thomas Cole, Robert Manning, William Oakes, Gardner B. Perry, John L. Russell, John C. Lee, B. H. Ives, J. M. Ives and Charles G. Page.

JAMES F. ALMY, treasurer of the Asbury Grove Corporation, extended a cordial welcome to the Institute at its third meeting at the grove. He spoke of the many natural attractions of the place, and said that while, as a summer home for hundreds of people, Asbury Grove had become very popular, the fact that it had been dedicated to the worship of God gave to it an added charm. Mr. Almy referred to the singing of the birds, the beauty of the trees and the ever-changing foliage, and the many forms of animal life, all of which offered an abundant opportunity for the study of nature which should be improved.

In closing, he gave some information regarding the growth of the Asbury Grove Association, the erection of new cottages and villas and the building of the new chapel, which was paid for by subscriptions in small sums from the people.

Mr. GEORGE D. PHIPPEN, introduced by the President as a member who joined the Natural History Society when a very young man, and who had in various ways, covering a period of many years, promoted its objects, said that we might well draw inspiration from the double purpose for which people come here ; there was no difficulty in harmonizing science and religion, both grew from a common inspiration. In this world there have been great convulsions in the building up of the earth ; but the process of completion is still going on. Among the prophets of science was Darwin, and the evolutionary principle is recognized as containing the elements of truth. He then spoke of plants with special reference to man's methods of helping nature ; selection, cross-breeding and hybridization were the three methods he described. He closed with an appeal to encourage the study of natural history among the young, and said that it had been of great service to him through life.

Vice President F. W. PUTNAM was the next speaker. He said that a little incident which occurred just before the meeting led him to take curiosity as the subject of his remarks. He then stated that while he was sitting under the trees with a friend he noticed many red ants, which were all going in one direction and all carrying objects of the same character. His curiosity was aroused and he caught several of the ants and found that each was

carrying another ant, apparently of the same species. While he and his friend were making their observations, a few other persons gathered around, and in a short time curiosity led many others to the spot and all became interested in the ants and curious to know why they were thus engaged in carrying their fellows, which it was found, could travel well enough as soon as they were taken from the jaws of their bearers. This led to a few statements in relation to the habits of the ants; and thus curiosity had led to knowledge. In this way curiosity had often been the cause, leading men to devote their lives to deep studies, the results of which had been of great importance to mankind, and when properly directed curiosity could not fail to elevate the mind; while misdirected curiosity, on the contrary, debases ourselves and often proves injurious to our fellow-men.

The speaker then gave instances in the life of some of the early naturalists who regarded all natural objects as curiosities, and who wrote to their friends to send them such curiosities as could be obtained, stating that they were curious to compare objects from different places. Thus begun many branches of natural science which have since occupied the minds of profound thinkers and men of deep research. He then called attention to the collecting of arrowheads and other worked stones, out of simple curiosity on the part of many persons, and showed how such curiosity, if not properly directed, leads to hoarding the objects as the miser does his gold, whereas if such collections were properly used and the curiosity of the collector properly directed so as to lead to research, much of interest and importance could be made from such things in relation to the early condition of man and his migrations. In concluding the speaker called attention to the importance

of taking advantage of the natural curiosity and so directing it as to lead to high results while developing the mind.

Mr. J. H. SEARS spoke with special reference to the plants peculiar to Wenham swamp. This swamp runs from Danvers to Hamilton and Ipswich, a distance of about five miles, and is three miles broad. In the part in Danvers and West Wenham, where he had botanized most, are the *Trillium erectum* L., *Cypripedium parviflorum* Salisb., *Cypripedium spectabile* Swartz., *Stellaria borealis* Bigelow, *Viburnum lantanoides* Michx. On Turkey Island, at this end of the swamp, the *Cornus florida* L. grows in abundance. He made reference to many plants that had been collected during the day, describing the peculiarities of several varieties.

Rev. B. F. McDANIEL made an interesting talk upon the bat and beetle, specimens of which had been given to him since his arrival. He had trained himself to keep an eye upon nature and nature's God, because he did not feel that he would be fitted to enter upon the future life, until he had learned all he could about this. Speaking of the beetle he described the details of its structure to show its adaptability to its needs. He closed by speaking of the desirability of the study of natural history in vacation days, and of this place as being adapted to such study; and also as favorable to the mental growth to be obtained in this way.

Mr. N. A. HORTON made reference to the nature of the Institute as devoted to inquiry into things which pertain to civil history, as well as to those which relate to

natural history. Mr. Spencer, of whom the President had spoken, gave shelter to George Thompson, the English anti-slavery agitator, when he was in Salem. Rev. Mr. Cutler, who preached fifty years in Hamilton, took an important part in founding the first settlement in the state of Ohio, which was a part of the great northwest territory to which the ordinance of 1787 applied; and there has been a strong presentation to show that this early anti-slavery measure, of which Nathan Dane of Beverly is supposed to be the author, was a result of preliminary councils, in which Dr. Cutler was a conspicuous influence.

He spoke of the many improvements made at the grove since 1877, and of the many attractions of the place. He alluded to the courtesies extended to the members of the Institute, and concluded his remarks with proposing the following vote which was unanimously adopted.

*Voted*, That the thanks of the Essex Institute be extended to the officers of the Asbury Grove Association for the use of the grove and the chapel, to James F. Almy for many attentions, and to the young ladies who served so efficiently at the dinner tables.

FIELD DAY AT NEWBURY OLD TOWN, THURSDAY, AUGUST 28, 1884.

THE party, on arrival in the early morning trains, proceeded to Plum Island, and spent two hours in a pleasant ramble ; thence to the Old Town Parish, where the local points of interest were visited ; some to inspect the collections of Mr. Alfred Osgood, some to the old burial ground containing the graves of Rev. John Parker, the Sewalls and many of the first settlers ; others to see several of the old houses, especially the residence of the late Joshua Coffin, the historian of Newbury, and the house built by Rev. James Noyes, pastor of the parish from 1635 to 1656, the year of his death, in the 48th year of his age, and now occupied by a descendant, Miss Mary E. Noyes, who was very courteous to the numerous visitors. Delegations from Groveland, Danvers and Byfield arrived at noon.

The afternoon session was held at 2.30 P. M., in the lower hall of the chapel, and was largely attended by residents as well as by the Institute party.

The meeting was called to order by the President, who spoke of another visit of the Institute to Newbury, on a beautiful October day, twenty years ago. Some of those who were present then are present to-day ; but among the absent who are still living, no one is missed more than the venerable Rev. Dr. Withington, who at that time favored the Institute with an interesting sketch of the First Church at Newbury, of which he, then at the age of seventy-five, was the active pastor. He closed by introducing



LUTHER DAME, of Newbury, who read a carefully prepared paper on "The Life and Times of Sir William Pepperell." He reviewed the life of the Elder William, his early struggles and the laying of that mighty fortune which made the name of Pepperell such a tower of strength in the early colonial days down to the time of Sir William, and the final extinction of the name in America.

At the outbreak of the French and English war in 1744, the appointment of the second William by Governor Shirley, to lead the expedition against Louisburg, lifted him into prominence in the colonies and gave him enduring fame. He advanced £5,000 out of his own fortune to defray the expenses of the war and gave himself energetically to the organization of the army. The speaker exhibited original correspondence and other memorials of Sir William and other leading actors in the war, which had been handed down in the family.

This paper was referred to the publication committee to be printed in the Historical Collections.

ALFRED OSGOOD, of Newburyport, read a paper on "Archæology," illustrated by the exhibition of Indian arrowheads and other rude stone implements. His views of their uses were entirely different from those of most students; instead of thinking all these arrowheads, etc., to have been made and used for warlike purposes, he believed that many of them were of an emblematic character; some were used as drills, others for various domestic purposes, and he did not consider it unlikely that many were carried as ornaments. The arrow-chipper kept the art in his own family, and as he was never molested had ample opportunities to indulge his tastes in the way of fanciful designs. The speaker exhibited illustrations which he considered were rude attempts to represent fly-

ing birds, chosen as emblems to propitiate the powers above, and another of a stone implement described by a writer as a weapon of war, which in reality was an ingenious implement used for doubling and twisting cords in household spinning.

Hon. STEPHEN H. PHILLIPS spoke on "The Early Settlers of Newbury."

Among the early settlers of Ipswich who found their way here were the Rev. Mr. Parker, his neighbors John and Benjamin Woodbridge and the Rev. Mr. Noyes. In 1635 they came to this village and Old Town by way of the River Parker, named in honor of the distinguished divine.

He alluded to the long and bitter controversies which sprung up in the parish; he then proceeded to discuss the great witchcraft delusion of the early days and closed by describing a visit to the old home of Rev. Mr. Noyes and tracing the honorable record of the Woodbridges in other states.

The remarks of Mr. Phillips were referred to the committee on publications to be printed in the Historical Collections.

Rev. B. F. McDANIEL, of Salem, read an elaborate paper on the "Geology and Mineralogy of Newbury," which is herewith appended.

D. B. HAGAR, of the State Normal School, Salem, presented the following resolution which was unanimously adopted:

*Resolved*, That the hearty thanks of the Essex Institute are hereby presented to Alfred Osgood, of Newburyport,

and Miss Mary E. Noyes, of Newbury, and their co-workers, for their earnest and efficient labors towards promoting the pleasure and success of the present meeting; to the First Parish of Newbury for the free use of its chapel; and to the several gentlemen, who, by their entertaining and instructive addresses, have largely contributed toward the important objects which are ever cherished by the Institute.

Rev. FIELDER ISRAEL, of Salem, briefly described a call upon Rev. Dr. Withington, the venerable divine, during the day, and then moved the appointment of a committee to consist of the President, Mr. Phillips and the Secretary, for the purpose of drafting a resolution to be spread upon the records, commemorative of this meeting and the appreciation on the part of the Institute of the life, learning and piety of Rev. Dr. Withington. The motion was adopted.

GEORGE OSGOOD, of Kensington, N. H., remembered a prayer delivered by the venerable divine, forty years ago, in the course of which he presented a sentiment, he, the speaker, had never forgotten and which he thought was applicable to-day. "Let us elect members we are not ashamed of, nor afraid to obey."

*The Committee to Dr. Withington.*

REV. LEONARD WITHINGTON, D. D.

MY DEAR SIR:

In the opening remarks at the field meeting held in Newbury on Thursday, August 28, 1884, reference was made to the meeting held here some twenty years previously, on a pleasant October day, when you made

some interesting remarks on the history of this church and society, and regrets were expressed at your absence on the present occasion.

Rev. Mr. Israel, of Salem, alluded to the pleasant call which he had made on you this morning, and proposed that the Institute tender to you its high appreciation of your faithful services, not only in your long pastorate among this people, but in the advancement of religious truths, education and general culture in the community.

This suggestion was unanimously approved by the meeting, and in conformity with the wish so feelingly expressed, the members of the Essex Institute now formally present their tribute of high regard and esteem, and officially express the veneration which is due to your advanced years and elevated character.

May Heaven still longer spare your well-spent life!

With the high respect of the Essex Institute,

HENRY WHEATLAND, *Pres.*

STEPHEN H. PHILLIPS,

GEORGE M. WHIPPLE, *Sec'y.*

## GEOLOGY AND MINERALOGY OF NEWBURY.

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BY B. F. McDANIEL.

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THE geology of Newbury is that of the Huronian system of the Eozoic period, that is, the period of earliest life. The rocks of this system overlie those of the Azoic period, and, until recently, were held to be non-fossiliferous. But the discovery of the Eozöon Canadense in the Laurentian limestones of Canada and here in Newbury moved far back the palæontological horizon. With the exception of small areas of palæozoic rocks in Quincy and Braintree, the Huronian system forms the main part of the coast from the New Hampshire line to Plymouth. In great part it is drift-covered.

The rocks in sight show great disturbance and metamorphism. In some localities the evidences of these changes are of the most striking character. Their condition is simply chaotic.

The stratified portions have usually a northeast by southwest strike, and the unstratified and intruded members of the series show a parallelism with the strike of the stratified rocks, which usually dip sharply to the northwest.

The Huronian system in eastern Massachusetts is chiefly made up of the following rocks :

1. Granite (hornblendic and binary).
2. Felsite (petrosilex of some authors).
3. Diorite (unstratified and chiefly exotic).
4. Hornblendic gneiss, stratified diorite.
5. Limestone.

1. *Granite*. It will be noticed by recent students of geology that several changes have taken place in the classification of our rocks. The old name syenite has given place to that of hornblendic granite, as being more specific. The term granite is now used to cover many varieties of rock, all crystalline, ranging from distinct diorite on the one hand to felsite on the other. The specific names of these varieties are determined by the presence or absence, and the greater or less quantity, of certain constituent minerals, mainly hornblende, in the rock. I have always maintained, and this is the view now generally accepted, that there are no absolute distinctions between rocks. There are varieties almost infinite, but no absolute species. It is possible to arrange a continuous scale of specimens covering the whole series.

It is necessary to have specific names for strongly marked rocks, though these resolve themselves into varieties that shade off again into other species. It requires long familiarity with, and close study of, all classes of rocks to be able to determine these specific distinctions. When even the professors and geological authors differ so much in their classifications, amateurs need not feel cast down by an occasional mistake.

In Newbury a fine hornblendic granite is developed in two bands or ridges running east and west, enclosed by diorites, and broader and coarser at the eastern than at the western end.

The serpentinic limestone is associated with this granite, which led Dr. T. Sterry Hunt to call it Laurentian; but the whole formation is pronounced by Mr. Crosby to be Huronian.

2. *Felsite*. This term is now used to cover many varieties of rock, some of which were formerly called porphyry, metamorphic slate, hornstone, etc.

The term porphyry has deservedly fallen into disuse as a substantive, and is now rightly used as an adjective. All the varieties once called porphyry are now arranged as varieties under the several great species or families of rocks.

The term felsite is used to include rocks composed mainly of a fine paste of quartz and feldspar, sometimes enclosing grains of quartz and crystals of hornblende and feldspar, sometimes banded like jasper, and sometimes segregated like conglomerate. Examples of the compact varieties are the so-called jasper of Saugus and Lynn; the banded varieties are found at Marblehead, and an example of the segregated variety is the so-called toadstone of Newbury.

The Newbury felsite extends in a belt along the River Parker, from its mouth to Byfield, a distance of five miles. Its width is from a few rods to a mile and a half, and lies between belts of granite.

Its prevailing color is a deep red or brownish red, but sometimes shades to purple, pink and gray. It is never porphyritic, but shows a banded structure, due to the interlamination of layers of quartzose and feldspathic materials. This banding indicates a sedimentary, not an igneous origin, though like all metamorphic rocks, our felsite has undergone material change.

I have already alluded to the so-called toadstone of Newbury as a variety of felsite. A full examination of this rock will be found in Crosby's *Geology of Eastern Massachusetts*, which I have largely followed in this paper.

In Newbury the felsite is highly ferruginous. The sides of the granitic basin in which it lies partake of the reddish cast of the felsite. In some places it might not im-

properly be called an iron ore, and its decomposition in one or two places observed by me has yielded a red ochre.

3. *Diorite*. This rock is laid down on Crosby's map as covering a large part of Newbury. It is the gangue of the argentiferous galena. Composed of feldspar and hornblende, generally in a finely divided, and sometimes in an impalpable mixture, it is very hard.

Diorite is a convenient term to describe all that class of rocks formerly known as trap and greenstone. Like granite and felsite, it is not the name of a single distinct species, but of a family having relationship on one hand to felsite, and on the other to granite and hornblendic gneiss.

4. *Limestone*. The magnesian limestone of Newbury is the best known of its geological formations.

In colonial times quarries of it were worked at the localities known as the "Devil's Den" and "Devil's Basin." In his diary of remarkable events under date of 1697, Judge Sewell records the discovery by Ensign James Noyes, of the beds of limestone in this town at the localities just named. The discovery created great excitement, as hitherto clam and oyster shells had been the only sources of lime, and great difficulty had arisen in consequence.

This appears to have been the first limestone discovered in Massachusetts, and so valuable was it held to be that restrictive regulations for its use were adopted and a committee appointed by the town to enforce them.

In the first century after its discovery, quantities were exported, though from the size of the excavations I should



judge that the whole amount was not large. Why the quarry was abandoned I have not been able to learn.

It is in the "Devil's Den" that the most interesting minerals in Newbury are found. I have visited it and the other localities here for the last twelve years. First in interest is the serpentine, varying from a rich bottle green to a leek green; the first compact, pure and translucent, the second impure and opaque; the most harmful impurity being iron pyrite disseminated through the mass.

Great expectations were once entertained as to the commercial value of this rock, and a company operated the quarry for marble, but nothing has been done in a commercial way for many years. A shaft was sunk in the field, not far off, during the silver excitement, but was soon abandoned. Quantities of a beautiful porphyritic rock were thrown out, that in masses, might prove to be profitable.

At present, hardly enough attractive rock is in sight to warrant great expectations, and the large masses of wollastonite, garnet, calcite and dolomite mixed with the serpentinic limestone would seem to confirm this view; but when we consider that the excavations have not even reduced the knolls to the level of the surrounding country, and the "Den" itself is a very modest pit, the resources of the place can hardly be said to be exhausted.

I am firmly of the belief that some generous blasting would reveal an abundance of fine, rich stone, superior to any verde antique marble in our market. Associated with the serpentine are masses of wollastonite, once called tremolite. It is a beautiful white mineral, in long, bladed, radiated crystals. It is too brittle to serve any other than the mineralogist's purpose.

Masses of compact garnet are also found at the "Den." When associated with or disseminated through the ser-

pertinic limestone, this massive garnet enriches it for ornamental purposes. It is also an excellent flux, and possibly may sometimes serve that purpose here.

Small masses of crystallized calcite appear, which I believe to be the same as the chalybite or carbonite of iron that occurs in connection with the galena at the silver mines and elsewhere in Newbury.

Asbestos occurs at the "Den," but not in large quantities. Much of the mineral there found and called asbestos is an asbestiform serpentine, or chrysotile, which appears in thin seams interlaminated with noble serpentine. This is one of the most beautiful combinations known to me. The dark green serpentine prevails at the "Den," the light green at the "Basin," which is a larger excavation, but not so well known.

It would seem that information on these points would be better known here than elsewhere. Possibly this is the case with the silver mines, the popular interest in which was almost as great as was the speculative. The discovery and rapid development of the argentiferous galena was one of the great epochs in your local history. A sadly brief one it was, as these deserted mounds and works testify.

That this clean, brilliant metal, mined in masses that made the town talk of those days, and yielding flattering assays, was not to be a perpetual bonanza, was regarded as rank heresy.

At least, that was my experience. No account, apparently, was taken of the local geology nor of the character of the gangue rock with reference to its docility in smelting. I ventured to express an opinion to the superintendent of the Chipman mine that these galena deposits were pockets in the diorite, each of them comparatively small in size, though possibly many in number. Operations

were suspended sooner than I anticipated, judging from the output of the leading mine, so that I do not know whether this theory was or was not confirmed. It is to be hoped that a part of the expectations then raised may sometime be realized.

The last formation to be noticed is the amygdaloid lying in the basin of the River Parker and on Kent's Island. This is a purplish-brown or chocolate color. It is not of great extent and is of little importance. On one side it passes into a breccia, and on the other into a chlorite slate, and may be only a product of the felsite.

I trust I have said enough to show that Newbury is rich in geological and mineralogical interest, and to excite a desire in some minds to explore still farther these fields and hills. It was amateur exploration that revealed these minerals of which I have been speaking. It is to the amateur geologist that the professional student mainly looks for hints.

Where so many richly suggestive hints exist as in Newbury, the amateur ought to feel encouraged to prosecute his field-work; not, let me say, in the hope of "striking something rich," with which to form a stock company, but to contribute new and important facts to science and to enrich his own mind with the wealth of knowledge and beauty that fills the earth.

FLOWERING OF PLANTS, DECEMBER, 1884.

At the meeting of the Institute, held on Monday, December 15, 1884, Mr. John H. Sears presented the following list of plants which he had found in bloom in the fields and pastures of Salem and vicinity.

DEC. 8, 1884.

Tansy, *Tanacetum vulgare*.  
Fall Dandelion, *Leontodon autumnale*.  
Common Dandelion, *Taraxacum Dens-leonis*.  
Golden Rod, *Solidago nemoralis*.  
Sea-side Golden Rod, *Solidago sempervirens*.  
Shepherd's Purse, *Capsilla Bursa-pastoris*.  
Charlock, *Brassica sinapistrum*.  
Field Chickweed, *Cerastium arvense*.  
Common Mallow, *Malva rotundifolia*.  
Yarrow, *Achillea millefolium*.  
Common Groundsel, *Senecia vulgaris*.  
Red Clover, *Trifolium pratense*.  
Mayweed, *Maruta cotula*.  
Arrow-leaved Violet, *Viola sagittata*.  
Spurry, *Spurgula arvensis*.  
Knawel Weed, *Scleranthus annuus*.

DEC. 14, 1884.

Witch hazel, *Hamamelis Virginica*.













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