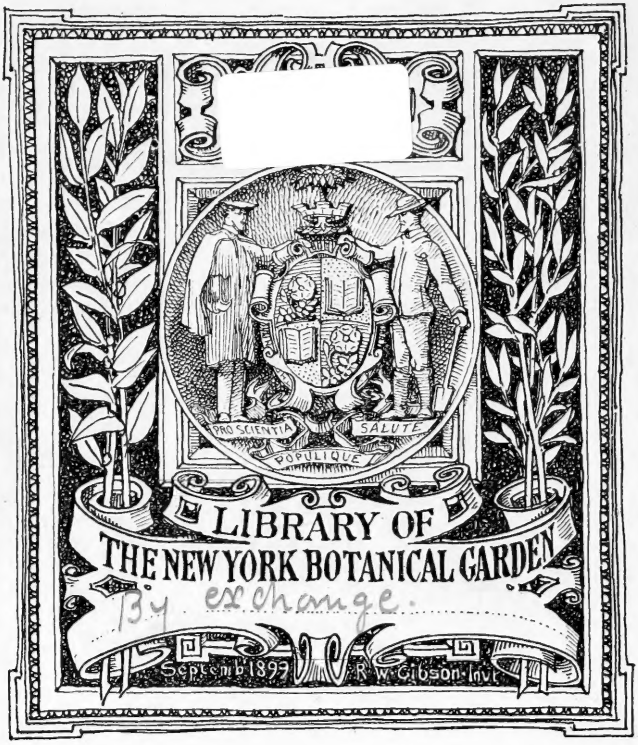

DAVENPORT ACADEMY OF NATURAL SCIENCES
INCORPORATED
MDCCCLXVIII


PRO SCIENTIA ATQUE SALUTE POPULIQUE
LIBRARY OF
THE NEW YORK BOTANICAL GARDEN
By exchange.
September 1897
R. W. Gibson, Invt.

Engd by E.G. Williams & Bro. N.Y.

C. C. Parry M.D.

PROCEEDINGS

OF THE

DAVENPORT ACADEMY

OF

NATURAL SCIENCES.

VOLUME VI.

1889–1897.

DAVENPORT, IOWA:
PUBLISHED FROM THE INCOME OF THE
Putnam Memorial Fund.
1897.

PUBLICATION COMMITTEE—1897.

MRS. MARY L. D. PUTNAM, *Chairman*.

PROF. W. H. BARRIS. DR. C. H. PRESTON.

PROF. SAMUEL CALVIN. DR. JENNIE McCOWEN.

The authors of the various papers are alone responsible for what is contained in them. The date of printing each form is given in the signature line.

EDWARD BORCHERDT, PRINTER.

PREFACE.

In presenting this, the sixth volume of its PROCEEDINGS to the scientific public, the Davenport Academy of Natural Sciences indulges the hope that it may be found to merit a reception no less favorable than that accorded to its predecessors.

It is the expectation of the Academy to publish at shorter intervals in the future than in the past, meanwhile issuing important papers as heretofore in *brochure* form, as soon as possible after their reception.

The recent endowment of the Publication Fund of the Academy by Mrs. Mary L. D. Putnam, Chairman of the Publication Committee, in the sum of nine thousand five hundred dollars, as a memorial to her husband, Charles E. Putnam, and her son, Joseph Duncan Putnam, provides for it assured financial support to the extent of the interest of the sum mentioned.

Early in the history of the organization (1876) the publication of PROCEEDINGS was begun under great difficulties by that indomitable young scientist, J. D. Putnam, and during the short remainder of his life he bent his energies toward placing it on an enduring basis. To this end he was ably assisted by his father, who not only lent the moral support of his approval, but was ever ready to respond to appeals for material aid, and it is eminently fitting that the father's name should be associated with that of the son in this memorial endowment.

The first signature line of the present volume bears date, December 14 1892, the twenty-fifth anniversary of the Academy's founding. Since then the unsparing hand of death has removed many of those most closely connected with its origin and growth.

The demise, shortly after his removal to Minneapolis, of Professor W. H Pratt, deprived this Academy of a life-long and enthusiastic worker for all pertaining to its interests and those of science in general. A life member and one of the original group to whom it owes its existence, on his foresight and energy the Academy had learned very largely to depend, and his loss is most deeply felt.

Among other prominent members who have passed away since this volume was begun, are Rev. S. S. Hunting of Des Moines, a former President and life member; William H. Holmes of this city, an earnest supporter; and Israel Hall, a friend and life member; while the scientific world at large has suffered irreparable loss in the death of Professors John Tyndall and C. V. Riley, both honorary members, and Charles Wachsmuth, a corresponding member of the Academy.

With a steady growth in its Museum and Library, the latter now numbering over thirty thousand volumes, the Academy yet feels sorely both the

loss of workers and the lack of funds for pushing original investigation But a glance at the contents of this volume will at least show good work done by associate members.

Articles of especial value and interest are a List of Coleoptera from the Southern Shore of Lake Superior, by Professor H. F. Wickham of the Iowa State University; a Bibliography of Iowa Antiquities, and a Summary of the Archæology of Iowa, by Professor Frederick Starr of the University of Chicago; and a Revision of the Truxalinæ of North America, by Professor Jerome McNeill of the University of Arkansas. The six beautiful plates accompanying the latter paper were reproduced by the Heliotype Printing Company of Boston, from careful delineations by Miss A. Simonds and Miss A. Leverett.

The excellent engraved portrait of Dr. C. C. Parry, which forms the frontispiece to the volume, was donated by Mrs. Parry, who also prepared the list of his published writings. These, with the accompanying Biographical Sketch by Dr. C. H. Preston, will give added interest to the volume for botanists the world over, as well as for the many personal friends and acquaintances of Dr. Parry in this city and elsewhere.

The SYNOPSIS OF PROCEEDINGS has been brought down to the beginning of the present year, and a comprehensive index is appended which will prove helpful to those consulting the volume.

Among the papers in prospect for Volume VII. are one on the Local Geology of Davenport, by Professor W. H. Barris, now ready, which it was intended to have included in Volume VI., and one on the Flora of Scott and Muscatine Counties, Iowa, in course of preparation by Messrs. F. Reppert, A. A. Miller, and W. D. Barnes. Also, biographical sketches of Charles E. Putnam and W. H. Pratt, with portraits, which were to have appeared in this, will be given in the seventh volume.

The Publication Committee takes pleasure in acknowledging the uniform courtesy of Messrs. Edward Borcherdt and R. B. Russell, of the Borcherdt publishing house, while the volume has been passing through the press.

DAVENPORT, IOWA,
March 29th, 1897.

CONTENTS.

LIST OF ILLUSTRATIONS.

PLATES.

WOOD-CUTS.

PROCEEDINGS

OF THE

DAVENPORT ACADEMY

OF

NATURAL SCIENCES.

VOLUME VI.

BIBLIOGRAPHY OF IOWA ANTIQUITIES.*

BY FREDERICK STARR, PH. D.

1. ALDRICH, CHARLES. *American Antiquarian*, vi., 42.
   Letter describing human remains, with relics, from Webster City, and mentioning mounds near Ft. Dodge, near Webster City, and in Emmett County.

2. ALEXANDER, W. E. *Hist. Winneshiek and Allamakee Cos.*, 1882, [pp. 357–361.
   Refers to mounds, pottery, copper relics, etc.

3. AMERICAN ANTIQUARIAN. 1887 (ix.), p. 116.
   Quotes Prof. Leon de Rosny, in paper before the Societe Americane de France, as against the Davenport Tablets.

4. ——— 1887 (ix.), p. 250.
   Quotes Uhle's remarks upon Putnam's address as given in paper—*Les pipes et le Tobaq*,—before the Berlin Anthropological Society. Also at p. 55.

*This Bibliography was presented before the Academy in 1887. It has recently (October, 1892) been extended, that it might be fairly complete to date. A few titles of ethnological articles, relative to the Sacs and Foxes, or other Iowa tribes, have been introduced.

5. ———————— 1889 (xi.), p. 325.

Notice of vol. iv., pt. 1, of the Proceedings of the Academy, and reference to its work in archæology.

6. American Journal of Science and Arts. 1885, pp. 411–412.

Notice of the vindication pamphlet and fair presentation of the Academy's claims.

7. American Naturalist. xviii., 954.

Refers to Henshaw's article (No. 51).

8. ———————— xix., 827.

Refers to "Conflict" between Davenport Academy and the Bureau of Ethnology.

9. ———————— xix., 913.

Refers to Academy's fine Collection of Pottery in a review of Holmes' paper (No. 52).

10. ———————— 1880, p. 216.

"Mound-builders." Summarizes Stevenson's article upon the work of the Muscatine Academy of Science.

11. ———————— 1880, p. 455.

Announces discovery of Elephant Pipe No. 2.

12. ———————— 1880, pp. 814–815.

Notice of vol. ii., pt. 2, and vol. iii., pt. 1, of the Proceedings of the Davenport Academy, and consideration of the Elephant Pipes.

13. ———————— 1886 (xx.), p. 671.

Notice of vol. iv. Proceedings of the Davenport Academy, and consideration of Putnam's vindication.

14. Annals of Iowa. New Series, i., No. 2, p. 1.

"Indian Mounds." Questions the antiquity of mounds and mound-building. Refers to cup found in Iowa City mound.

15. BANTA, W. V., and JNO. GARRETSON. *Smithsonian R.*, 1881, 532.
"Mounds at Snake Den, near Salem, in Henry County." Nine mounds, some of which were explored. Skeletons, badly decayed, and stones in some of those opened.

16. BARBER, EDWIN A. *American Naturalist*, 1882, xvi., pp. 263–281.
"Mound Pipes." A study of the curved-base pipes, illustrated by many specimens in the collection of the Academy.

17. ——— *American Naturalist*, xvii., 745.
"Catlinite and Pipes." Describes use of catlinite. Iowa pipes figured and described.

18. BEAL and LOOS, PROFS. *Chicago Journal*, June 23, 1886.
Mound Exploration three miles west of Toledo, Tama County.

19. BEEBE, MAJ. *Popular Science Monthly*, xx., 403.
Letter asking definite expression of opinion from Putnam, Rau, Mallery, Henderson, concerning the Grave Creek, Piqua, and Davenport Tablets, and the Pemberton Axe.

20. BERLIN, A. F. *American Antiquarian*, viii., 97.
"Fraudulent Objects of Stone." Four pages of correspondence between Messrs. Gass, Stevens, and Berlin.

21. ——— *American Antiquarian*, viii., 228.
"Fraudulent Stone Objects, and the Gass Correspondence." Letter in reply to Putnam's "Davenport Tablets" (No. 94).

22. BETTISWORTH, GEO. W. *History of Linn County*, Chicago, 1878.
Fanciful article. List of mounds near Cedar Rapids.

23. BLUMER, REV. A. *Proceedings Davenport Academy*, ii., 132.
"Mounds in Louisa County." Interesting Exploration. "Elephant Pipe" secured.

24. BRACE, A. L. *Young Mineralogist and Antiquarian*, December, [1884, pp. 46–47.
Mounds near Sioux City.

25. BUSBY, MISS ALLIE B. *Two Summers with the Musquakies*, 12 [mo., 1886.

Recollections of a teacher among our Tama City Indians.

26. CALVIN, SAMUEL. *Prehistoric Iowa*, 8vo., pp. 5–29, 1892.

Lecture; printed in pamphlet form by State Historical Society. Mainly geological; refers to implements from Iowa loess, the Neanderthaloid Skulls, and approvingly to the Elephant Pipes.

27. CAMPBELL, AUGUSTUS. *American Antiquarian*, ix., p. 43.

"Modern Mound Builders." Vaulted mound near East Dubuque, contained sitting skeletons and a cup.

28. CAMPBELL, JOHN. *American Antiquarian*, iv., 145.

"Proposed Reading of the Davenport Tablets." Quite an elaborate article. The tablet a Hittite relic.

29. ———— *Trans. Am. Assoc. Adv. Sci.*, 1883, pp. 419–421.

"The Mound Builders Identified." Study of the Khitans. Khita hieroglyphics compared with the Davenport Tablets inscriptions.

30. CATLIN, GEORGE.

Information about the Sacs and Foxes scattered through his work are collected in Donaldson's article (No. 42).

31. CHURCHILL, A. D. *Proceedings Davenport Academy*, ii., 257.

"East Davenport Mounds." Exploration of three mounds. No remains.

32. CLAYPOLE, E. W. *Trans. Am. Assoc. Adv. Sci.*, 1887, p. 312.

"What Is It?" Refers to the curious cast-like objects in the form of shells, possessed by the Academy, and believes them made by the Indians or for trade with them.

33. CONANT, A. J. *Footprints of Vanished Races in the Mississippi* [*Valley*, 8 vo., pp. 120, St. Louis, 1879.

Cites Pidgeon at pp. 15–24, and p. 70, regarding Iowa mounds; also, Iowa planter's opinion of "corn-field mounds."

34. CUTTS, J. B. *Smithsonian R.*, 1872, 417.
"Ancient Relics in North-western Iowa." Pottery fragments, charcoal, stone circles, etc., near Little Sioux River.

35. DAHLBERG, ROBT. N. and CHAS. L. *Smithsonian R.*, 1879, 349.
"Ancient Pottery from Mounds on the Des Moines River." Treats of its composition and manner of manufacture.

36. DAVENPORT ACADEMY. *Proceedings*, i.
Brief references to Antiquities, etc.
Bone Implement from East Davenport, 43.
Copper Implement described, 59.
Prehistoric Cremation Furnace, 64. With figure, Plate 26.
Copper Axe, 73.
New Boston and Toolesboro Explorations, 77.
List of Museum Additions, —.

37. ———— *Proceedings*, vol. ii.
Brief References.
Additions to Museum, 49, 214.
Mound Builders' Cloth, 6.
"Gass Tablets" announced. Resolution, etc., 81, 86, 256.
Stone Carving, Hardin County, 115.
S. F. Baird's "Opinion of Tablets," 127, 145.
Cleona Inscriptions presented, 137.
Letter asking advice, from J. W. Powell, 137.
"Pleasant Valley Carving," 138.
Publication Committee's Report on Tablets, 216.
Mound opened below Rockingham, 219.
Elephant Pipe. Circumstances of, 348.

38. ———— *Proceedings*, vol. iii.
Brief References.
President's address refers to relics and explorations, 9, 13.
Curator's Report, 6.
Elephant Pipe No. 2 shown, 130.
Mounds near Wheatland, 134.

39. ———— *Proceedings*, vol. iv.
Brief References.
To Henshaw's Article, 246, 249, 250.
Exploration of large mound by Gass, Muscatine Co., 210.

40. DAVIS, M. W. *History of Johnson County*, Iowa City, 1883.
Davis and Col. Trowbridge are quoted regarding the groups of mounds of the county, and some remains and relics, particularly a complete vessel of pottery, are described.

41. DEAN, SETH. *Smithsonian R.*, 1881, 528.
"Antiquities of Mills County." Circular depressions in bluffs, and mounds near Glenwood.

42. DONALDSON, THOS. *Smithsonian R.*, 1885, pt. 2, App., pp. 13–39.
"The George Catlin Indian Gallery." Catlin's outline pictures of Sacs and Foxes are here reproduced, with his observations upon the tribe. Some notes regarding their present condition are added.

43. DORSEY, J. O. *Transactions Anthropological Society*, vol. ii.
"Gentile System of the Iowas."

44. EVANS, S. B. *Smithsonian R.*, 1879, 344.
"Notes on Some of the Principal Mounds of Des Moines Valley." Diagram 1 shows five locations near Ottumwa. Diagram 2 shows locations of shell-heaps and mounds near Keosauqua. Explorations of mounds described.

45. ———— *Chicago Times.*
"Mounds of Des Moines Valley." Occasional papers on this subject during 1879 and 1880.

46. ———— *Ottumwa Democrat.*
Occasional papers from 1870 onward.

47. ———— *Western Scientist*, vol. i.
"Mounds of Des Moines Valley." (Magazine published at Ottumwa. Crawford, editor.)

48. EVANS, S. B. *History of Wapello County*, Chicago, pp. 336–342.
Articles in *Smithsonian Reports* and *Chicago Times* are here quoted. The same article also appears in the History of Van Buren County.

49. FARNSWORTH, P. J. 1875.
"Mounds and Mound-Builders." Paper read before "Iowa Academy of Natural Science."

50. ——— *Popular Science*, xx., 266.
"Identity of Indians and Mound-Builders." Letter referring to platycnemism in certain mound remains, and states that Dr. Farquharson found the same in Sioux remains at Davenport.

51. FARQUHARSON, R. J. *American Antiquarian*, i., 136.
"Phonetic Elements in American Languages." Speaks of Mexican symbol for "war."

52. ——— *American Antiquarian*, i., 168.
"Davenport Tablets." Quotes M. Lucien Adam, at Luxembourg meeting of the "Americanistes," as endorsing the tablets.

53. ——— *American Antiquarian*, ii., 67.
"The Elephant Pipe." History of finding Pipe No. 1. Description. Table of measurements of elephants and mastodons. Points out several examples of omission of "*tusks*" in representations.

54. ——— *American Antiquarian*, iii., 330.
"Amulets and Post Mortem Trepanation." Describes a "rondelle" and two skull fragments from which such objects had been cut. All from Iowa. Refers to literature on subject.

55. ——— *Proceedings Davenport Academy*, i., 117.
"Recent Archæological Discoveries at Davenport of Copper Axes, Cloth, etc., etc." Valuable paper of 26 pp. "Cook Farm Mounds" exploration. Many notes regarding the relics found.

56. ——— *Proceedings Davenport Academy*, ii., 103.
"On Inscribed Tablets." Quite elaborate; 12 pp. Full discussion. Figures.

57. ——— ——— *A. A. A. S. Trans.*, 18, 1875.
"Recent Exploration of Mounds Near Davenport," 18 pp., with 6 plates. Practically same as No. 33.

58. FOSTER, J. W. *Prehistoric Races of the U. S.*, p. 105.
Simply mentions small mounds near Dubuque.

59. FULTON, A. R. *History of Boone County*, 8 vo., 1878.
"Archæology of the North-west." References to Iowa mounds. Article of little value. Occurs also in History of Mahaska County.

60. FULTON, A. R. *The Red Men of Iowa*, 8 vo., 558 p., 1882.
Treats of past history and present condition of our Iowa tribes. Pages 81–94 treat of "Prehistoric Man."

61. GALLARD, ISAAC. *Annals of Iowa*, vii., 347–366.
"Indian Tribes of the West: Their Languages, Religion, and Traditions." The best informations upon the Sacs and Foxes.

GARRETSON, JOHN. (See No. 5.)

62. GASS, J. *Proceedings Davenport Academy*, ii., 92.
"Excavation of Mound No. 3, Cook Farm," Davenport. Description of openings in 1874 and 1877. Finding of "Tablets," etc.

63. ——— ——— *Proceedings Davenport Academy*, ii., 140.
"Mounds in Louisa County." Describes opening of nine burial mounds.

64. ——— ——— *Proceedings Davenport Academy*, ii., 189.
"Mounds in Louisa County." Opening of several mounds. Relics found. (See No. 11.)

65. ——— ——— *Proceedings Davenport Academy*, ii., 141.
"Mound No. 10, Cook Farm." Account of opening. Diagram showing *curious* structure.

66. ———— *Proceedings Davenport Academy*, ii., 142.
"Inscribed Stones, Cleona Township, Scott County." Five found in bed of creek.

67. ———— *Proceedings Davenport Academy*, ii., 172.
"Inscribed Rocks in Cleona Township." Fuller description than No. 66. Stones are hard, heavy, coarse greenstone.

68. ———— *Proceedings Davenport Academy*, ii., 155.
"Mound in Jackson County." Opened for Mr. Gass. Simple structure. Some relics.

69. ———— *Proceedings Davenport Academy*, ii., 173, 219.
"Mounds in Jackson County." Further exploration. Location of groups, and excavation.

70. ———— *Proceedings Davenport Academy*, iii., 183.
"Ancient Fortification, Louisa County." Grandview Township. Two earth-walls enclosing two acres between ravines. Diagram.

71. ———— *Proceedings Davenport Academy*, iii., 189.
"Mound Explorations." Location and examination of many mounds in Grandview Township. Finding of Toolesboro Tablet. Sums up year's work, pp. 140–146.

72. ———— *Proceedings Davenport Academy*, iii., 191.
"Mounds Near Muscatine." Examination of some mounds in two groups.

73. HARRISON, CHARLES E. *Proceed. Davenport Academy*, ii., 221.
"Cook Mound, No. 11." Finding of Tablet 3. Other relics of interest.

74. ———— *Proceedings Davenport Academy*, iv., 197.
"Report of Mound Exploration, Pine Creek, Muscatine County." Open only unopened mound in group of ten. No relics.

75. HENDERSON, JOHN J. *Smithsonian R.*, 1882, 686.

"Aboriginal Remains Near Naples, Ill." Thirty-five pages on mounds and builders. Pages 713–717 is list of "Fauna of Mound-Builders' Era," in which various Iowa pipes are mentioned.

76. HENSHAW, H. W. *Bureau of Ethnology, 2d Ann. Rept.*, 123.

"Animal Carvings from Mounds in Mississippi Valley." Attacks Elephant Pipes on pp. 155–157.

77. HOLMES, WM. H. *Ancient Pottery of Mississippi Valley*, 8 vo., [pp. 73.

"A Study of the Davenport Academy's Collection." Printed in advance of vol. iv. of Davenport Academy's Proceedings.

——— *Proceedings Davenport Academy*, iv., 123 *et seq.*

The same.

78. HOLMES, WM. H. *Fourth Ann. Rept. Bureau of Ethnology*, [pp. 361–436.

"Ancient Pottery of Mississippi Valley." Many specimens from Academy described. Iowa specimens described on pp. 427–429.

79. HOWE, S. S. *Annals of Iowa*, i., No. 3, p. 33.

"Indian Mounds."

80. JORDAN, CORA M. *American Antiquarian*, 1892, pp. 226–227.

"A Stone Dam in Iowa." A stone dam, a mound (entirely artificial?), and a copper cup (lost) from Plum Creek, Knowlton Township, Ringgold County, described.

81. KIMBERLING, L. G. *Knoxville Journal*, 1883.

Various papers on mounds of *unusual* interest (see No. 109) in the vicinity of Knoxville, published during 1883–84 in the *Journal* of Knoxville, F. C. Barber, publisher.

82. LEWIS, T. H. *Science*, v., 131.

"Notice of Some Recently Discovered Effigy Mounds." Refers only to Iowa. Mounds mostly Minnesotan.

83 ———— *Science*, vi. (No. 146.)
"Effigy Mounds in Iowa." Group in Clayton County, near North McGregor. Shows disproportions. Head *generally* south. Feet *generally* toward water.

84. ———— *American Anthropologist*, 1889, pp. 159–164.
"Stone Monuments in South Dakota." Says that similar monuments occur in Iowa.

85. ———— *American Anthropologist*, 1890, pp. 269–274.
"Stone Monuments in North-western Iowa."

86. ———— *Appleton's Annual Cyclopædia*, 1889, pp. 117–122.
"Cave Drawings." Describes and figures interesting wall designs from caves of Allamakee County.

87. ———— *Science*, xv. (1890), p. 275.
"Effigy Mounds in Valley of Big Sioux River, Iowa." In the Lyon County group described by Starr; a fort also described.

LOOS, PROF. *Chicago Journal*, June 23, 1886.
See Beal and Loos, Profs.

88. LINDLEY, CLARENCE. *Proceedings Davenport Academy*, i., 112.
"Mound Exploration, 1875, Muscatine County." Groups near Pine Creek. Burial Mounds. Some opened. Relics.

89. ———— *Proceedings Davenport Academy*, ii., 83.
"Mound Exploration in Jackson County." Groups in Iowa Township. Skeletons and a few relics.

90. MACLEAN J. P. *The Mound-Builders*, 12 mo.
On page 116 refers to Davenport Tablet.

91. MALLERY, GARRICK. *Fourth Ann. Rept. Bureau of Ethnology*, [p. 23.
"Pictographs of North American Indians." Refers to incised and painted pictographs on cliffs in North-eastern Iowa.

92. MASON, OTIS T. *American Naturalist*, 1878 (xii.).
Announces discovery of tablet, and suggests caution (p. 322), to which Mr. J. D. Putnam replies (p. 400) that there can be no room for fraud.

93. MATERIAUX POUR L'HISTOIRE DE L'HOMME. 1887.
Refers to mounds near Clayton.

94. MCGEE, W. J. *Am. Jour. Sci. and Arts*, ser. iii., vol. xvi., p. 272.
"Artificial Mounds in North-eastern Iowa, and the Evidence of the Employment of a Unit of Measurement in Their Construction." Six-page article on Metrology.

95. ———— *American Antiquarian*, iii., 194.
"Inductive Metrology." Compares his notes and methods with Petrie's, as given in Petrie's book of above title. Arrives at similar conclusions.

96. ———— *Am. Jour. Sci. and Arts*, ser. iii., vol. xvi., p. 458.
"On an Anatomical Peculiarity by which the Crania of Mound-Builders may be distinguished from those of Modern Indians."

97. MOULTON, M. W. *Smithsonian R.*, 1877, 250.
"Mounds in Delaware County." Groups of mounds and earthworks forming nearly a hollow square.

98. MYERS, JUSTUS M. T. *History of Lee County*, pp. 427–428.
Mounds described. In one thirty-two skeletons seated in vaults of limestone slabs.

99. MURDOCH, SAMUEL. *Iowa Historical Record*, ii., p. 356.
"The Mound-Builders of the Mississippi Valley." General discussion to prove Mound-Builders ancient, extinct, and cannibal.

100. ———— *Iowa Historical Record*, 1888, pp. 28–32.
Mounds long and round. The former older. Two races of builders; the later with conical skulls.

101. DE NADAILLAC, MARQUIS. *Prehistoric Peoples*, pp. 358–360.
Quotes Clement L. Webster regarding Floyd finds.

102. NISSLEY, J. R. *American Antiquarian*, 1887, p. 303.
"Skeletons and Relics from Iowa." Skeletons of low type from flat near Niobrara River. Stone ball with incised lines.

103. NEGUS, CHARLES. *Annals of Iowa*, v. (1867), p. 840.
"Antiquities." In Jefferson County, a series of mounds; also an iron cross bolted into sandstone bluff near Cedar River.

104. ——— *Annals of Iowa*, xii., pp. 256–262.
"The River of the Mounds." Describes mounds in various parts of Iowa. Some good information.

105. ——— *Tuttle's History of Iowa*, pp. 32, *et seq.*
Same material as in the two preceding articles.

106. PEET, STEPHEN D. *American Antiquarian*, i., 106.
"Recent Mound Explorations." Gives a short description of Davenport Tablets.

107. ——— *American Antiquarian*, ii., 320.
"Elephant Pipe No. 2." Notices discovery, and gives brief description.

108. ——— *American Antiquarian*, vi., 275.
"Measurements Among Mounds." Refers to McGee's article (No. 95). Thinks the unit *not* McGee's and Whittlesey's cubit — 25.7 inches,— but the pace — three feet.

109. ——— *American Antiquarian*, vi., 276.
"Mounds at Knoxville." Interesting system of mounds, earthworks, raised ways, etc. Refers to articles by Kimberling (No. 81).

110. ——— *American Antiquarian*, viii., 46.
Are the Davenport Tablets Frauds?" Ten-page editorial.

111. ———— *American Antiquarian*, viii., 117.
"The Points Involved." Three-page editorial, replying to Pratt (No. 136), and summarizing.

112. ———— *American Antiquarian*, viii., 256.
Editorial note against "Elephant Pipes and Mounds."

113. ———— *American Antiquarian*, viii., 256.
Editorial criticism of Holmes' paper (No. 77). Culture of Mississippi Valley region *not* so homogeneous as Holmes thinks.

114. ———— *American Antiquarian*, viii., 309.
"Extra-limital Animals and Mound-Builder Pipes." Drawn out by No. 76. Sustains claim for "extra-limitals." Compares an Academy "Otter Pipe" with "Manitu," and figures both. Refers to Academy difficulties.

115. ———— *American Antiquarian*, ix., pp. 242–246.
"The Mastodon in America and the Mound-Builders." Argument to show status of the question. Mentions Davenport Tablets and Pipes.

116. ———— *American Antiquarian*, 1889, pp. 359–378.
"Burial Mounds Viewed as Monuments." On p. 368 refers to Academy's work on Cook Mounds.

117. ———— *American Antiquarian*, 1890, p. 187.
"Distribution of Effigy Mounds." Refers to Lewis' Lyon County mound, and calls it a bear with paws extended.

118. ———— *American Antiquarian*, 1891, pp. 255–281.
"The Mysterious Race." Refers to Iowa (p. 264); to Elephant Pipes and Tablets (p. 266), and figures the Cook Farm group (p. 275).

119. ———— *American Antiquarian*, 1891, pp. 305–330.
"The Religion of the Mound-Builders." References and discussion regarding Iowa specimens scattered through article — pp. 309, 310, 317, 320.

120. ———— *American Antiquarian*, 1892, pp. 59–86.

"The Mound-Builders and the Mastodon." The tablets and pipes (pp. 71–76), and the structure of the Cook Farm mounds (p. 79).

121. PIDGEON, WILLIAM. *Traditions of De-coo-dah and Antiquarian Researches*, 1 vol., 16 mo., 1858, N. Y.

A strange work. Iowa mounds are described and "elucidated" at pp. 115–118, 129–130, 201–204, 231–238.

122. POPULAR SCIENCE MONTHLY. i., p. 768.

"Notes." Mentions Woodman at A. A. A. S. 1872 meeting reporting on mounds of Dubuque.

123. ———— xix., 128.

"Miscellany." Speaks of Pratt's address and of Academy's collections.

124. ———— xx., 421.

"Miscellany." Refers to Maj. Beebe's "translations" of Davenport, Piqua, Grave Creek, and Pemberton Inscriptions A. A. A. S. meeting.

125. ———— xxiii., 432.

"Notes." Mentions gifts of mound pipes to Academy by Mr. Gass.

126. ———— xxvii., 707.

"Review of Putnam's Vindication."

127. PRATT, W. H. *Proceedings Davenport Academy*, i., 106.

"Mounds of Louisa County—Toolesboro." Interesting relics. Bird Pipes with "eyes." Copper Axes with impressions, etc.

128. ———— *Proceedings Davenport Academy*, i., 106.

"Mounds Near Pine Creek." Portion of skull found with "rondelles" cut out.

129. ———— *Proceedings Davenport Academy*, ii., 38.

"On Shell Moneys." Eight pages. Refers to shell beads and "pearl eyes," and to copper axes.

130. ———— *Proceedings Davenport Academy*, ii., 148.
"Mounds on Allen Farm." Group of six mounds. A few relics. One "curved base" pipe.

131. ———— *Proceedings Davenport Academy*, ii., 156.
"Shell-beds in Vicinity of Davenport." Thinks all but one are *natural*. Formed at time of a *higher* river.

132. ———— *Proceedings Davenport Academy*, ii., 256.
"Curious Relic From Cook Farm." Rudely carved animal. Quartz crystal eyes. Mound No. 3.

133. ———— *Proceedings Davenport Academy*, iii., 151.
"Mound-Builders." Presidential address. Status of Mound-Builders. Condition of Academy's collection.

134. ———— *Science*, i., 496.
Letter briefly referring to relics from Southern Mounds, and to Cranial Deformities.

135. ———— *Science*, iii. (No. 71.)
Report of Academy meeting. Refers to "Inca-bone."

136. ———— *American Antiquarian*, viii., 92.
"The Davenport Tablets Genuine." Four-page reply to (No. 110) Peet.

137. PRICE, ELIPHALET. *Annals of Iowa*, vi., p. 121.
"On the Origin, Antiquity, and Object of the Mounds of the Mississippi." Of no value on Iowa.

138. PROUDFIT, S. V. *American Antiquarian*, iii., 139.
"Earthworks on Missouri River." Read before Iowa Academy of Science, Des Moines.

139. ———— *American Antiquarian*, iii., 271.
"Mounds of South-west Iowa." Old trails, mounds, and lodges described. Record of relics from undisturbed loess.

140. — — — — — *American Antiquarian*, viii., 222.
"The Lodge-Dweller." Paper read before Anthropological Society, Washington, April 20, 1886. "Lodge-Dwellers" intermediate to Indians and Mound-Builders.

141. ———— *American Antiquarian*, viii., 299.
"Pottery Vessels in Glenwood." Broken vessel from six feet down in loess.

142. PUTNAM, C. E. *Elephant Pipes*, 8 vo., 40 pp., 1885.
A vindication of the Elephant Pipes and Inscribed Tablets from the accusations of the Bureau of Ethnology.

143. ———— *Elephant Pipes and Inscribed Tablets*, 8vo., 96 [pp., 1886.
"Second edition" of No. 142, with "correspondence" added. Printed separately and as an appendix to vol. iv. of Proceedings.

144 ———— *Science*, vol. vii. (No. 157.)
"The Davenport Tablets." Reply to Thomas' letters (No. 171, No. 172).

145. ——— —— *Science*, vii. (No. 171.)
"The Davenport Tablets." Letter from Mr. Gass *disavowing intentional fraud.* (See Nos. 8 and 9.)

146. RAU, CHARLES. *Prehistoric Fishing*, p. 125.
Describes an Arkansas bone fish-hook from the Academy's collection.

147. ———— *Prehistoric Fishing*, pp. 241–242.
Summary of C. A. White's articles upon shell-heaps.

148. READ, M. C. *American Antiquarian*, iv., 225.
"The Welsh Butterfly. Is the Inscription Old?" Refers with doubt to tablets.

149. RUST, H. N. *Proceedings A. A. A. S.*, 1882, 584.
"Remarks on Davenport Tablet." (Abstract.) Translation given by modern Dakotas.

150. SCHMIDT, E. *Kosmos*, 1884, 146.
"Mound-Builders and Their Relation to Historic Indians." Quoted by C. Thomas against Davenport Tablets.

151. ——— ———
"Die Præhistorischen Kupfergeräthe Nord-Amerikas." Describes the Davenport celts.

152. SCIENCE. Vol. i., No. 7.
Mentions Mr. Gass' gift of thirteen "Mound-Builder Pipes" to Academy's collection, making fifty-six in whole series.

153. ——— Vol. i., No. 9, p. 263.
Mention of Effigy Mounds in North-western Iowa.

154. ——— viii., 1886, p. 186.
Note upon the Louisa County exploration of the Academy.

155. ——— xix., 1892, p. 21.
Notice of arrowhead from loess near Muscatine, and of implements from Council Bluffs loess.

156. SEYFFARTH, G. *Proceedings Davenport Academy*, iii., 72.
"The Indian Inscriptions of Davenport." Elaborate classification and comparison of characters. Syllabic. Allied to Japanese, Chinese, and Corean. Considers the designs a "sacrificial scene" and a "record of the deluge."

157. SHAW, JAMES. *Smithsonian R.*, 1877, 257.
"The Mound-Builders of the Rock River Valley." Mainly Illinois, but refers somewhat to Mercer County.

158. SHORT, JOHN G. *North Americans of Antiquity*, 8vo.
Pp. 37–40, refers to Iowa Mounds and Davenport Tablets; 169–170, quotes Farquharson's cranial measurements; 530–531, refers to Louisa County pipes.

159. SLOAN, JUDGE. *History of Wapello Co.*, Chicago, pp. 336–342.
Quoted in reference to mounds near Ottumwa. The same article is given in History of Van Buren County, pp. 334–341.

160. SMITH, JOEL W. *Trans. A. A. A. S.*, 1888, p. 329.
"Iowa Mound-Builders' Relics." (Title only.)

161. SMITHSONIAN INSTITUTE REPORT. 1880.
Abstracts of Correspondence.
B. Morgan, Mounds of Des Moines Valley, 445.
H. T. Woodman, Unique Mound for Iowa near Dubuque, 448.

162. ——— 1879, 430.
Abstracts of Correspondence.
S. Allis, Lodge Cavities on Bluffs in Mills County.
W. V. Banta, Mounds in Henry County.
L. Bassett, Implements from Keokuk.
D. C. Beaman, Mounds near Keosauqua.
F. C. Canda, Copper Implements from Grandview.
H. Davis and W. A. McDonald, Clayton County "Lookout Mounds."
S. B. Evans, Summary of article in same volume. (No. 23.)
W. H. Ketterman, Mounds of Wapello County.
J. M. Mansfield, Mounds of Henry Co., near Mt. Pleasant.
F. M. Witter, Mounds and Relics, Toolesboro.

163. SQUIER, E. G. *Serpent Symbol in America*, 8 vo.
Pp. 140–142, quotes "Pidgeon" for serpent symbols near Guttenburg. Two figures.

164. STARR, FREDERICK. *American Antiquarian*, 1887, p. 303.
Shell-heaps at Cedar Rapids; attributed by mistake to W. G. Evans.

165 ——— *American Antiquarian*, ix., pp. 361–363.
"Mounds and Lodge Circles in Iowa." Describes group of mounds and many stone circles in Lyon County; also objects found there.

166. ——— *American Antiquarian*, 1888, pp. 279–282.
"Preservation by Copper Salts." The cloth-wrapped celts are described; also a Lyon County skeleton with preservation of face-flesh and hair.

167. ———— *Proceedings Davenport Academy*, v., pp. 110–112.
"Mound Exploration in North-western Iowa." Description of the mound relics and "stone circles" near La Valley, Lyon County.

168. STEPHENSON, J. E. *American Antiquarian*, ii., 89.
"The Mound-Builders." Paper before Muscatine Academy of Science. Restores the past from relics. Two figures and map.

169. THOMAS, C. *American Antiquarian*, vii., 212.
"Ancient Works in Iowa." Near New Albion, on Little Iowa River. Interesting remains.

170. ———— *Science*, vi., No. 151, 564.
"The Davenport Tablets." Limestone tablet a "plant." Quotes Tiffany. Objects to mode of occurrence.

171. ———— *Science*, vi., No. 152.
"The Davenport Tablets." Against slate tablet. Based on characters.

172. ———— *Science*, vii., No. 160.
"The Davenport Tablets." Reply to Putnam (No. 94). Quotes "*doubts*" from various authors.

173. ———— *Fifth An. Rept. Bureau of Ethnology*, 1887.
"Burial Mounds of the Northern Section of the United States." In pp. 24–38 are described the Cook farm group; and investigation conducted by the Bureau in Allamakee and Dubuque Counties.

174. ———— *Catalogue of Prehistoric Works East of the Rocky [Mountains*, 8 vo., 1891.
The Iowa list occupies pp. 83–88. Summary of many statements by others. Original notice of mounds in Adams, Allamakee, Clayton, Clinton, Dubuque, Hamilton, Lee, Lyon, Marion, Marshall, Van Buren, Warren, and Wright Counties.

175. THOMPSON, THERON. *American Antiquarian*, ii., 60.
"Mounds at Muscatine." Letter describing mounds, remains, pot, and relics.

176. ———— *American Antiquarian*, i., 172.
"Mound Relics." Describes copper relics, pot, and *iron* axe.

177. ———— *Smithsonian R.*, 1879, 359.
"Mounds in Muscatine County." Describes groups of mounds, location, arrangement, etc.

178. TIFFANY, A. S. *Proceedings Davenport Academy*, i., 113.
"Mound Explorations in 1875." Near Davenport in Buffalo Township, at Gilbert and Rockingham.

179. TOOLE, WILLIAM L. *Annals of Iowa*, v., p. 45, etc.
"Incidents of Settlement of Louisa County." Refers to mounds, "fort," and relics.

180. TROWBRIDGE, C. S. *History of Johnson Co.*, Iowa City, 1883.
Quoted in reference to mound groups near Iowa City.

181. UHLE, MAX. *Zeitschrift fur Ethnologie*, 1887.
Long paper in reference to the Elephant Pipes.

182. VAN ALLEN, G. C. *Smithsonian R.*, 1882, 682.
"Mounds in Henry County." Three burial mounds. Some remains and relics.

183. ———— *Young Mineralogist and Antiquarian*, 1884, p. 34.
Mounds in Henry County. (Cf. Smith.)

184. WASHINGTON EVENING STAR. May 3, 1889.
Small mound near Floyd explored. Yielded skeletons.

185. WEBSTER, CLEMENT L. *American Naturalist*, xxiii., 1889, pp. [185–188.
"Ancient Mounds at Floyd, Iowa." Five seated skeletons in a stone-lined basin. One skull, Neanderthaloid.

186. ———— *American Naturalist*, xxiii., 1889, pp. 650–655.

"Aboriginal Remains near Old Chicasaw." One mound yielded three sitting skeletons, all with Neanderthaloid skulls.

187. ———— *Smithsonian Annual*, 1887, i., pp. 575–589.

"Ancient Mounds and Earthworks in Floyd and Cerro Gordo Counties." One with a layer of broken pottery; one stratified; a group of thirty-one, some of which yielded interesting bundles of bones; also a crematory.

188. ———— . *Smithsonian Annual*, 1887, i., 590–592.

"Indian Graves in Floyd and Chicasaw Counties." Several, some quite recent, with details of construction.

189. ———— *Smithsonian Annual*, 1887, i., pp. 593–597.

"Ancient Mounds in Johnson County." Locates groups of mounds of two types — largely as Davis and others.

190. ———— *Smithsonian Annual*, 1887, i., pp. 598–602.

"Ancient Mounds in Iowa and Wisconsin." Quoted mainly from a Mr. Knapp. Refers to mounds near Guttenburg, Garnavillo, and Buena Vista; also describes Pottawatomie flint chipping.

191. ———— *Smithsonian Annual*, 1887, i., pp. 603–604.

"Mounds of the Western Prairies." Describes mounds made by various mammals, and often mistaken for human constructions.

192. WHITE, CHARLES A. *American Naturalist*, ii. (1868).

"Lakes of Iowa, Past and Present." Describes the natural formation of "wall lakes," so often considered the work of a vanished race — as by Peschel (Races of Man, p. 426).

193. ———— *Annals of Iowa*, vi., pp. 19–23.

"Indian Mounds." Refers to location of mounds usually in the State, and to mounds in Johnson and Van Buren Counties. Particularly mentions some near Sac City.

194. ———— *Compte rendu, Int. Cong. Prehist.*, Bologna, 1871, [pp. 379 et.
"Kjoeckkenmöddings de l'Amerique du Nord."

195. ———— *American Naturalist*, iii., 1870, 54.
"Kjoeckkenmöddings in Iowa." Note. Heaps at Keosauqua, with bones and relics.

196. ———— *Proceedings A. A. A. S.*, 1873, 133.
"Kjoeckkenmöddings in Iowa." Heaps at Keosauqua, Sabula, Belleville.

197. WILLIAMS, WILLIAM. *Annals of Iowa*, vii., p. 339.
"Ancient Fortifications and Mounds in Webster County." Locates and describes mounds and embankments, and mentions relics found.

198. WILSON, THOMAS. *Annual Report U. S. N. M.*, 1889, p. 330.
Notes that Dr. F. A. Steinmeyer donates five implements of palæolithic type, from near Bonaparte, to the Smithsonian Institution.

199. WITTER, F. M. *Weekly Tribune*, Muscatine, Nov. 21, 1878.
"Notes on Mounds and Mound-Builders." Read before Muscatine Academy of Science.

200. ———— *History of Muscatine Co.*, Chicago, 1879, Western [History Co.
"Prehistoric Remains in Muscatine County."

201. ———— *Tribune*, Muscatine, Nov. 5, 1879.
"Mounds and Mound-Builders in Muscatine County." Read before Muscatine Academy of Science.

202. ———— *American Geologist*, ix., p. 276.
————. Reports finding of arrow-point in Muscatine loess.

203. WOODMAN, H. T. *Proceedings A. A. A. S.*, 1872, 225.
"Mounds near Dubuque." Group of seventy. Some regularity in arrangement.

204. LYNCH, E. P., A. C. FULTON, C. E. HARRISON, C. H. PRESTON. [*Proc. Dav. Acad.*, v., 37–42.

"Mound Explorations at Toolesboro, Louisa County, Iowa." Three mounds opened, all yielding skeletons; in one interesting copper celts wrapped with cloth, or enclosed in bark, and stone pipes; in another, pottery vessels.

205. HARRISON, C. E., and W. H. PRATT. *Proc. Dav. Acad.*, v., [43–44.

"Additional Explorations at Toolesboro." One mound opened yielded skeleton and one very low-type skull; among the relics one stone pipe.

NOTES:

1. The author regrets that on account of a considerable space of time passing between the preparation of the first and last series of references, these are not in all cases similar in form. Time did not allow of rewriting.

2. The author has not seen articles 18, 24, 181, 183, 184, 194.

BUDDHISM IN AMERICA.

BY EDWARD L. BERTHOUD.

To My Friends of the Davenport Academy:

Ladies and Gentlemen—With much diffidence I impart to you a curious coincidence which I have in the past year examined, bearing upon the mooted point of the frequentation, or, perhaps, more properly speaking, upon the discovery by Chinese Buddhist priests of North America in the present boundaries of Mexico or Southern California.

The original account was derived, about the year 1761, by De Guignes, a celebrated French sinologist, from the ancient year-books or annuals of the Chinese Empire, and its substance is about as follows: "That in the year 499 of our era one Hoei-schin, a Buddhist missionary (his name signified 'universal compassion') came to Hua-Kang in China, and he narrated that he had come from a country named 'Fu-Sang,' which is 20,000 Chinese miles, or 'li,' easterly from 'Tahan,' the Chinese name for Alaska and the Aleutian Isles. That Hoei-schin also told that many trees called Fu-sang grew there, whose tender sprouts were eaten, whose fruit was like unto a 'pear' in shape but red, while from the bark of this tree the inhabitants prepared a sort of linen, and also ornamented stuffs." All of which agrees remarkably with the Mexican maguey plant, or agave, which to-day precisely produces the same articles of every-day use for the lower classes of Old Mexico. During a recent visit to Arizona and the Sonora border, I have repeatedly seen the agave plant, and coarse cloth made from its fibres, while its tender heart was eaten by the Apaches and other Indian tribes, and the Mexicans.

Hoei-schin also stated that five beggar Buddhist monks went there in 458, and succeeded in enlightening the people there with the doctrines, writings, and images, of Buddha. He also describes the customs of the people he saw there, their products, and the domestic animals used; that they had no knowledge of iron, but that gold, silver, and copper were not prized nor used as money; and that horses (?), oxen, and stags were harnessed to wagons, etc.

This original publication of De Guignes was violently attacked and criticised by Klaproth, yet it was again reaffirmed by Prof. Carl Neumann, professor of oriental languages at Munich, and again by Mr. Gustave d'Eichthal was defended and vindicated. I will not follow this question any further than to add that the confimation of this fact inasmuch as it relates to Buddhist writings and remains, has not heretofore been proved; yet Buddhist images, or at least many strikingly resembling them, have been found in Old Mexico and Central America.

Last fall I had the great pleasure of perusing Schliemann's "Ilios," published by Harpers in New York, and was wonderfully pleased with that singularly attractive work on ancient Troy, as revealed to him by his several years' labor on the hill of Hissarlik near the ancient Scamander. Nothing, however, pleased me so much as the extraordinary similitude between the ancient flint and stone weapons and the pottery of the lowest pre-historical cities unearthed by Dr. Schliemann and those we have both found and seen not only in the valley of the great Father of Waters which eddies by your beautiful town, but also in Colorado, Utah, New Mexico, and Arizona. While comparing the forms of pottery well delineated in the illustrated catalogue of the Bureau of Ethnology for 1881, drawn by Mr. W. H. Holmes, I was struck by the resemblance between Fig. 140 of the Ethnological Collection, pages 466–67, and the Buddhist signs of which

Fig. 1.   *Fig. 2.*

the Sanscrit name of Fig. 1 is "svastika," a sign of good luck, meaning "to be well," being No. 1 of the sixty-five auspicious signs of the footprints of the Hindoo God Buddha; while No. 2 represents a reversal of Fig. 1, the svastika, and ranks as the fourth sign of Buddha, and is called in Sanscrit "sauvastika." Dr. Schliemann is inclined to consider these figures, from the communication upon them from Max Mueller to him, as representing the vernal and autumnal sun. At all events, they were universally considered to be signs of good augury. Emile Burnouf thinks that these two signs represent the two pieces of wood which were laid crosswise before the altars to produce the sacred fire called "Ague," the ends of which were bent "at right angles and

fastened by four nails." In Fig. 140 of the Bureau of Ethnology we see "four dots also."

I have noticed portions of the "svastika" on fragments of pottery from New Mexico and Arizona, but as these fragments were imperfect I merely indicate this resemblace to stimulate further research in this curious matter. The figure 140 of the Ethnological Report, by Holmes, compares the shape as "of two rectangular tablets or slips, slit longitudinally and interlaced at right angles," * * "lines are * * deeply incised." The object was made of shell, and was found on Fain's Island, Tennessee.

Dr. Schliemann says these signs, the "svastika and sauvastika," are found in Europe, Asia, and Africa; that they are the same as the "sign of life" written on the forehead, as mentioned in Ezekiel, chapter ix., verses 4–6.

The universality of these signs cannot be ascribed to chance or the evolution of an imitation in ornament, and is suggestive in North America of a connection between their use and the rites, writings, and teachings of Hoei-schin and the other Buddhist missionaries in Mexico or California, which were finally, in the continual emigrations of the American tribes, their feuds and wars, scattered eastward by fragments of nations, or even whole emigrating tribes. Fig. 3 represents Fig. 140 of Ethnological Report of 1881.

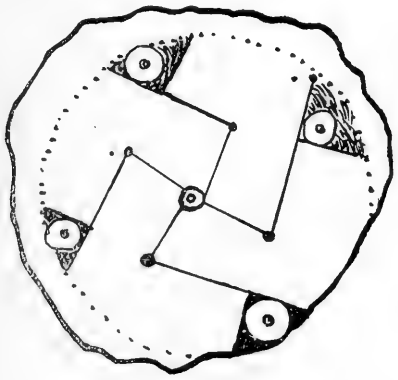


Fig. 3.

[*Representing Fig. 140 from illustrated catalogue of Bureau of Ethnology, 1881. Pages 466, 467. W. H. Holmes.*]

While we present these facts to your attention as perhaps fit subjects for more critical examination and study by those who are more com-

petent to give a sound, critical opinion on such a momentous question, yet I would not have my friends of the Davenport Academy conceive that I give this subject simply as a curious coincidence, or as a piece of transcendental archæology. Believing the narration of the Chinese annals to be in the main part true, we cannot afford to entirely throw out any fact remotely bearing on this disputed point of Chinese discovery. We have certain evidence of the shipwreck of Chinese and Japanese ships upon the coast of Alaska, Oregon, and California as far back as nearly 150 years ago, so that the probability of the discovery of America's west coast at an early date is not so impossible. This, coupled with the zeal so well known to have been elsewhere displayed by Buddhist missionaries lends inferentially a great deal of strength to the claim of the Chinese annals. This discovery admitted, then the singularity of the resemblance between the marks on the carved shell and the Buddhist signs of Figs. 1 and 2 remains simply to be shown as such, saving any direct evidence that proves the carving as merely conventional or the work of chance.

Fig. 131 of the Report on Ethnology, 1881, gives a representation of a carved ornamental "shell gorget." The description on page 467 calls the center figure "a conventionalized figure of an insect resembling a spider." It may be that such was the idea of the carver, yet if we turn to Ilios, pages 337–338, and compare the figure of the Trojan "lead idol" and its description by Dr. Schliemann, there is a curious "rapprochement" between the navel and vulva marks of the "lead idol" and the marks and triangular figure at the base of the carved figure on the shell gorget.

Can all these singular affinities be relegated to chance or idle work? We cannot believe.

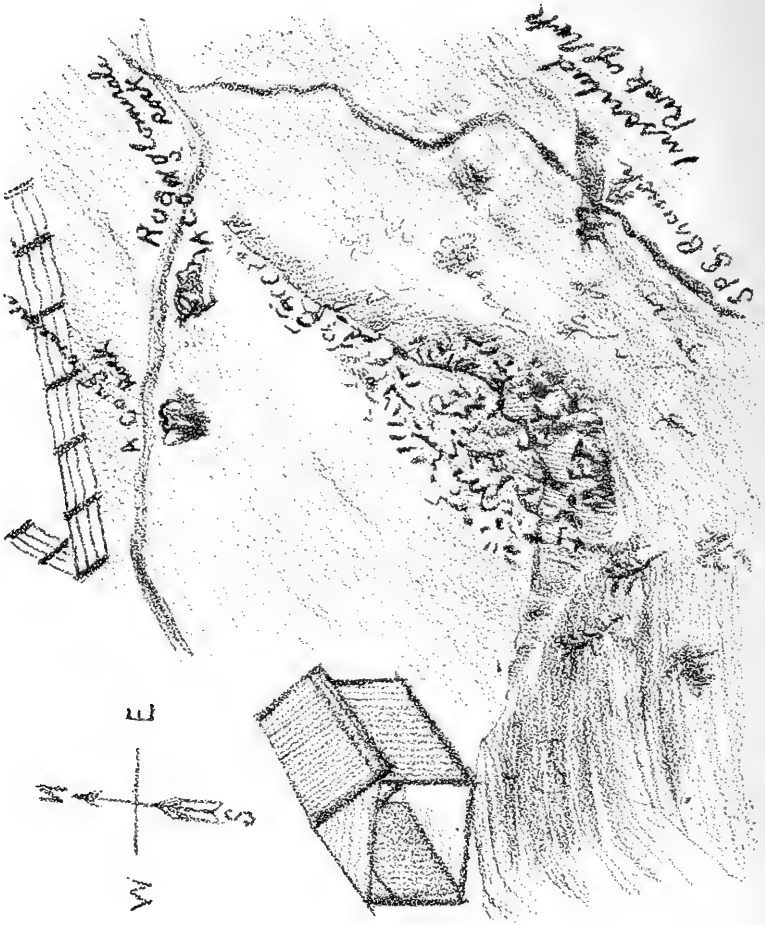
ANCIENT GROOVED ROCKS IN ARKANSAS.

BY W. A. CHAPMAN.

CLARK COUNTY, ARKANSAS, abounds in much that is of interest to those who are engaged in deciphering records of the once powerful race that peopled the Mississippi Valley in times so long past that the records of their presence have become so obscure and so intermixed with those of later Indian races as to render the decipherment of such existing data as have a bearing upon the origin, characteristics, and disappearance of the builders of the mounds an exceedingly difficult task. Of these features (relating to this departed race) now open to our inspection, there are probably none more worthy of our attention, nor more perplexing in their nature, than the so-called incised or sculptured rocks. The rock which forms the subject of this paper is exposed to view on Sec. 18, Tp. 8, R. 22 W. (fifty feet from Gentry's Mill). Its texture is that of a coarse micaceous sandstone, difficultly frangible. The surface where ungrooved is smooth. The exposure is triangular in shape, and is 12x75 feet in extent, its greatest length being nearly N. and S. The east side and portions of the north project above the valley of the spring branch from one to three feet. The north and east sides are covered by a slight elevation. The exposed surface of to-day is undoubtedly much more extensive than when these groovings were made, as portions of the rock are so covered by these grooves as to render their forms obscure.

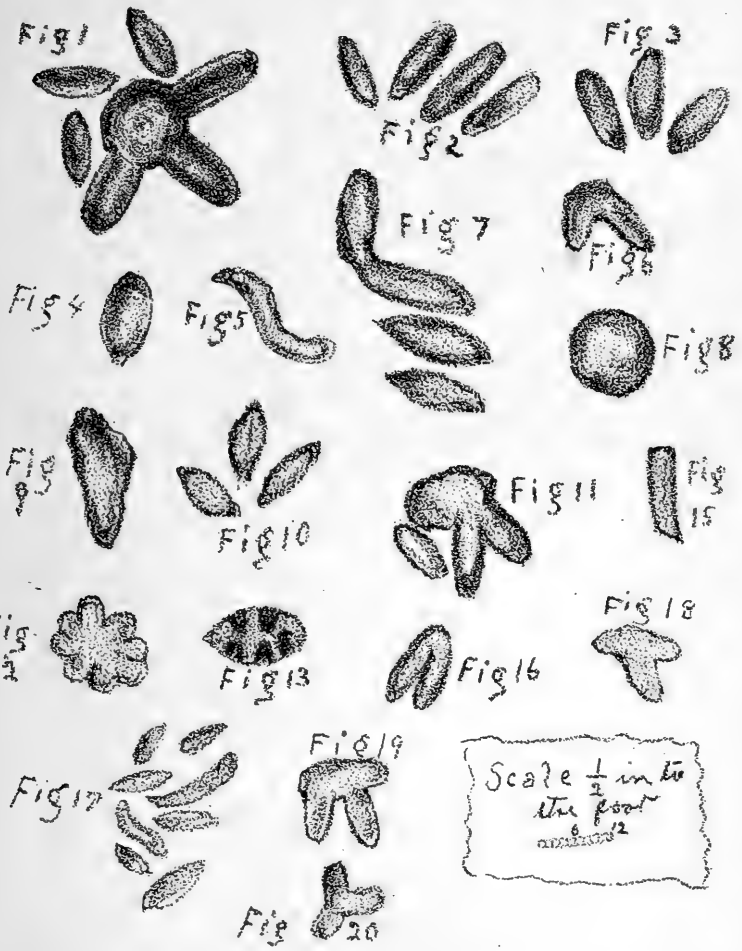
The groups as figured in the diagrams are *fac similes* of the most striking forms seen upon the rock. These, if taken singly, would appear to have been designed as symbolical; but when taken collectively with the various interjacent figures (not shown in the diagram) this methodical arrangement and appearance of design vanishes, and the confusion which prevails demonstrates that the forms are accidental and that the groovings which form them were a secondary and unsought for product of the labor of the artisan, whose sole endeavor had been to sharpen and polish his stone implements. Figs. 18 and 20 bear a marked resemblance to Fig. 6 as portrayed by T. H. Lewis in his "Ancient Rock Inscriptions in Eastern Dakota," and there is also a

less marked, but evident, relation between other members of both series. This resemblance is restricted to form, the inscriptions on the Arkansas stone being, with few exceptions, of greater length, width, and depth. It is probable, however, that both series are resultant from



the same cause, and owe their origin to the work of Mound Builders. The near vicinity of this rock is very prolific in relics and other incidental indications of populous villages of Mound Builders, whose selection of this individual rock as a grindstone was due to its being the only exposure of rock of easy access having good abrading qualities;

and, without doubt, the same reasons led to the selection and utilization of the rock described by Lewis, for the same purpose, by the Mound Builders of Dakota. Convinced that the nondescript character of the forms would preclude their being accepted as symbolical, I sought for some method of determining the truth or falsity of my sur-



mises regarding the causes that led to their origin. Selecting a scraper and placing myself in position upon the ground, I proceeded to go through the motions of shaping, sharpening, and polishing it, after the ame manner the Mound Builders must necessarily have followed in

order to give the implement its peculiar shape. The results of my labor were as follows: Length of stroke, ten inches; width of groove, two to two and one-half inches, the groove being deepest in the center of the stroke, where the greatest pressure was unavoidably brought to bear, and the ends sloping and rounded. Repeating the process without changing my position, a character corresponding to Fig. 3 was formed. Reversing the tool and resuming operations, Fig. 10 (having ends more acute than Fig. 3) was reproduced. Next selecting a large circular or semi-oval implement, I proceeded with the grinding as in the other instances, being governed in my operations not by a desire to reproduce the forms upon the rock, but by the shape of the implement. The result of this last operation corresponds with Fig. 8, the whole bearing a close resemblance to the pictographs upon the rock, differing from them only in length and width, and that but slightly. It will be seen by inspection that the complicated forms are simply the result of a grouping of the two primary or simple forms of designs, as Figs. 4, 8, and 15. Several repetitions of these simple forms, from a central point, governed by such slight changes in his position as the laborer would almost unconsciously assume for the purpose of rest or with a view to reach a fresh grinding surface, would naturally and almost unavoidably result in the production of such forms as Figs. 2, 3, 4, 7, 10, 16, and 17. Figs. 1, 11, 12, 13, 18, 19, and 20 are, perhaps, due to the efforts of several individuals laboring together. That these markings are not incisions, but the result of abrasion, is evident from the regularity of the form, the rounded outline of the ends, and the smooth and sloping finish of the interior of each.

Biographical Sketch

— of —

Charles Christopher Parry.

1823 — 1890.

BIOGRAPHICAL SKETCH OF DR. C. C. PARRY.

BY C. H. PRESTON, M. D.

(*Read before the Davenport Academy of Sciences, September 15, 1893.*)

On the twentieth of February, 1890, there died at his pleasant home near this city, one to whom the Davenport Academy of Sciences was deeply indebted, and whose memory, fragrant and pure as the flowers he loved, it will ever cherish.

At that time the working force of our Association had been almost paralyzed by recent sad losses; the publication of its Proceedings was for a time deferred, and so it happened that he who was always ready with an appreciative tribute to the memory of associate or friend, has waited thus long for an expression from this, his home Society, of the admiration and esteem which each and all of its members entertained for him. It is to be regretted that there was not found among us some co-laborer in his own field of botanical science to prepare a sketch of Dr. Parry's life and work—an undertaking for which the writer is qualified only by warm personal friendship and long association in the affairs of this Academy. Deficiencies which must in consequence of necessity exist will, however, in part be made good by citations from those better qualified to speak.

Charles Christopher Parry was born in the hamlet of Admington, Gloucestershire, England, August 28, 1823. Descended through a long line of clergymen of the Established Church, he was himself of a deeply religious nature, and rarely endowed with that poetic feeling and insight so apt to characterize the true naturalist.

In 1832 the family removed to America, settling on a farm in Washington County, New York. Here the remainder of his boyhood was passed, and, the advantages of the schools of the locality having been well improved, he entered Union College at Schenectady, and in due time was graduated therefrom with honors. He began the study of medical botany in his undergraduate years, and subsequently received the degree of Doctor of Medicine from Columbia College.

Coming West and to Davenport in the fall of 1846, he entered upon the practice of his profession, but continued in it for a few months only, very soon discovering that all his natural tastes and instincts led directly away from the unreason, the too often self-inflicted ills, and the petty conflicts with which the active physician has perforce to deal—led him to the unvexed, blossoming solitudes where Nature, silent and orderly, works out her fair results.

His earliest collecting had been done in the attractive floral region about his home in North-eastern New York, in the summer of 1842 and the four years following; and now again, attracted to this more congenial work, we find him employing much of the season of 1847 in making a collection of the wild flowers about Davenport, of which, with the dates of finding, he has left a manuscript list. Those of us who knew him well in after years can readily picture the brisk, dark-complexioned, though blue-eyed youth, symmetrically but slightly built and somewhat below the medium height, in his solitary quest by river side and deep ravine, over wooded bluff and prairie expanse, for the treasures which were more to him than gold — for such early friends as "the prairie primrose, the moccasin-flower, and the gentian," which in later years he complained had been quite driven out by "the blue-grass and white clover."

In the course of that summer, also, he accompanied a United States surveying party, under Lieutenant J. Morehead, on an excursion into Central Iowa, in the vicinity of the present State capital. From this time on (except for a short time while connected with the Mexican Boundary Survey, when he discharged the duties of Assistant Surgeon), the physician was merged in the naturalist. He was almost continuously in the field collecting, but Davenport remained his home. Here, in 1853, he was married to Miss Sarah M. Dalzell, who, dying five years later, left with him an only child, a daughter. But she, too, a fair, unfolding flower, was claimed by death at an early age.

In 1859 he was married again, to Mrs. E. R. Preston of Westford, Connecticut, who, through the more than thirty years of their union, entered helpfully into all his work and plans, assisting him in his study and often accompanying him to the field, and who is left to mourn the loss of one who, in every relation of life, was exceptionally unselfish and kind. Of his two brothers and six sisters only two remain, viz.: Joseph Parry and Mrs. Charles

Pickering, both of Davenport, beside a half-sister, Mrs. Austin, residing in Arkansas.

We are fortunate in possessing, in Dr. Parry's own words (PROC., Vol. II., p. 279), a succinct, chronological account of his work up to 1878, which need not be repeated here. Suffice it to say that for more than thirty years the greater part of his time had been spent in observing and collecting—along the St. Peters and up the St. Croix; across the Isthmus to San Diego, to the junction of the Gila and Colorado, along the Southern boundary line and up the coast as far as Monterey; through Texas to El Paso, to the Pimo settlements on the Gila, and along the Rio Grande; in the mountains of Colorado, to which and to those of California he returned again and again in the pursuit of his special study, the Alpine Flora of North America; across the continent with a Pacific railroad surveying party by way of the Sangre de Christo Pass, through New Mexico and Arizona, through the Tehachapi Pass, through the Tulare and San Joaquin Valleys to San Francisco; through the Wind River district to the Yellowstone National Park; in the Valley of the Virgen and about Mt. Nebo, Utah; about San Bernardino, California, and in the arid regions stretching to the eastward; and in Mexico about San Luis Potosi, Saltillo, and Monterey.

The winter of 1852–3 was spent in Washington, in the preparation of his report as Botanist to the Mexican Boundary Survey; and the years from 1869 to 1871 inclusive, while Botanist to the United States Agricultural Department, were also passed chiefly at the capital, employed in arranging the extensive botanical collections from various government explorations, which had accumulated at the Smithsonian Institution. During this period, also, he visited, in his official capacity, the Royal Gardens and herbaria at Kew, England, and was attached as Botanist to the Commission of Inquiry which visited San Domingo early in 1871. The report of his observations in that island is a valuable summary of its chief botanical features, vegetable products, and agricultural capacities.

His visit to Kew and the land of his birth was the beginning of a lasting friendship between himself and the eminent Sir Joseph Hooker, Director of the Gardens, who afterward in a congratulatory letter dated February 27, 1877, calls him "already king of Colorado botany," and expresses deep interest in the results of his explorations, then making, in Southern California.

Subsequent to 1878, the date of the autobiographical sketch before mentioned, his work, although arduous and important, may be briefly summed up as follows:

In 1879, being called to the East by the illness and death of his father, he did little if any work in the field. In 1880, as special agent of the Forestry Department of the United States Census Office, he accompanied Dr. Engelmann and Professor Sargent in an expedition to the Valley of the Columbia and the far Northwest. Wintering in California he spent the following year in that State, making numerous collecting trips North and South, including a trip to the Yosemite in June. Home again in the summer of 1882, he was busily employed for some months in arranging his collections and on work for our Academy PROCEEDINGS. In the fall of that year he returned to California, and passed the winter in San Diego.

In January and February, 1883, he made two camping trips into Lower California; then, going to San Francisco, made numerous excursions from that point, and returned to Davenport in September. In June, 1884, he sailed a second time for England, returning in August of the following year, after spending much time at Kew, and visiting other herbaria and gardens on the Continent.

The summer of 1886 he spent partly with friends in Wisconsin, partly in the quiet enjoyment of his Iowa home. But even when resting, his mind did not rest—his wonderfully voluminous correspondence went on, and the microscope filled in his otherwise leisure hours. Again the winter was passed in San Francisco, from which city he made numerous collecting trips as before. Remaining in California, chiefly in the vicinity of San Francisco, until September, 1888, he was busily employed making special collections of *Arctostaphylos* and *Ceanothus*, and in the study of these and the Genus *Alnus*. His last visit to California was made in the spring of 1889. Returning to Davenport in July, he made a trip to Canada and New England, visited New York and Philadelphia, and returned to his home but a few weeks before his death.

Most intimately connected with the botany of the Pacific Coast; "treading reverently in the steps of Chamisso, Douglas, Nuttall, and others of less note," who, at such accessible points as San Diego, Santa Barbara, Monterey, and the mouth of the Columbia, had, at an early day, preceded him, he greatly extended their labors.

"None of the early investigators," says a writer in the *Century*

Magazine (Oct., 1892), "was more typical than the late Dr. C. C. Parry, who first crossed the country with the Mexican Boundary Commission. At intervals, for forty years after, he was a familiar figure to hunters, prospectors, mountaineers, and all sorts of outdoor people, from the Arizona deserts to the Siskiyou pine forests."

Dr. Parry was recognized as an authority by botanists everywhere; not only in this country (where he ranked with the first) and in England, but on the Continent as well; and this notwithstanding the fact that he never published a book, had no ambition in the way of authorship, and left most of his discoveries to be described by others. His writings, though sufficient to constitute volumes, and comprising much of great scientific value, are scattered in fragmentary form through various government and society reports, scientific journals, and the daily press. A list, approximately complete, will be published in connection herewith.

In 1875 he was made a fellow of the American Association for the Advancement of Science, in which body his membership dates back to 1851. He kept up a corresponding membership in the Philadelphia, Buffalo, St. Louis, Chicago, and California Academies of Science, and was connected with various other organizations, among them the Philosophical Society of Washington, D. C., the Bay District Horticultural Society of California, and the State Historical Society of Iowa. Of our own Academy he was, from the start, a most active promoter and one of the main supports. Its welfare was a matter of constant solicitude with him, and to his valuable papers, published in our PROCEEDINGS, the Academy's favorable recognition abroad is in great part due. Although absent in Arizona at the time of its organization, he was made a member of the first Board of Trustees, and continued in that capacity as long as he lived. On the resignation of our first President, Prof. Sheldon, in 1868, Dr. Parry was chosen to succeed him, and reëlected again and again, until, in 1875, he declined longer to retain a place from which, and its duties, he must of necessity be much of the time absent. As a member of the Publication Committee from its inception, his counsel and assistance were invaluable, as indeed they were, while he lived, in the Academy's every undertaking.

Wholly free from that jealous self-seeking which too often mars genuine merit, his relations with his fellow-workers, whether tyros or masters in the science, were always of the pleasantest. The

veteran botanist, Prof. John Torrey of Columbia College, to whose assistance and encouragement, from the time of their first acquaintance in 1845, he acknowledged himself deeply indebted, was his warm personal friend through life. Of their last living interview, which occurred in September, 1872, shortly before Torrey's death "full of years and honors," Dr. Parry writes in an obituary notice prepared for this Academy: "It was my privilege to entertain this distinguished guest at my rude botanical retreat in the heart of the Rocky Mountains. Here, in close proximity to my cabin, I could point out to him many of the living plants that he had described fifty years previously, from herbarium specimens, but had never before seen in their living beauty." Owing to the early severity of the season at the time of this visit, Dr. Torrey was prevented from making the ascent of the peak to which his name had been given by his host and friend, although permitted "to gaze on its sky-piercing summit and to snatch from its wintry slopes some late-grown floral mementos of his early labors." Of this and its companion peak, Mt. Gray, Dr. Parry says: "In my first botanical exploration of the Rocky Mountain region of Colorado, in 1861, I applied the name of 'Torrey and Gray' to twin peaks which, from a distant view, had often attracted my attention. In the year following I succeeded in reaching the summit of the eastern peak, now well known as Gray's Peak, and determined its elevation by barometric observation. Two years afterward, in 1872, I stood for the second time on the same elevation, accompanied by Prof. Gray himself and a large party of acquaintances. In response to some appropriate resolutions on this occasion, Prof. Gray, pointing to the closely-adjoining western peak, expressed the earnest wish, seconded by all present, that it should continue to bear the name first affixed — of Mt. Torrey — in worthy commemoration of his early and valued scientific associate."

It was Dr. Parry's pleasant privilege also to give its name to Mt. Guyot, in honor of his friend, Prof. Arnold Guyot of Princeton. His own name (bestowed by Surveyor-General F. M. Case) is borne by a peak of the Snowy Range, to the north-west of Empire City. Farther removed from the abodes of men, retiring yet not inconspicuous, it stands amongst its fellows, an enduring and a fitting monument to him whom his friends knew as "good Dr. Parry."

Not less close than with Torrey and Gray were his relations with

Dr. George Engelmann of St. Louis, whose death occurred in 1885. "Since my first acquaintance with him, in 1848," he writes, "when I called on him at St. Louis before starting on my first exploring trip with Dr. D. D. Owen in the then Northwest, our friendly intercourse has been constant, and the letters received from him would make up a respectable volume. How much I owe to his wise counsels, his substantial encouragement, and not less to his sharp criticisms (always well-meant), I can now best realize by feeling their loss. He knew just what to look for, and, when seen, he also knew its significance in elucidating the system of nature." This was not less true of Dr. Parry himself.

Torrey, Gray, Engelmann, Parry! What were American botany but for these four co-laborers whose work and fame are inseparably interlinked?

Dr. Parry was essentially a field student, and the general accuracy of his conclusions is largely due to the fact that his observations were all made at first-hand: to this and to the thoroughness of his determinations, which were based on careful dissections of all accessible fruit, as well as of the flowering specimen; so that he was generally able, as he declared, to discriminate species by the fruit alone.

Industrious and indefatigable, "the bulk and value of his collections have probably not been equalled in America." (I quote from the Bulletin of the Torrey Botanical Club.) Beside contributing largely to the collections of his botanical friends and of various societies at home and abroad, he made for himself one of the finest private herbaria in the land, a collection, systematically classified and arranged, comprising over 18,000 determined specimens representative of nearly 6,800 species, together with some 1,400 specimens determined only as far as the genus. But while himself thus chiefly occupied in collecting from untrodden heights and tangled wilds, he recognized "with respect and reverence" the magnitude of the task assumed "by those masters of botanical science who have taken upon their broad shoulders the burden of a systematic arrangement of the whole vegetable kingdom."

Appreciating the beautiful as he did wherever found, and especially as embodied in floral and arboreal forms, Dr. Parry was yet, for a naturalist, markedly utilitarian. Wherever he went, in whatever he did, his eyes were open to the practical. The plant, the tree which gave promise of usefulness was to him doubly interesting, and he spared no pains to obtain for such the recognition they

deserved. To bring the Mexican rose into cultivation, for example, he made an extra trip into Lower California. He was at especial pains to introduce the remarkable *Spiræa cæspitosa* or "tree-moss," found in the Wasatch Mountains, of which he writes: "The peculiar adaptation of this plant for ornamental rock-work can be appreciated by those who have seen it in its native haunts, and it is hoped that from plants and seeds somewhat copiously collected it may eventually find a much larger number of admirers in gardens devoted to this charming class of horticultural adornments." Every region he explored was viewed not alone with the botanist's searching eye, but was studied as well in its topographical and climatic aspects, as affecting its economic possibilities.

Of his careful work in the field we have pleasant glimpses in the notes of his first Pike's Peak expedition. At the close of each day's toilsome journey we see the earnest student seated by the camp-fire, note-book in hand, tracing a map of the route just passed over and recording its general features—topographical, geological, botanical—in simple, terse narrative, with scarcely a word interlined or erased. As he said of his lamented young friend and associate, J. Duncan Putnam, who accompanied him on more than one toilsome expedition, "with him the truths of nature were serious matters."

The conscious possessor of a talent for observation, he used it reverently; taking careful account of what so many would have suffered to pass unseen or fade into forgetfulness. Nor was he content to be simply receptive, but interrogated Nature continually. Often, intent on some all-absorbing quest, he would disappear from camp for a day or more at a time, still however, with the woodsman's unerring instinct, reappearing safe and sound.

Yet, curiously exemplifying the absorption of the naturalist in other than the affairs of his fellow-men, these notes contain no mention of his traveling companions, nor of any of the unique and interesting specimens of Western humanity with which he was continually coming in contact. The most warm-hearted, unassuming, and genial of men; one whose learning and humility were alike delightful, whose nature reflected the sweetness of the flowers he loved, and who was welcomed to every fireside; one of whom, as of Agassiz, it may truly be said:

"where'er
He met a stranger, there he left a friend,"

he yet made no study of man as man, caring only for hearty companionship, the warm greeting, and fervent God-speed.

Deeply affectionate, almost extravagantly fond of children, and with a sense of humor which often sparkled in his home conversation, he was yet so reticent that only the intimate few were aware of these traits in his character. With no expensive habits and almost no wants save knowledge, he looked on money as of value chiefly for the amount of this it could procure and diffuse. Devoted not only to his own special study but to Natural Science in general as a too much neglected part of the great educational field, he lost no opportunity to support its claims as against the dull abstractions of unused tongues and all exclusively text-book instruction.

Of his scientific achievements I will leave those to speak who shared in and were conversant with his labors.

Prof. J. G. Lemmon—with whom he explored the San Bernardino Valley, and in whose pleasant home, in the quietude of his herbarium, Dr. Parry's last days in California were spent—after paying a feeling tribute to the memory of his friend, thus sums up his western coast work:

"Dr. C. C. Parry was most intimately connected with the flora and the botanists of California. Since his early explorations on the coast near San Diego, in 1849, the Doctor has made several brief visits to different regions of the western slope, intent upon some special discovery or study. During one visit it was the curious little sand plant, the *Chorizanthe*, that caught his keen eye and secured his careful discrimination. Another visit was devoted to the *Alders;* another to the *Cacti;* etc.

"In 1882 Dr. Parry traveled well over the Pacific slope, studying the interesting family of *Arctostaphylos* or 'Manzanita,' publishing the following year, in the PROCEEDINGS OF THE DAVENPORT ACADEMY OF SCIENCES, a monograph which cleared away much of the misconception and ambiguity that has all along encumbered our botanical literature, by showing that there were several distinct forms mingled in previous descriptions. A second monograph, read before the California Academy of Sciences, June 20, 1887, still further elucidated the subject, and the two papers cited complete our knowledge of the California manzanitas, Dr. Parry having detected and described therein six new species, besides determining the proper limits of the other nine.

"Later, in 1887 and 1888, he performed like excellent services in the examination of our *Ceanothus* family, many species of which form our coast chaparral, while others constitute the valuable forage plants called 'tea bushes' or 'deer brush' in the interior mountain regions. In two able monographs, published February and August, 1889, he has cleared up the mass of confusion in this

genus, while detecting a half-dozen new species and defining the twenty-six remaining ones."

C. R. Orcutt, editor of the *West American Scientist*, writes:

"Dr. Parry discovered during his extensive explorations hundreds of new plants afterward described by Dr. Gray and by Dr. Engelmann, and his name is firmly fixed in the history of West American botany. While his greatest service has been rendered to botanical science, yet horticulturists will not soon forget that it was Dr. Parry who discovered *Picea pungens*, the beautiful blue spruce of our gardens; *Pinus Engelmanni*, *Pinus Torreyana*, *Pinus Parryana*, *Pinus aristata*, and a host of others of beauty and value. Through his zeal and enterprise many plants now familiar to American and European gardens were first cultivated. *Zizyphus Parryi*, *Phacelia Parryi*, *Frasera Parryi*, *Lilium Parryi*, *Saxafraga Parryi*, *Dalea Parryi*, *Primula Parryi*, and many other plants of great beauty or utility bear his name in commemoration of his labors and worthily do him honor.

"No name is more intimately connected with the flora of West America than is the name of Charles Christopher Parry. For nearly fifty years his indefatigable labors and explorations in the West have enriched our botanical lore. His name is associated with many pleasant memories in the mind of every one who was so fortunate as to know him personally. Since 1882 he has published very important papers on the species of *Chorizanthe* on the Pacific Slope; on the genus *Arctostaphylos* (the manzanita); on Pacific Coast Alders; and, later, on the genus *Ceanothus*, which contains the numerous mountain and coast shrubs known as 'wild lilacs.' These papers were the result of special studies in the field of these difficult groups of plants and contained descriptions of many new species."

In the vicinity of San Diego, in 1882, as Mr. Orcutt further relates, "he rediscovered the little fern *Ophiglossum nudicaule*, which he had first found in 1850, and which ever since had been unseen. In the neighborhood of Todos Santos, or All Saints Bay, were discovered the new *Ribes viburnifolium*, Parry's Mexican rose (*Rosa minutifolia, Engelm.*), and a dwarf horse-chestnut (*Aesculus Parryi*) among other new plants;" also, later, in the same region, "the new spice bush (*Ptelea aptera*, Parry)." The Parry lily (*Lilium Parryi*, Watson) was discovered in 1876 on the ranche of the Ring brothers in Southern California, near San Gorgonio Pass.

Dr. Parry's work on earth is done. His was a busy, useful life; unselfish, but crowned with the proudest success. His name "has been stamped upon the mountain peak and traced in lines of beauty in many a mountain flower." At last the gathering hand has been

gathered; the wandering feet have brought him back to lie down on the green hillside within sight of the home he loved; to rest under fragrant, clustering flowers, where in years long past he was wont to seek their shy, wild sisters. They and he are gone; but, let us trust with his friend, the prose poet of the Yosemite, "he has but gone botanizing in a better land."

Over his grave, through the years to come—

"Swing, O flowers, your bells of bloom!
Deep below as high above
Sweeps the circle of God's love."

LIST OF PAPERS
PUBLISHED BY THE LATE DR. C. C. PARRY.

BY MRS. C. C. PARRY.

In the Report of the United States and Mexican Boundary Survey.

Reconnaissance to the Mouth of the Gila River from San Diego, Cal., Sept. 11 to Dec. 10, 1849. Vol. I., Pt. I., p. 125.

General Geological Features of the Country. Vol. I., Pt. II., p. 1.

Geological Features of the Rio Grande Valley from El Paso to the Mouth of the Pecos River. Vol. I., Pt. II., p. 49.

Report of a Geological Survey of Wisconsin, Iowa, and Minnesota. By David Dale Owen.

Systematic Catalogue of plants of Wisconsin and Minnesota. 1848. Art. V., p. 606.

Reports of the U. S. Department of Agriculture.

Character of Herbarium, etc. 1869, p. 91.

Royal Gardens at Kew, etc. 1870, p. 108.

Botanical Explorations in East Tennessee. 1871, p. 221 (?).

Cinchona Planting in Jamaica. 1872 (?).

Report of Kansas Pacific Railway Survey. 1867–8.

Preliminary Report, and Extract from Detailed Report, as Geologist and Naturalist. P. 196 and p. 213.

Report of the Commission of Inquiry to the Island of Santo Domingo. 1871. Forty-second Congress, First Session, Senate Executive Document No. 9.

Report on the Botanical Features, Agricultural Products, and Timber Growth of the Peninsula of Samana, San Domingo. P. 71.

Botany of the Southern District of Santo Domingo. P. 86.

Proceedings of the American Association for the Advancement of Science.

The Habitative Features of the North American Continental Plateau near the Line of the Thirty-ninth Parallel of North Latitude. Vol. XVII., p. 312.

The Rocky Mountain Alpine Region. Vol. XVIII., p. 248.

On a Form of Boomerang in Use Among the Moqui Pueblo Indians of North America. Vol. XX., p. 397.

Report of the British Association for the Advancement of Science.

North American Desert Flora between 32°–42° North Latitude. Vol. XL., p. 122. (Published also in The Journal of Botany, Vol. VIII., p. 343.)

American Journal of Science.

Physiographical Sketch of That Portion of the Rocky Mountain Range at the Headwaters of South Clear Creek and East of Middle Park, with an Enumeration of Plants Collected in this District in the Summer Months of 1861. Second Series, Vol. XXXIII., p. 231, p. 404; Vol. XXXIV., p. 249, p. 330.

Supplement I. to Enumeration of Plants of Dr. Parry's Collection in the Rocky Mountains, *Coniferæ*, by Drs. Parry and Engelmann.

Botanical Gazette.

On Some Recent Notes and Descriptions of *Eriogoneæ* in Proceedings of California Academy of Science (Vol. XI., No. 3). Vol. II., p. 54.

Iowa Instructor and School Journal.

Claims of Natural Science as a Branch of Mental Education. Vol. I., (1859) Nos. 3, 4, 5, 6, 7, 8, 9

Evil Effects Resulting from an Improper Association of Educational Interests with Party Politics. Vol. II., No. 2.

The Three Periods in a Writer's Progress. Vol. IV., No. 9.

Overland Monthly.

Early Botanical Explorers of the Pacific Coast. October, 1883.

Rancho Chico. June, 1888.

Proceedings of the Davenport Academy of Natural Sciences.

Valedictory Address. Vol. I., p. 19.

Annual Address. Vol. I., p. 67.

Annual Address. (Omitted from Vol. I.) Vol. II., p. 355.

Obituary Notice of Prof. John Torrey. Vol. I., p. 44.

Notice of the late I. A. Lapham. Vol. II., p. 29.

Biographical Sketch of the Late J. Duncan Putnam. Vol. III., p. 255.

Obituary Notice of Dr. John Le Conte. Vol. IV., p. 230.

Obituary Notice of Dr. George Engelmann. Vol. IV., p. 242.

Memorial of Prof. David S. Sheldon. Vol. V., p. 179.

Early Reminiscences of Richard Smetham. Vol. V., p. 205.

Ode on Laying the Corner-stone. Vol. II., p. 178.

On Depositing the Parry Botanical Collection. Vol. II., p. 279. (Autobiographical.)

Summer Botanizing in the Wasatch Mountains, Utah. (A letter addressed to Prof. Asa Gray.) Vol. I., p. 145.

A New California Lily. Vol II., p. 188, plates 5, 6.

Oxytheca. Two New Species from Southern California. Vol. III., p. 174.

Arctostaphylos, Adans. Notes on the United States Pacific Coast Species, Including a New Species from Lower California. Vol. IV., p. 31.

New Plants from Southern and Lower California. Vol. IV., p. 38.

Chorizanthe, R. Brown. Revision of the Genus, and Rearrangement of the Annual Species — with one exception, all North American. Vol. IV., p. 45.

Harfordia, Greene and Parry. A New Genus of *Eriogoneæ* from Lower California. Vol. V., p. 26.

Lastarriæa, Remy. Confirmation of the Genus, with Character Extended. Vol. V., p. 35.

The North American Genus *Ceanothus*, with an Enumerative List, and Notes and Descriptions of Several Pacific Coast Species. Vol. V., p. 162.

Chorizanthe, R. Brown. Review of Certain Species Heretofore Improperly Characterized or Wrongly Referred; with two New Species. Vol. V., p. 174.

Ceanothus, L. Recent Field Notes, with a Partial Revision of Species. Vol. V., p. 185.

Transactions of the St. Louis Academy of Science.

Ascent of Pike's Peak. Vol. II., No. 1.

Notice of Some Additional Observations on the Physiography of the Rocky Mountains, Made During the Summer of 1864. Vol. II., No. 2, p. 272.

Account of the Passage Through the Great Cañon of the Colorado by Mr. James White in 1867, with Geological Notes. Vol. II., No. 3.

On the Timber Vegetation of the Rocky Mountains. (A paper referred to in the President's Annual Address, Vol. II., p. 582, but which may not have been published.)

On the Character of Persistent Snow Accumulations in the Rocky Mountains — Latitude 40°–41° N.— and Certain Features Pertaining to the Alpine Flora. Vol. II., No. 3, p. 532.

Bulletin of the Torrey Botanical Club.

Fruit of *Cucurbita*. Vol. IX., p. 30, pl. 14.

A New North American Rose. Vol. IX., p. 97.

A New Species of *Oxytheca*. Vol. X., p. 23.

Cucurbita Californica. Vol. X., p. 50, with plates.

Note on *Harfordia*, Greene and Parry. Vol. XVI., p. 277.

Bulletin of the California Academy of Science.

Pacific Coast Alders. Vol. I., p. 351.

California Manzanitas. A Partial Revision of the *Uva Ursa* Section of the Genus *Arctostaphylos*, Adans, as Represented on the North American Coast. Vol. II., p. 483.

West American Scientist.

New Genus of *Euphorbiaceæ* from Lower California. Vol. I., p. 13.

Notes on *Chorizanthe Lastarriæa*. Vol. I., No. 5.

Historical Notice of *Pinus Torreyana*. Vol. I., No. 6.

A New Species of *Eriogonum*. Vol. VI., No. 47.

American Naturalist.

Visit to the Original Locality of the New Species of *Arceuthobium* in Warren County, N. Y. Vol. VI., p. 404.

Botanical Observations in Western Wyoming, with Notices of Rare Plants and Descriptions of New Species Collected on the Route of the Northwestern Wyoming Expedition under Captain W. A. Jones. Vol. VIII., pp. 9, 102, 175, 211. Reprint, 25 pages.

Herbarium Cases. Vol. VIII. (August, 1874.)

Botanical Observations in Southern Utah. Vol. IX., pp. 14, 139, 199, 267, 346.

San Francisco Bulletin.

San Bernardino. Two Struggling Systems; Growth of Civilization; The Gardens of Riverside; The Hopeless Region of the Colorado. Feb. 16, 1881.

The Desert Palm. Botanical History of the *Washingtonia Filifera*—Its Character and Habitat. March 24, 1881.

San Joaquin Valley. Past, Present, and Possible Future of a Vast Region. Sept. 7, 1881.

Tree Culture. Dec. 23, 1881.

The Desert Ironwood. Explorations in the Mojave and Arizona Regions. Jan. 12, 1882.

Cohahuilla Indians. Feb. 1, 1882.

Fruit Lands. Irrigation from the Santa Anna River. March 9, 1882.

San Diego Revisited. March 28, 1882.

Lower California. Notes of a Botanist Visiting Mexican Soil. April 28, 1882.

Down South. May 15, 1882.

A Botanist in Lower California. March 15, 1883.

Across the Mojave Desert. April 12, 1883.

Howard Schuyler. Jan. 23, 1884.

Chicago Evening Journal.

The Far West. Its External Features and Natural Resources. Dec. 8, 1863. (Copied in the Davenport Gazette, Dec. 17, 1863.)

Eastern Nebraska Along the Platte Valley. Dec. 15, 1863.

Western Nebraska and Eastern Colorado to the Base of the Rocky Mountains. Dec. 22, 1863. (Copied in the Davenport Gazette, Dec. 31, 1863.)

External Features and Natural Resources—First Impressions of Rocky Mountain Scenery. Dec. 30, 1863. (Copied in Davenport Gazette, Jan. 7, 1864.)

The Snowy Range of the Rocky Mountains. Jan. 6, 1864. (Copied in the Davenport Gazette Jan. 9, 1864.)

The Passes of the Snowy Range of the Rocky Mountains Leading to Middle Park. Jan. 15, 1864. (Copied in the Davenport Gazette, Jan. 18, 1864.)

The Route of the Pacific Railroad. Its External Features and Natural Resources. Jan. 20, 1864.

The Far West. Its Present Wants and Future Prospects. Jan. 27, 1864. (Copied in the Davenport Gazette, Jan. 29, 1864.)

A City in the Heart of the Rocky Mountains. Its History, Scenery, Altitude, Surroundings, etc. Dec. 2, 1864.

Dividing Line Between the Agricultural and Pastoral Regions. (Date uncertain.)

Denver City. (Date uncertain.)

Midsummer Week in Middle Park. Sept. (?), 1864.

Far West Sketches. Ascent of Long's Peak. Sept. 28, 1864. (Copied in the Davenport Gazette, Oct. 2 (?), 1864.)

Davenport Gazette.

Panama — New Granada, S. A. July 5, 1849.

Account of the Isthmus from Chagres to Panama. May 23, 1849.

A Public Library. April 1, 1854.

Geology of Iowa. Nov. 15, 1858.

Claims of Dr. Fountain. Jan. 31, 1862. (Read before the Scott County Medical Society.)

The Utility of Collections in Natural History in Connection with Common Schools. April (?) 1864. (High-school lecture.)

Peat as an Article of Fuel. Jan. 25, 1866.

Peru Coal in Davenport. Nov. 19, 1866.

St. Louis. Its General Aspect, Street Railroads, Nicholson Pavements, etc. 1867.

Departure on an Exploring Expedition to the Pacific. May 8, 1867.

Indian War and the Pacific Railroad. July 19, 1867.

Sangre de Christo Pass in the Rocky Mountains. Sept. —, 1867.

From New Mexico. Harvest Month on the Rio Grande. Nov. 6, 1867.

From Arizona. An Interesting Account of the Territory. Jan. 6, 1868.

The Great Colorado of the West. Its Navigable Waters and Deep Cañons. Feb. 11, 1868.

Davenport Academy of Natural Science. June 1, 1868.

General Kit Carson. June 12 (?), 1868.

New England Seen Through Western Eyes. Aug. —, 1868.

Aspects of Rocky Mountain Scenery. (Lecture.) April 27, 1868.

Letter from Washington. May —, 1869.

Letter from California. Climatic Luxuriance. Jan. 21, 1876.

Letter from Philadelphia. June 13, 1877.

Letter from Cambridge, Mass. July 24, 1877.

Mexico. Aztec Capitol, etc. Feb. 13, 1878.

Mexico. A Winter's Journey and Its Observations. March —, 1878.

Mexico and Mexicans Impartially Presented. May 22, 1878.

Thirty-six Years a Botanist. Collection Deposited in the D. A. N. S., Oct. 26, 1878. (Proc. D. A. N. S., Vol. II., p. 279.)

The Potato—was it Given to the World by the Aztecs? Nov. 3, 1879.

Shall We Have a State Entomologist? March 12, 1880.

Northern Oregon. A Trip on the Columbia River. Aug. 27, 1880.

The Columbia—the River and the Valley. Sept. 9, 1880.

The Gulf of California. A Journey Thither by an Old Friend. Dec. 4, 1880.

Midwinter in Southern California. Feb. 7, 1881.

Letter from Los Angeles. June 2, 1881.

On the Pacific Coast. The Indescribable Yosemite, etc. Aug. 23, 1881.

The Autumn in the Pacific State. Its Peculiar Aspects. Dec. 1, 1881.

A Parting Paper. Last Address to the D. A. N. S. Before Departure for Europe. April 27, 1884.

Davenport Daily Democrat.

English Rural Life. March 22, 1885.

The Western Weekly (Davenport).

Essay. Wild Plants for House Culture. (Read before the Scott County Horticultural Society.) Feb. 21, 1874.

Rocky Mountain News (Denver).

Mountain Heights in the United States. March 19, 1863.

Colorado Chieftain.

Letter from Pueblo, Col. Oct. 21, 1869.

Utah Pomologist.

The Valley of the Virgen in 1844 and 1874. May, 1874.

San Bernardino Times.

Rocky Mountain Cacti. (Place and time of publication uncertain; year probably 1876.)

On Botany of California. (Date uncertain.)

San Diego Union.

Address before Natural History Society. March 12, 1882.

Remarks on Lower California. (Address before Natural History Society.) Feb. 9, 1883.

Oskaloosa (Iowa) Herald.

Report on Botany and Horticulture. (Read before the State Horticultural Society.) January, 1877.

Pamphlet.

Historical Address on the Early Exploration and Settlement of the Mississippi Valley. Delivered at Davenport, Iowa, June 21, 1873.

What a Botanist Saw in Europe. (Read before the Chautauqua Literary and Scientific Circle at Monterey, Cal., July, 1887. Not known where printed.)

DAVENPORT, IOWA, September 15, 1893.

SUMMARY OF THE ARCHÆOLOGY OF IOWA.

BY FREDERICK STARR, PH. D.

IT is now several years since I planned the work of which this is a part. As a student, in Iowa, of Iowa archæology, I believed that a systematic work carefully outlined might be carried out with profit. As the plan shaped itself it comprised five separate pieces of work:

(*a*) Preparation of a *bibliography*, that workers might know where to look for the literature.

(*b*) Publication of a *summary*, that those interested, who do not have access to libraries, may know what has been done.

(*c*) Organization of exploration in every part of the State; collection of data, diagrams, plans; making of a working-map, showing the location of mounds, shell-heaps, trails, village sites, etc.—in other words, *field-work*.

(*d*) *Publication* of a final report of the work done under such organization, and a separate publication of the map worked out by the exploration.

(*e*) Preparation of a pamphlet of illustrations of "Iowa types" of archæological specimens and of a series of plaster copies and models of remarkable specimens, mounds and the like, for distribution to universities, high schools, colleges, and scientific and historical societies within the State. This *educational* work is the most important and significant part of the whole plan, and can only be done well after the other parts have been performed.

How far this plan is to be realized remains to be seen. The Bibliography has been printed; the Summary is here presented. By a wide distribution of this through the State it is hoped that a body of helpers and co-workers may be raised up to work under direction toward definite ends. Persons interested are urged to write to the Academy for advice and for fuller statement of plans.

Very many individuals have helped the author in the preparation of the Bibliography and in this Summary both by criticism, supply of material, and by loan of prints; to all such we give thanks.

The following corrections should be made in the Bibliography (PROC. D. A. N. S., vi., pp. 1–24):

In No. 16, for pp. 263–281 read pp. 265–281.

In No. 23, for Vol. ii. read Vol. iii.
38, for pp. 9, 13 read pp. 4–5.
50, for p. 266 read p. 267.
63, strike out word *nine;* add *sums up work of 1880;* read Vol. iii., not Vol. ii.
64, this should be same as No. 71.
71, for pp. 140–146 read *for 1881.*
75, for John J. read John G.
81, for Barber read Barker.
85, add *and South-eastern Minnesota.*
93, in place of reference given, read Zeitschrift für Ethnologie, 1886, pp. (194)–(195).
101, is part of No. 185.
106, for p. 106 read p. 107.
115, for p. 246 read p. 247.
139, Title, "*Antiquities of Missouri Bluffs.*" Add *Read before Iowa Academy of Sciences, Des Moines.*
144, for No. 172 read No. 170.
157, for Mercer County read Iowa.
162, for No. 23 read No. 44.
171, for Vol. vi. read Vol. vii.
172, for No. 94 read No. 144.
179, for Vol. v. read Vol. vi.
181, for 1887 read 1886, pp. (322)–(328).

Also, add the following titles and numbers: (The author has not seen articles thus marked*).

206. AMERICAN ANTIQUARIAN. 1885, vii., p. 253.
Speaks of Henshaw on Mound-Builders' Art.

207. ARCHÆOLOGIST. 1894, ii., p. 282.
Refers to skeletons and relics found at Sioux City.

*208. CHART OF IOWA AND WISCONSIN: GEOGRAPHICAL, GEOLOGICAL, AND STATISTICAL. Philadelphia, 1838.
Refers to Iowa Mounds.

*209. COLUMBUS JUNCTION HERALD. 1876.
Articles on Toolesboro and other mounds.

210. EVANS, S. B. *Proc. Congres Int. des Americanistes,* 1890, [pp. 498–506.
"On Some Claims of the American Indians." Attacks Bureau of Ethnology theory of Mound-Builders.

211. HERMANN, RICHARD. *Personal Letter.*
Describes relics from Dubuque County.

212. HOLMES, WILLIAM H. *Bureau of Ethnology, Third Annual [Report*, 1881–2, pp. 397–423.
"Prehistoric Textile Fabrics," etc. Refers to Iowa specimens: pottery on p. 417, celts on p. 411.

213. LEWIS, T. H. *The Archæologist*, 1892, ii., pp. 85–89.
"Effigy Mounds near Aurora, Ill." On p. 87 refers to distribution of effigies in Iowa.

214. MORGAN, BENJAMIN. *Cedar Rapids Gazette*, Oct. 14, 1887.
"The Mound-Builders." Mentions Iowa mounds generally, but gives some detail regarding mound in Keokuk County, containing "burial urns," and one in Warren County, containing many skeletons.

215. DE NADAILLAC, MARQUIS. *Materiaux pour l'histoire, etc.*, [1885, pp. 497–517.
"Les Pipes et le Tabac." Figures and describes some Iowa pipes.

216. PEET, STEPHEN D. *American Antiquarian*, xvi., p. 93 *et. seq.*
"Craft Symbols and Religious Emblems." Refers to Iowa pipes on pp. 93–94.

*217. POLK COUNTY, CENTENNIAL HISTORY OF. Des Moines, [1876.
At pp. 15–16 refers to earth-works on site of old Fort Des Moines.

218. PRATT, WILLIAM H. *Proc. Davenport Acad.*, ii., p. 154.
"Exploration of Mound 1 on Allen Farm."

219. ———— *Proc. Davenport Acad.*, iii., pp. 90–91.
"Exploration of mound on Allen Farm." The last mound of the series explored. Some bones and a few relics.

220. THOMAS, CYRUS. *The Cherokees in Pre-Columbian Times*, [16mo., pp. 97.
Refers on p. 78 to Allamakee County enclosure; on p. 81 to pipes; on p. 83 to East Iowa mounds; on p. 89 to customs in region.

221. ———— *12th Annual Report Bureau of Ethnology*, [1890–1891.
"Report on the Mound Explorations of the Bureau of Ethnology." On pp. 38–39 he describes the Lyon County

mounds and circles; p. 553 refers to varied character of Scott County mounds; pp. 99–112 treats specifically of Iowa archæology. Works in Allamakee, Clayton, Dubuque, Wapello, Van Buren, and Lee Counties are described.

*222. WEBSTER, CLEMENT L. *Nature*, Jan. 1, 1891.
The same probably as No. 185.
This author has written many newspaper articles, the contents of which were afterward republished in the various articles referred to in the Bibliography.

*223. WHINERY, S. C. *Iowa State Register*, August, 1883.
"The De Soto Mounds."

224. WITTER, F. M. *American Geologist*, ix., p. 276.
Describes löess at Muscatine; its organic remains and two arrow-heads and some flint chips.

In this Summary we aim at definiteness. Many articles upon Iowa Archæology are so vague as to have no value. The arrangement of material is, for convenience, in the alphabetical order of County names.

ADAMS COUNTY.

Thomas [174] lists a mound on the Thompson farm, near *Corning*.

ALLAMAKEE COUNTY.

Thomas [169, 173, 174] describes works seven miles above *New Albin*, on the Upper Iowa River. They are located upon a bluff, lying in a bend of the stream, and bordering a bayou — no doubt an old river channel. The top of the bluff is roughly rectangular. The northernmost, largest structure is an enclosure quite exactly circular, except on the east, where it conforms to the line of the bluff. At the southeast the ends overlap somewhat, leaving an entrance-way between them. A ditch within borders the embankment from the entrance on the south to the point where the circular part is broken by the bluff-line. The dimensions of the earthwork are—diameter from N. to S. outside to outside, 277 feet; diameter, E. to W. outside measures, 235 feet; circumference, 807 feet; part along the bluff, 100 feet; entrance overlap, 45 feet; the wall is quite uniform, with a height of about 4 feet and a width of 25 to 28 feet; the entrance is 16 feet wide; the ditch is 5 to 6 feet wide and 3 feet deep. At the north an excavation adjoins the wall; it is about 100 feet long, 35 feet wide at widest part, and 3 feet deep.

ALLAMAKEE COUNTY—*Continued.*

The circular embankment is composed chiefly of yellow-brown clay; this is covered with drifting sand and an accumulation of bones, river-shells, stone chips, potsherds, dirt, etc. A trench across it showed in section about 1 foot of sand, then from 1 to 2 feet of refuse matter, then the embankment proper 2 feet in height. Nearly all the implements found were of stone and very rude, little more than flakes with one sharp edge; a few arrow- and spear-points were found. Many charred bones of fish, birds, rabbit, fox, bear, wolf, elk, and deer occur in the refuse.——— Alexander [2] describes the same enclosure, and mentions from the locality a pottery vessel with ornamental markings. This measured at mouth, 14 inches in diameter; at widest, 26 inches. It had handles at each side. He also mentions two specimens of copper, one a thin strip 2 inches long and ¾ inch wide, and the other a triangle 1 inch wide at base and 1½ inch along the side, with centre and base perforated.——— Thomas [169] thinks the enclosure represents two stages of occupation: (*a*) as a palisaded fort, (*b*) as a village site.——— Both Thomas and Alexander describe other structures in the group—squarish enclosures to the south and south-west of the great circle, and many mounds. Of the latter Alexander speaks of eighty-three, Thomas says over one hundred, and appears to recognize an arrangement in six nearly parallel lines running north-east and south-west. The former author states that they continue to be found along the river to about twenty miles above New Albin. Thomas [173] describes the mounds as being mostly circular, from 15 to 40 feet in diameter and from 2 to 6 feet high; a few are oblong, from 50 to 100 feet in greatest diameter.——— Certain barren spots on the plateau proved to be burial places, among which were scattered stone chips, shells, charcoal, and ashes. They were seldom more than 18 inches deep, and on excavation show a compact layer of hard, light-colored earth, perhaps mixed ashes and clay, subjected to action of fire. These were covered with sand from the butte. ——— In section, the mounds themselves show, first a layer of soil, then the hard, light-colored layer, then the skeletons. Bones were numerous, both in the barren places and in the mounds, sometimes mingled with charcoal and ashes, but usually as horizontal skeletons at a depth of from 1 to 3 feet. The long mound,

ALLAMAKEE COUNTY—*Continued.*

No. 1 in the east line, contained an oblong pile of sandstone near the centre; beneath it was a rude stone coffin, of slabs, 6 feet long and 18 inches wide. This contained a skeleton, extended with head to the west, badly decayed; also stone chips, rude scrapers, a valve of unio, and potsherds. On the sand butte near by, which is about 100 feet in height, are three mounds like the rest in structure. Three mounds within the smaller, squarish enclosure to the south-west of the great circle were opened.

Elsewhere, Thomas [221] describes the square earthwork on the south-west corner of the plateau, on the margin of the bluff, facing west. The wall, which is from 12 to 15 feet wide and from 2 to 4 feet high, surrounded three sides of a square, and measures on the north, 200 feet; on the east (where it is ditched on the outer side), 150 feet; on the south, 175 feet. About thirty feet east of the north-west corner is an excavation about 3 feet deep. There are three small mounds within the enclosure.

No. 1 was 30 feet long by 20 feet wide, and 4 feet high. The top layer, 1 foot thick, was of loose sand; the remainder was of hard, yellowish clay. In this were several large, flat sandstone fragments, beneath which, at original surface, was a much-decayed human skeleton, with a few stone chips, unios, and potsherds.

No. 2 was a cairn of sandstones covering human bones, charcoal, and ashes. It was 18 feet in diameter and 3 feet high.

No. 3 was a cairn covered with earth and heaped over a mass of charred bones, charcoal, ashes, and potsherds. It was 15 feet in diameter and 3 feet high.

South of this group, just across an impassable slough, on a terrace at the foot of a bluff, is an oblong enclosure. Along the margin of the slough runs a wall 300 feet long; from its ends two walls run south, nearly at right angles to it; the western one is 160 feet long, the eastern is 175 feet long. The height of the walls varies from 1 to 3 feet, and the width from 10 to 15 feet. Outside of each end wall is a washout.———A walled vault in the side of the eastern bluff near here is described, and referred to some white or half-breed trapper.

Thomas [174] mentions mounds located on the Hays farm, just above the junction of the Upper Iowa and Mississippi Rivers, two miles south-east of *New Albin*. Besides small mounds, there

ALLAMAKEE COUNTY—*Continued.*

is here an excellent circular enclosure [221]. The circle consists of three parallel ditches and two intermediate earthen walls. The inside ditch was originally probably 5 or 6 feet deep and 12 feet wide; the inner wall is the same width; the middle ditch is 4 feet deep and about the same width as the wall. The circular wall is broken on the side where it strikes the south margin of the bluff overlooking the slough. The circumference of the circle exclusive of the break is 996 feet; the break extends along the bluff 225 feet. At the south-east an embankment 10 or 12 feet wide and from 3 to 5 feet high runs down the crest of a narrow spur about 150 feet, gradually tapering to a point.———Three "furnaces" of stone are here. One was in a small mound with-

From the Annual Cyclopædia. Copyright, 1880, by D. Appleton & Co.

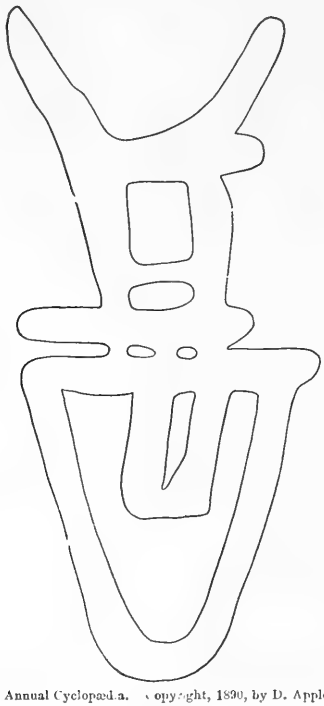
FIG. 1.

in the enclosure; the mound was 24 feet in diameter. In it were two walls of stone, flat sandstones roughly laid up and gradually drawn in near the top until one layer would cover the opening left in the top near that end. The walls were about 13 feet long, 3 feet high, and 3 feet apart. The stones show signs of fire.

ALLAMAKEE COUNTY—*Continued.*

The other two furnaces were not covered by mounds, and were outside the circle about eighty or ninety paces from its northwestern part.

The caves below New Albin in the bluffs of the Mississippi River are mentioned by Thomas [174], Mallery [91], and carefully described by Lewis [86]. *No. 1* is above *Kain's Station*, in N.-E. ¼ Sec. 26, Twp. 100, R. 4 W. A rock ledge extends for 150 yards



From the Annual Cyclopædia. Copyright, 1890, by D. Appleton & Co.

FIG. 2.

along a slough, rising to a height of 25 feet above the water. The cave has been used as a home, and fragments of burnt bones, potsherds, etc., are dug up in the floor. Here are pictographs. One represents a human head with horns or feathers (Fig. 1). In fissures and shelters in the same ledge are other representations of hands, feet, men, bird-claws, etc. *No. 2*, in the N.-E. ¼ Sec. 18, Twp. 99, R. 3 W., is a small cave in a ledge of rock 200 feet above

ALLAMAKEE COUNTY—*Continued.*

the river. The designs were incised and then painted; several human heads, snakes, animals, canoes, and the like occur; also one bird (?) measuring 6 x 15 inches (Fig. 2). *No. 3* is in a ledge 100 feet above the river, three or four miles below *Lansing*, in N.-E. ¼ Sec. 3, Twp. 98, R. 3 W. Here are simply two fissures, which formerly bore a large number of designs—men, animals, snakes, birds, human feet, tracks of birds and animals, human faces, canoes, etc.—but few are left. One design appears to represent some sort of bird; it measures 14 x 19 inches (Fig. 3).

From the Annual Cyclopædia. Copyright, 1890, by D. Appleton & Co.

FIG. 3.

This last locality is apparently the one referred to by Mallery [71] as fifteen miles south from New Albia.

Alexander [2] further speaks indefinitely of other works and relics. According to him, circular (and one rectangular) enclos-

ALLAMAKEE COUNTY—*Continued.*

ures occur, located usually at intervals of two miles, on the second bottoms. They range from 75 to 100 feet in diameter, and the embankments vary from 25 to 30 feet in width, and are 2 to 3 feet high. He mentions as found in them large stone mortars, pestles, stone axes, celts, arrow-heads, etc. Stone mortars may attain to 14 inches diameter; pestles are of several styles; celts range from 2¼ inches length to the size of a blacksmith's sledge.

Uncertain location, due to Thomas' misuse of name, Little Iowa, elsewhere; means, perhaps, the Upper Iowa [173]. Near the Mississippi River, a short distance below where the Little Iowa joins it, a group of mounds on the crest of a ridge one-fourth mile from the Mississippi and parallel to it; thirty or more mounds; circular, 20 to 40 feet in diameter. All are burial mounds. Those on the higher sandy ground, although of about the same size and with cores of clay similar to those on the firm clayey portion of the ridge, have an upper layer of 2 feet or more added to them. Under the clay core are decaying bones, potsherds, rude stone implements; generally two or more skeletons in a mound, horizontal, side by side, on original surface. On the terrace below were remnants of a row of comparatively *large* burial mounds, largely destroyed by railroad. They ranged from 6 to 15 feet high, and were chiefly of sandy loam like the neighboring soil; each had a central core of hard clay and ashes. Usually one skeleton; relics—chiefly stone axes, arrow- and spear-points, and a few copper celts.——In one mound, 32 feet diameter and 8 feet high, less injured than the rest, was a circular vault of flat, unworked stones, dry-laid, lessening above, and covered by one stone. One skeleton, and a squat and small, globular, earthen vase. This locality is described also by Thomas in his final report. [221]

BOONE COUNTY.

Fulton [59] mentions mound at *Moingona.*

CERRO GORDO COUNTY.

On the south bank of Lime Creek, at *Hackberry*, a small mound on a bluff 70 feet above the stream, has been examined by Webster. [187] The position is a fine outlook point. The mound, partly destroyed by natural agencies, appears to have been origi-

CERRO GORDO COUNTY—*Continued.*

nally 1½ to 2 feet high, is circular, and measures about 15 feet in diameter. At a depth slightly below the original surface of the surrounding land was a horizontal layer of broken pottery, the fragments having their concave side upward; numerous finished and unfinished arrow-points here. In the south-east part of the mound, a few inches above the pottery layer, were found several plates from the plastron of a turtle; these may have been interred after the mound was built.

CHEROKEE COUNTY.

Township 93, R. 39 (Spring Township). On the banks of Little Sioux River, at 3 feet below surface, Cutts [34] found fragments of ornamented pottery. The river here is terraced at ten to twelve feet in height; the upper six to eight feet is alluvial soil —loëss wash; below that is a grayish clay. The pottery fragments are numerous, ornamented with cross and parallel lines and indentations; the ware is from ⅛ to ½ inch thick.———A circle of stones about the size of the fist was found; within it were charcoals; above this were potsherds; then the bones of buffalo, elk, and beaver.

CHICKASAW COUNTY.

Near *Old Chickasaw*, on the west side of the Little Cedar River, a group of ten mounds has been carefully described by Webster. [186] Their location, about one and one-half miles below the town, is at the border of the first terrace, 20 to 40 feet above the flood-plain at its base. A spring is situated at a distance of about 260 yards to the south-east. The mounds are from 2 to 50 feet apart, are circular, round-topped, and measure from 22 to 51 feet in diameter, and from 1¾ to 5 feet in height. The main line of mounds runs north, a few degrees east. The others run parallel to the main line. The mounds of particular interest were:

No. 1. Mound 22 feet in diameter and about 1 foot in height. A few inches above the original surface was a thick bed of charcoal and a large, thoroughly-burned oaken log 8 feet long and 12 inches thick; there were no ashes to speak of.

No. 2. This mound was graded down years ago; its structure was as that of No. 4, but the mound was smaller; at the original surface two sitting skeletons were found; the bones were

CHICKASAW COUNTY—*Continued.*

well preserved. No relics were found in these mounds nor in the surrounding fields.

No. 3. In this three well-preserved skeletons were found, in sitting posture, at the level of the original ground surface; (*a*) one skeleton faced the east; the second (*b*), in front of (*a*), faced it; the third, a few inches north of (*a*), faced the east. The skulls of all three of these skeletons were markedly Neanderthal-

FIG. 4.

oid in type. In one specimen the lower forehead back of the eye orbits is very narrow, but rapidly expands backward; the frontal arch rises only 4.7 mm. before sloping abruptly backward, leaving a concavity back of and over the eyes. The largest cranium was 6¼ inches long by 5 inches wide. One skull appears to be that of a woman; another appears to have belonged to an aged person.———The structure of this mound is reported. The upper 3½ feet was of yellow clay soil unlike that in the immediate neighborhood; under this came 1½ feet of earth and ashes, very hard, with scattered bits of charcoal; then, at the original level, the skeletons.

No. 4. Two sitting skeletons were found at the original ground level. The crania were crushed, but some of the long bones were preserved. These indicate great muscular development and lofty stature.———Structure: the upper 1¾ feet were

CHICKASAW COUNTY—*Continued.*

of yellow earth; then 3¼ feet of very hard earth and ashes, below which were the skeletons; scattered pieces of oak charcoal were found and patches of ashes; under the latter were thin, deeply-stained layers of earth and ashes.

No. 9. Four sitting skeletons at about 1½ feet above the original surface. The lower jaw of one was large, strong, with squared angles; the teeth were well preserved, but worn down; one molar had a decayed cavity. Another lower jaw measured 12½ cm. from outer angle to outer angle, but had been fractured during life; the angles were low and much straightened; the teeth, except incisors and canines, were gone and the cavities absorbed. One skull appears to have been subjected to action of fire before it was buried. The skeletons appear to have belonged to two aged, one middle-aged, and one younger individual.—— In structure this mound showed, first, 1¼ feet soft, yellow earth; then 1¾ feet mixed earth and ashes of great hardness, with a small amount of scattered charcoal. The skeletons were at centre, upon a hillock of ashes and earth 1½ feet high.

No. 10 yielded three well-preserved skeletons. The bodies had been placed sitting with feet drawn under. One lower jaw, in fine preservation, was particularly massive and broad, with large, sound but much worn teeth.——— The mound was 45 feet in diameter and 3 feet high. The material was as in the others, but not packed hard. The skeletons were upon a little hillock about 1 foot in height.

Bradford. Webster [188] describes Winnebago graves on the brow of the hills overlooking the Little Iowa River. More than twelve individuals, wrapped in blankets and with provisions and possessions, were buried here. They were covered over by stakes driven obliquely into the ground on each side and meeting above; clods of earth covered these.——— On the west of the stream are many graves; these were enclosed by a tight crib. (cf. Charles City, Floyd County, Iowa.)

CLAYTON COUNTY.

Davis and McDonald [162] describe "lookout" mounds, yielding no relics, at localities as follows: On high bluff overlooking the Mississippi River *opposite Prairie du Chien*, the land belonging to the Girard Land Company; on bluff one-fourth mile south of

CLAYTON COUNTY—*Continued.*

the above. There are at the latter place two mounds, circular, 25 feet in diameter and 4 feet high; a third lies seventy feet back from these.

Lewis [83] gives description of a group of effigy mounds near *North McGregor*, 500 feet above the river, on a dividing ridge situated in S.-W. ¼ Sec. 3, Twp. 95, R. 3 W. The surrounding country is broken and rugged. The Yellow River lies to the north-west and Bloody Run to the south-west. The group extends a distance of about 2,000 feet, and includes ten animals and three birds, with two long embankments. The first embankment is 190 feet long, 18 feet wide, 1½ feet high; the second is 138 feet long, 18 feet wide, and 1½ feet high. The effigies vary from 79 to 109 feet in length and are from 2 to 3 feet high; no two effigies are just alike, the variation being most marked in the head; all are tailless; though the construction is good the form and design are bad; the birds are all different and are symmetrical, but the wings are unnaturally long.———One mile south and east is one bird effigy.

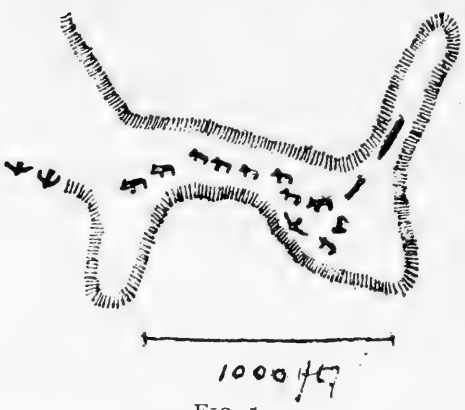


FIG. 5.

Thomas [174] lists three groups of mounds above *McGregor*. These may be the same as above described.

Near *Sny Magill* Lewis [83] mentions a group of ninety-two mounds. These are mostly round mounds and embankments, but there are also two animals and two birds. A number of skeletons were found in one large tumulus in this group. The same group is listed by Thomas. [174]

In an article by Clement L. Webster [190] a mound situated four and one-half miles west of *Guttenberg* is described. The mound is on the bank of the ravine of Miner's Creek, some 60 feet above the stream; it was 10 feet long by 7 feet wide, and composed of soft soil; evidently modern, it yielded a well-preserved skeleton, with stone arrow-heads, a pestle, a catlinite pipe, etc.

CLAYTON COUNTY—*Continued.*

The same author mentions a circular, round-topped mound, 24 feet in diameter and 3½ feet high, situated five or six miles south-east of *Garnavillo*, on the brow of a bluff 260 feet above Buck Creek, near its junction with the Mississippi. At 2½ feet below the original surface, at the center of the mound, was a well-preserved skeleton, extended, with head to the north. The front part of the skull was crushed. No relics were found. The soil was soft and the mounds appeared to be modern. Lewis [83] says mounds and embankments, singly or in groups, are found at intervals between Guttenberg and Yellow River.

Webster, [190] quoting Knapp, mentions many circular and long mounds in and near *Guttenberg*. He considers most or all of them as recent. Some, he says, are 124 feet long and contain bones. One, opened by Knapp, was circular, 16 feet in diameter, 3 to 4 feet high; it contained, at centre and 2 feet below the original surface, a skeleton; at each side of the head was a large silver ornament, circular, and 2 inches in diameter; flint arrow-points were also found; the mound was composed of soft, moist soil.

The same author describes the making of arrow-heads by a band of Pottawatomies on *Twelve-Mile Island*, in the Mississippi River, near Guttenberg. A notch six inches deep cut in a tree-trunk and the leg bone of a deer were the elements in the apparatus, with which the flints were chipped by pressure.

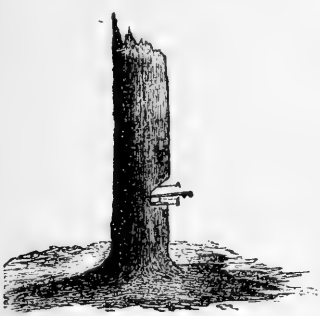


FIG. 6.

Thomas [174, 221] mentions an effigy mound on a bluff overlooking the Turkey River, near *Elkport*, about ten miles west of the Mississippi River. Perhaps an otter; length, 150 feet; greatest height, 5 feet.

Webster [190] describes a stone grave near *Buena Vista*, three or four miles west of the Mississippi River, on the summit of a high hill. A rude box of large stone slabs contained a skeleton extended at length, head to the north, with arrow-points, axes, and other stone implements.

CLINTON COUNTY.

At *Lyons* was a square mound, with flat and level top measuring 40 feet across, situated upon a bluff at some 200 feet above the river. Farnsworth [49] reports that its height was perhaps 8 feet, and that the structure was removed to fill in low ground in the town. In excavating, heaps of bones were found both on the east and the west sides of the mound; the skulls were distorted ("like specimens from Albany, Illinois"), but could not be preserved; some of the long bones were broken and some were gnawed before burial. Some of the skeletons of the eastern heap, especially those near the middle of the mound, appeared to have been buried extended; flat pieces of stone were laid over some of the bones; fires appear to have been kindled above some of the bone-heaps.———An oval slate tablet 5 inches long and 3 inches wide, with two holes, was found here.——— Near the centre of the mound was a skeleton, well preserved, seated; about the neck were copper beads, and on the breast a thin copper sheet, 4 inches square, badly eroded; to the left were a pipe of soft sandstone and a small, polished, stone axe. The author considers this an intrusive burial.

Three miles east of *Wheatland*, on the bluffs of the Wapsipinicon, is a group of nine low, conical mounds, averaging about 15 feet in diameter and 2 feet in height. Four were opened; they were composed of a mixture of black soil and clay; no bones, relics, nor traces of fire were found. [38]

Cyrus Thomas [174] cites Colonel Norris for mounds at *Buena Vista*.

CRAWFORD COUNTY.

A group of eight mounds in a semi-circle below *Denison* are reported by Fulton; [59] also a group of mounds at the mouth of *Paradise Creek*.

DELAWARE COUNTY.

Moulton's [97] description is very imperfect; no locality is given, and little information regarding the size of most of the mounds. So far as we can make out from his description, three series of earthworks enclose a square open on the west and comprising about ten acres; the northern row runs nearly east and west, slightly curving with the high ground on which it is located; the

DELAWARE COUNTY—*Continued.*

eastern series consists of two earthworks, respectively 40 and 50 yards long, separated by an interval of 10 yards, and running S. 20° W.; these embankments begin 36 yards from the end of the line of mounds; from its southern end,—W. 18 yards and S. 54 yards,—begins another line of mounds, six in number, with the same course; from the southernmost of these is another series of six extending to the west; starting at the north-east corner of the series is a line of eleven mounds running in a straight line north-east. These are round and symmetrical, 4 feet high and 30 feet in diameter.

DUBUQUE COUNTY.

Near *Peru*, according to Thomas, [173, 221] is a group of mounds upon a dry sandy bench or terrace, 20 feet above a bayou making out from the Mississippi River. The mounds are mostly small and circular; at the north end are four mounds from 40 to 110 feet long and from 1½ to 4 feet high; here also is an excavation some 30 feet in diameter and 6 feet deep; scattered circular earth-rings from 12 to 30 feet in diameter and 1 foot to 2 feet high occur.——— The inner part of these mounds is of hard, compact earth or clay. They yield detached parts of human skeletons. Thus in one may be a skull, in another a leg, arm, or some other part; four or five adjacent mounds might furnish a whole set of bones. Some of the bones are charred and much decayed.

At *Eagle Point*, three miles above Dubuque, is a group of mounds [173, 221] on a bluff fifty feet above high-water mark. There are about seventy mounds in the group, all but two of which are small and conical; two are oblong. About eleven of the small mounds were opened, and nothing but charcoal, stone chips, and potsherds were found.——— In one long mound, just west of the group, were two much decayed skeletons; near the breast of one was a gorget of blue stone and five rude stone scrapers; with the other were found thirty-one fresh-water pearls.——— An oblong and a circular mound near the extreme point of the bluff were opened; they presented a central core of clay and ashes, very hard but crumbling when broken out, and traversed by flattened horizontal cavities lined with a felt-like substance.

Woodman [203] speaks of mounds in the north part of *Dubuque*, adjacent to Lake Peosta. These may be the same as those just

DUBUQUE COUNTY—*Continued.*

described. He says that the group is located fifty feet above the Lake, and that it contains about seventy mounds, regularly arranged in straight or slightly-curving parallel lines. All but the three largest are circular; the smaller ones measure about 20 feet in diameter and 2 to 2½ feet in height; they average about 15 paces apart from centre to centre; they are composed of ordinary soil.——A few rods north and east from the group fragments of pottery and several flint arrow-heads were found.——The same observer remarks that many mounds have been destroyed in building the city of Dubuque.——Another author mentions a cairn near the Lake Peosta group.

McGee [94] figures a group of mounds located in the S.-E. ¼ N.-E. ¼ Sec. 4, Twp. 88 N., R. 1 W. These are about three miles north-east of *Farley*. There are three animal mounds and

FIG. 7.

three long mounds in the group (Fig. 7).——A mile west of this group, on the same elevation, is a large animal effigy.——Two miles east, on the end of the same ridge, are two embankments, each about 40 yards long.——A great system of mounds exists

DUBUQUE COUNTY—*Continued.*

on the ridge separating the Mississippi and Turkey Rivers. The ridge is never more than a mile in width and is usually narrow; it rises two hundred to three hundred feet above the river level. Mounds, extending in a line toward the north-west for about six miles, occur upon it; they number more than forty, and comprise simple conical mounds, embankments, and effigies. This group was the one upon which McGee made his special metrological study.

Hermann [211] reports a fine double-grooved stone axe, 10 or 12 inches long, from a mound near Catfish Creek, and a nearly transparent quartz spear-head 7 to 8 inches long.

EMMETT COUNTY.

Aldrich [1] mentions a line of thirteen large mounds, extending north and south, upon a high river terrace; they are from 1½ to 6 feet in height; no exact location is assigned.

FLOYD COUNTY.

Webster has pursued studies here with much care, and reports the results in several important papers.

Near *Charles City* [187] is a large and very interesting group of thirty-one mounds. They lie, with one exception, near the centre of Sec. 26, Twp. 96, R. 16 W., about two miles north-west of Charles City (the one exception is near the centre of S.-W. ¼ Sec. 23). Twenty-eight of them are in a nearly straight line running 20° W. of N., on the summit of a low, broad ridge. The topography is shown by the diagram. (Fig.8.)

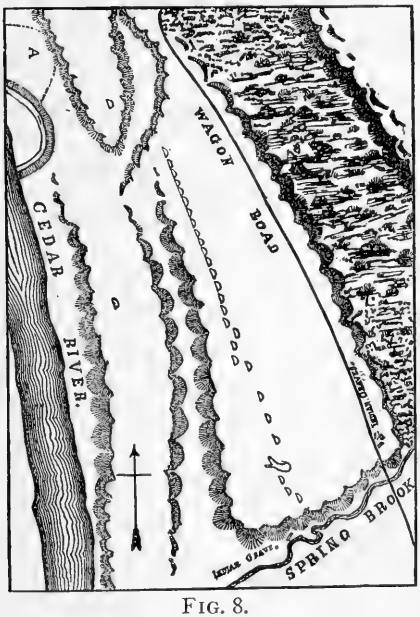


FIG. 8.

No. 1. The southernmost; largely natural elevation; no finds; 63 feet long, 48 feet wide, 3 feet high.

2. Seventy-one feet west; circular, 21 feet in diameter and 1½ feet high.

3. Fifteen feet north-west; circular, 20 feet in diameter and 2 feet high.

FLOYD COUNTY—*Continued.*

**4.* Ten feet from last; large, curved mound, 163 feet long on outer curve; 20 to 25 feet wide, 2½ to 3 feet high; tapers and decreases in height toward the north-west, where it is only 8 feet wide and 1½ feet high; near this end is an extension of the mound—a spur 27 feet long, rapidly diminishing in height and width to 1 foot and 10 feet; apparently a natural mound, modified; no remains.

5. Three hundred feet from No. 4; circular, 21 feet in diameter, 1½ feet high.

6. Two hundred feet distant; circular, 21 feet in diameter, over 1½ feet high.

(There is an illy-defined mound between Nos. 5 and 6, not shown on the diagram.)

7. One hundred or more feet from No. 6, and like it.

8. Fifty feet distant; circular, 45 feet in diameter and 3 feet high.

**9.* Ten feet distant; 30 feet in diameter, 2½ feet high.

**10.* Twelve feet from No. 9; circular, 36 feet in diameter and 3 feet high; no finds.

**11.* Four feet distant; circular, 45 feet diameter, 2¼ feet high.

**12.* Twelve feet distant; like No. 11, but slightly smaller.

13. Fifteen feet from No. 12; circular, 45 feet diameter and 2 feet high.

**14.* Sixteen feet from No. 13; circular, 51 feet in diameter, 1½ feet high.

**15.* Ten feet distant; circular, 30 feet in diameter, 1¾ feet high.

**16.* Sixteen feet distant; of same character.

17 Three feet distant; circular, 25 feet in diameter, 1½ feet high.

**18.* Twenty feet distant; circular, 42 feet in diameter, 2½ feet high; homogeneous structure.

**19.* Twenty feet from No. 18; same measurements.

**20.* Twenty-one feet distant; like last.

**21.* Twenty-five feet distant; circular, 30 feet in diameter, 2 feet high.

**22.* Thirty feet distant; of same size.

---

*Opened by Webster.

FLOYD COUNTY—*Continued.*

**23*. Twenty-five feet distant; circular, flattened, 30 feet in diameter, 1 foot high.

**24*. Twenty-five feet distant; circular, 45 feet in diameter, 1½ feet high.

**25*. Twenty feet distant; circular, 45 feet in diameter, 3 feet high; a few scattered fragments of charcoal and burnt clay; the whole is packed hard.

**26*. Fifty-three feet distant; 33 feet in diameter, 3 feet high; a few small bits of oak charcoal.

27. Five feet distant; same form but smaller.

28. Forty feet distant; circular, 24 feet diameter, 1 foot high.

Several mounds in this group yielded interesting results, thus:

No. 9. From 20 inches and downward pottery fragments were found. On the natural surface of the ground was a bundle of human arm and leg-bones, lying east and west; on the east end of these was a crushed and somewhat separated cranium, some parts very thick, with large and strong teeth; these parts pertained to a young adult.———Two feet north-east of this was a similar bundle, directed a few degrees south of east; on the east end of this bundle lay part of a crushed skull; these somewhat charred. ———A few feet south-east a similar bundle, directed 13° south of east; no skull.———A few feet north-west of the first bundle, another, lying east and west, without skull.———Evidence of fire, bits of charcoal, burned clay, and heated limestones scattered through mound.———A former exploration had removed a skull and some bone-bundles.———All the bones in the mound show some evidence of calcination, but all but second bundle apparently burned *elsewhere*.

No. 11. At 10 inches depth, and slightly east of the centre, a piece of broken pottery and a few small fragments of charcoal. No signs of fire built here.

No. 12. Numerous pieces of hard-burned clay from outside scattered through it. At 10 inches part of a calcined femur. No signs of fire.

No. 14. In centre, at 10 inches depth, an imperfect dog's (?) skull, facing the south-west. Near this skull and 7 inches below it were five quite closely-associated bundles of leg and arm-bones; in three cases crushed skulls were on the west end of bundles,

* Opened by Webster.

FLOYD COUNTY—*Continued.*

and one skull lay between two of them; under the west end of the north bundle was half of a lower jaw, retaining teeth; the skull between the bundles was on its right side, with mouth open, facing the north-west; the teeth were (some of them) scattered through the soil; all the bundles lay directed in an east, north-east, or south-east direction.———Seven inches below the dog's skull were pieces of ribs and other small bones promiscuously thrown in.——— All the skulls were rather thick, with large and strong jaws and teeth. Some of the bones were of aged persons, but most were of young adults.———Scattered through the mound were numerous pieces of burned clay and charcoal from outside.——— Six inches from surface two large slabs of water-worn Devonian limestone.——— The human remains had all been subjected to heat before burial here. (Fig. 9.)

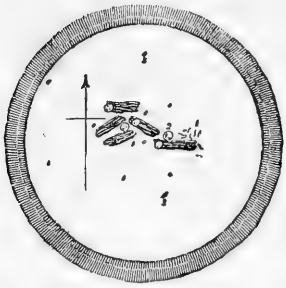


FIG. 9.
Diagram of Mound No. 14.

No. 16. Human leg and arm-bones apparently thrown in promiscuously, at 17 inches depth. No fire here.

No. 19. An adult skeleton, at length, with head 11° south of east, found at depth of original surface. The body had been placed on its back, head on its left side, mouth open about an inch, left shoulder drawn up, and chin resting on clavicle; the arms at sides. Cranium large, well formed; jaws strong; teeth large, strong, and much worn; bones poorly preserved.——— No trace of fire; no relics.——— Earth around and for 1½ feet above body hard-tamped.

No. 20. In centre, at 26 inches in depth, three bundles of long bones, five crushed skulls, two decayed pelvic bones.——— In the midst of these bones a very rude but nearly perfect pottery vessel, upright. The bones represent all ages, but were poorly preserved and more or less calcined—some before and some after being placed here.——— Charcoal, burned clay, and potsherds with the remains.——— Soil above and around bones packed hard.

No. 21. Within was found a circular, oval mound of red, burned clay, of about 10 feet diameter and 1 foot in height. Its

FLOYD COUNTY—*Continued.*

surface was at a depth of about 1 foot. Under this, and nearly central, were three bundles of bones, two directed 11° east of south, the third one north-west and south-east; on the north end of the two former reposed crushed skulls; on the south-east end of the third was also a crushed skull.———Many other human bones were associated with the bundles. All had been more or less burned.———No charcoal, ashes, etc. (Fig. 10.)

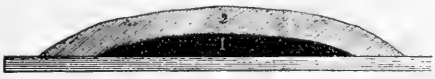


FIG. 10.

No. 22. At 2 feet depth, near the centre, a bundle of bones and part of a skull, all much decayed. The bundle lay north-east and south-west.———Pieces of oak charcoal and burnt clay from outside were scattered through the mound.———No fire here.———Soil around and above had been beaten hard.

No.. 24. At 3 feet south of the centre a bundle of bones lying due east and west; two skulls lay, one on each end of this bundle; the one on the east was large, of moderate thickness, with very low forehead abruptly sloping backward; teeth large, strong, much worn.

[N. B.—A later study of the locality showed two curious mounds in the neighborhood of the mound No. 4 (see diagram). Nearly to the east, 4 or 5 feet distant, was an elliptical mound, 30 feet long, 24 feet wide, 2 feet high. Still further east, 24 feet from No. 4, is a long mound 81 feet in length, 15 feet at base, and 2 feet high. (Fig. 11.)———Several small, circular mounds, from 8 to 10 feet in diameter, run in a north by north-west line from the elliptical mound.]

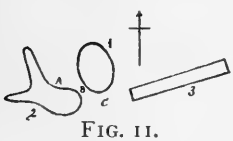


FIG. 11.

Three isolated mounds occur in the neighborhood of this group:

(*a*) One-third of a mile north-west of the line of mounds; it is circular, 20 feet in diameter, and only 6 inches (originally 1½ feet) high. It is situated upon a higher and narrower ridge than the group, and at forty rods distance from an abandoned part of the channel of the Cedar River. At 6 inches below the original surface was much broken pottery, charcoal, two sinkers,

FLOYD COUNTY—*Continued.*

an arrow-head, and flint chips; all of these were burned after being placed here; 1 foot below the pottery were parts of a human skeleton. An earlier explorer found pottery and a good net-sinker.———The pottery found showed a combination of net and basket and separate cord markings; the vessels were in some cases smoothed, all were of moderate thickness, of a reddish yellow color, and made of clay, fine gravel, and powdered granite. Parts of six vessels were found; one of the largest and best reconstructed had a diameter at mouth of 20½ cm.; a maximum diameter of 31 cm.; a height of 16 cm. The neck was sharply constricted. Several of the six vessels had a similar form.——— About six feet north-east of the mound is a depression 10 feet in diameter and 1½ feet deep, whence the material may have been taken.———Along the abandoned river channel, forty rods north-west of the mound, broken pottery, some unlike that from the mound, is found on the lower and level space; also arrow-points, lance-points, drills, flint chips, hammers, etc.

(*b*) One-half mile north-east of last, on the end of the brow of the ridge near the Cedar River. The mound is circular, with diameter of 20 feet and height of 2 feet. It was long since opened, and yielded pottery fragments. Other relics have been found near by—very rude arrow-heads; a spear-head; a fine knife of milky quartz, 7¾ cm. long, 3 cm. wide, and tapering toward each end; a beautifully symmetrical ovate plummet, with a longitudinal groove about it—length, 5¼ cm., diameter, 5¼ cm.

(*c*) Opposite *No. 14*, on the second ridge, west of the line of mounds. It measured from north to south 42 feet; from west to east 30 feet; 1 foot high. About 3 feet from the base of the north-east part of the mound is a saucer-shaped depression, about 22 feet in diameter and 1 foot deep; a long, shallower depression exists along the whole east side; these spots apparently supplied the material for the mound. At 1 foot below the original surface, near the north-eastern part of the mound, were several leg and arm-bones and part of a calcined skull carelessly placed. Five feet south of here were remains of a second body, with the leg-bones and arm-bones more completely calcined; in general the long bones lay north and south; they had apparently been calcined elsewhere; a few pieces of charcoal, potsherds, and flint chips were found near the surface.

FLOYD COUNTY—*Continued.*

One-third of a mile south of the line of mounds, at a lower level, were several other round mounds which were not explored.

Eight miles north-east from *Charles City*, on the S.-W. ¼ N.-W. ¼ Sec. 36, Twp. 96, R. 15, an ancient earthwork lies on the east side of the Little Cedar River. The country is broken and irregular; the earthwork is about one hundred and fifty feet from an abandoned channel of the river, and about the same distance from a ravine on the south-east, tributary to the Little Cedar; the beds of these channels are 18 to 20 feet below the fortification. The earthwork is 124 feet long, 16 feet wide at base, 2¾ feet high; it is composed of ordinary soil; it trends 17° W. of N. Arrow-heads are not uncommon in the neighborhood. (Fig. 12.)

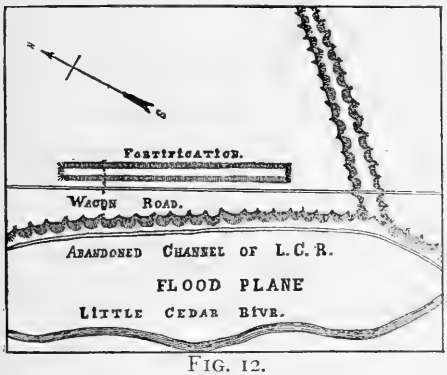


FIG. 12.

In the "*big woods*" on the west side of the Little Cedar, seven miles below the above locality, are three mounds of drift bowlders and soil. They are 2½ feet high, 2 feet wide, and from 4 to 7 feet long.

Two miles north-west of *Charles City* is a group of four Indian graves on high, dry ground, north from a small creek. They are close together; three extend north-east and south-west, while the other is north and south; three are graves of adults and are 7 feet long, while the other is that of a child and is 3½ feet long. They are perhaps Winnebago graves. One-fourth mile west-south-west is a grave where a Winnebago was buried in 1849–1850. Wrapped in his blanket he was laid out at length, extending north-east and south-west, on a level space back from a creek. Slabs of green wood 3 feet long were placed over his body in an inverted V-shape, meeting at the top. The ends of the enclosure were covered over with other slabs. At the head was a post of green wood, 6 inches in diameter, driven into the ground; this post was peeled and bore characters. A tight log crib was built about this enclosure; it was of green logs laid up in log-cabin

FLOYD COUNTY—*Continued.*

fashion, and measured 10 feet in length, 7 feet in width, and more than 3 feet in height; other logs were tightly fitted over the top. ———One mile below the last locality, on the south bank of the Cedar River, were several graves of Winnebago children. The bodies had been placed on the ground and enclosed on all sides by 12-inch logs; the space was then filled up with earth, which was heaped up 13 inches or so (Webster [188]).

Webster also describes [185] a group of three mounds on the west side of Cedar River, one-half mile east of *Floyd*. They are situated on a high, level space, 50 feet above and 220 yards back from the stream, midway between two points; they form a slightly curved line. They are low, circular, and separated from each other by intervals of about 20 feet. The largest and easternmost mound is about 30 feet in diameter, and was once 2 feet high; the smallest is perhaps natural. In the largest were five well-preserved skeletons. The structure of the mound shows that the surface had first been excavated into a basin shape to a depth of 3¾ feet; the basin was then macadamized with gravel and fragments of limestone; on the center of this floor the five skeletons had been placed in a sitting position, facing north, and with the feet drawn under the body; a thin layer of earth was piled above them, then 9 inches of earth and ashes in which were a few bits of fine-grained charcoal; the remaining four feet was nearly all red from heat; the whole material was rammed or pounded hard;

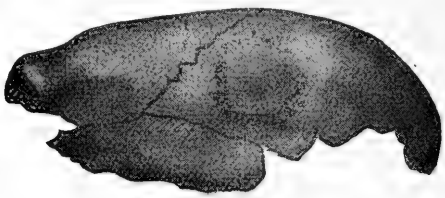


FIG. 12.

the soil about the bodies was deeply stained from decomposition. The westernmost skeleton was that of a woman of middle age; six inches east of it was an infant's skeleton; to the north, and close by the babe, was the skeleton of a large, middle-aged man; skeletons of two young adults lay east and south of the babe. The woman was apparently of low grade, and well muscled; the

FLOYD COUNTY—*Continued.*

skull was markedly neanderthaloid (Fig. 12); the forehead was low; the inner portion of the brow-ridges was prominent; the skull was small; from the lower part of the nasal bones to the upper margin of the orbits was but 4 cm.; the distance from orbit to orbit, midway between their upper margins and the lower part of the nasal bones was 2¾ cm. Most of the skulls were crushed; one jaw had teeth well preserved. The skull of the babe was very thick; the teeth were small. The man was nearly six feet high; the crowns of his teeth were much worn down.———This mound appears to be very ancient; the limestone fragments in the floor are much decomposed.

A small mound near *Floyd* is reported to have yielded a skeleton.[184]

A peculiar mound is described by Webster,[187] in a low, level spot at about the centre of the S.-E. ¼ Sec. 5, Twp. 95, R. 17 N., one-half mile west from *Flood Creek*. It is 16 feet in diameter and 1 foot high; circular at base, it is flat-topped, except a rounded ridge 8 or 10 inches high and 1 foot wide at the outer edge of the surface area. A trench 10 inches deep and 1 foot wide is around the base. The mound is overgrown with trees. The structure of the mound was found to be—

(*a*) Decomposed vegetation and earth.
(*b*) Charcoal layer.
(*c*) Bed of ashes.
(*d*) Soil.

This order was repeated; the natural surface then reached showed no particular evidence of strong heat; the charcoal, in large pieces and well preserved, appears to be of poplar wood; no bones or relics were found (Fig. 13).

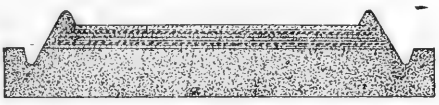


FIG. 13.

The same author [188] describes a grave on low, dry ground in *Carman's Woods*, near the meeting of the Beaver Dam Brook and Shellrock River, one-half mile north of Rockford. The grave was 7 feet long, 2½ feet wide, 1¼ feet high, and 3 feet deep; it

FLOYD COUNTY—*Continued.*

is excavated through soil down to the limestone; through the centre of the grave, running lengthwise from bottom to top, is a line of limestone slabs set edgewise; these slabs are from 2 to 3 inches thick; the lowest foot of depth in the graves was filled with fragments of limestone; the rest was filled with slabs of limestone set obliquely with the higher edge against the central partition; the upper slabs were so heavy as to require a man's full strength in their removal. There were no remains and no relics (Fig. 14).

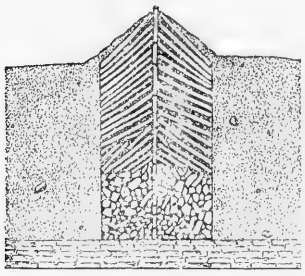


FIG. 14.

HAMILTON COUNTY.

Aldrich [1] reports that in 1857 or 1858 an excavation at *Webster City* revealed, at two feet depth, a heap of human bones representing at least twenty-six persons; one skull was very large and thick; round beads of soft stone were also found.——— On a knoll in the south-east part of the town three skeletons were found at a depth of thirty inches.———North of the town plat are five undisturbed mounds. They are located on a bluff some forty feet above the Boone River, and extend in a north-east and south-west line; the earth for the mounds was taken from north of the group.———A mile from the town there has been found a polished stone tablet, about 2½ inches square and ¼ inch thick; drilled with two holes on opposite sides.

A mound north-west of *Cairo Lake* is reported by Bonney.[174]

HARDIN COUNTY.

A stone carving representing a human head is said to have come from a well excavation in this county;[37] the depth reported is thirty-nine feet.

HENRY COUNTY.

It is said [15] that there are many mounds in the county; Mansfield [162] mentions some near *Mount Pleasant.*

Banta and Garretson [15] investigated a group of nine mounds at the *Snake Den,* three miles west of Salem. They report as follows:

(*a*) Twenty feet in diameter, 8 feet high; no remains.

HENRY COUNTY—*Continued.*

(*b*) Some sixty feet from (*a*); 20 feet in diameter and very low; flat rocks were found above a large quantity of broken and, in some cases, burned bones.

(*c*) Some sixty feet from (*b*); 3 feet high; one skeleton, extended, between two flagstones; the head was toward the north; bones were badly decayed.

(*d*) Sixty feet from preceding; 20 feet in diameter; 3 feet high; three badly decayed skeletons, extended, with heads to the north.

(*e*) Sixty feet distant; 20 feet in diameter and 5 feet high; smooth, flat rocks were found, laid in an elongate hexagonal form; stones were set edgewise about the border; at five feet depth were two extended skeletons with heads north.

(*f*) At sixty feet distance; 30 feet in diameter; 5 feet high; not opened.

(*g*) At sixty feet distance; 20 feet in diameter; 5 feet high; a few bones were found.

(*h*) At sixty feet distance; 30 feet in diameter; 5 feet high; is *said* to have contained a rude stone vault, with badly decayed human skull, etc.; the bodies were buried, perhaps, in a sitting (?) position; a sandstone mortar and arrow-points were found here.

(*i*) At sixty feet distance; 5 feet high; no contents.

These mounds are in a right line; (*a*) is at the western end.

Van Allen [182] reports mounds situated in Sec. 34, Twp. 72, R. 7 W. Three in number, they are upon a hill 120 feet high, 1,000 feet long, and more than 300 feet wide. One was opened and yielded a quantity of bones, teeth, and charcoal; some of the sticks were but half burned; the bones were in a heap; some were charred, and more than one individual was represented by them; one pinkish-white arrow-head was found.———The measurements of these mounds are: (*a*), 50 x 41 feet; (*b*), 43 x 49 feet; (*c*), 40 x 40 feet; (*b*) was one hundred and seven feet from (*a*), and (*c*) was fifty feet from (*b*); the mounds ranged from 4½ to 3 feet in height.———Two mounds about 1 foot high lie south of (*c*).

JACKSON COUNTY.

Gass, [68] without assigning locality, mentions in this county a very large, oval mound, 200 feet by 100 feet, (with circumference

JACKSON COUNTY—*Continued.*

of 700 feet), and 30 to 35 feet high; the sides have a very steep slope, 70°; the top is flat, oval, measuring about 30 x 50 feet. The mound is situated on a bottom, near the bank of a creek, in a deep ravine. Excavation to a depth of 12 to 14 feet yielded pieces of hematite, some of which were burned, and two arrow-heads.———In another paper [69] the same author describes a mound of simple construction, with a diameter of 30 feet and a height of 4 feet. A few feet from the surface were found a number of irregularly-scattered stones and pieces of wood; at 5 feet a quantity of ashes, with burned bones, fragments of dark-colored pottery, two knives of copper, and a copper spear-head.———A human skeleton was found in a ditch excavation; near it were three ornaments of rolled copper, an arrow-head, and a bit of blanket.

With no other location than "Mr. Heisig's farm," the same author [69] describes a group of three mounds, arranged in an equilateral triangle, in an open, level field; they are about 15 feet in diameter and 3 feet high. Structure: (*a*) consists of hard mixed soil to a depth of 2 feet below the original surface; (*b*) consists of 3 feet of light earth, then 2 feet of mixed earth; (*c*) is like (*a*) in all respects.———A similar group in number, size, arrangement and construction is mentioned as near *Fairfield.*

One mile from *Spragueville,* on a hill near a creek is a mound composed of light earth, 15 to 20 feet in diameter and a few feet high; at 4 feet depth a human jaw-bone was found. [69] This mound is also mentioned in [174].

In *Iowa Township,* four miles below the mouth of the Maquoketa and one-half mile from the Mississippi, on the Thomas Boothby farm, near "The Point," is a group of nine mounds; the land rises abruptly from the river; the mounds are in a single row; four of them have been examined by Mr. J. W. Boothby with the following result: [89]

(*a*) The furthest up the river; an elongated pyramid 5 feet high; the remains of seven skeletons were found; all were lying on their backs, three with heads east, four with heads west; ununder the skull of one of the latter was a thin copper crescent; above the skeletons were three or four large stones; on the floor of the mound, 4 feet north of the centre, was an earthen vessel

JACKSON COUNTY—*Continued.*

bottom-side up; this was destroyed in removing it, but measured about 25 inches in circumference and 4 inches in depth; under it was a *unio* perforated near the hinge; numerous pieces of scattered charcoal were found in the mound.

(*b*) *No. 4* in the series; is conical in form and about 60 feet in diameter and 5 feet high. It contained thirty-one skeletons, mostly with heads south and feet north, although there was no careful arrangement; a number of stones were above the bodies; on and below the cervical vertebræ of two of the skeletons were one hundred and sixty copper beads; in three of these beads the cord of woody fibre was still preserved; with one of the piles of beads were eight perforated bear's teeth; a flint spear-head, 8¾ inches long, lay among the ribs of one skeleton; numbers of small, fresh-water bivalve shells were found.

(*c*) *No. 6* in the series; it had about the same dimensions as the last, but was perhaps a little higher. Near the level of the original surface were four skeletons; a fifth, probably intrusive, was at a depth of one foot. The latter was in a bed of ashes, and the bones were blackened and charred.

(*d*) *No. 7* in the series; contained one skeleton which was entirely and closely covered with rocks; charcoal and burned stones were above and outside of this rock covering.

At *Bellevue*, White [196] examined a shell-heap which was composed of the shells of eleven species of *Unio* and one species of *Alasmodonta;* the bones of deer and buffalo, potsherds, and flint arrow-heads were found.

At *Sabula*, on the Mississippi River, a shell-heap contained shells of ten species of *Unio*, the bones of deer, wild goose, snapping-turtle, soft-shelled turtle, catfish, sheephead, and various undetermined fragments. Coarse potsherds, with bits of pounded shell in the paste, were found.——— These two shell-heaps show the mode of cooking in use among the makers; small pits were dug in the bank soil; these were ½-yard wide and of the same depth; the sides and bottom show action of fire; these are closely filled with shells and bones; charcoal occurs; in the original article White gives a list of the species represented, and estimates the age of the heaps at a minimum of two hundred years.

JEFFERSON COUNTY.

Negus [103] describes an iron cross, which at an early date was planted on a sandstone bluff overlooking the Cedar River; near by is a series of mounds 25 to 50 feet in diameter, and 3 to 5 feet high.

JOHNSON COUNTY.

Webster [189] reports that there are at least one hundred mounds known along the Iowa River in this county. There are two classes: (*a*) The more common; circular, with round or flattened top; from 12 to 24 feet in diameter, and from 1½ to 3 feet high. (*b*) Long and narrow; sometimes forming an extension of mounds of the first type; from 12 to 13½ feet wide; from 1½ to 2 feet high.

In detail he describes:

Five miles north of *Iowa City:* Group of eighteen mounds in a slightly curved line, upon summit of a high, narrow ridge between the Iowa River and Sanders Creek.

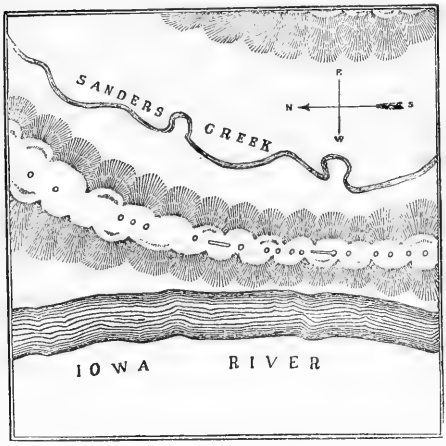


FIG. 15.

No.	Width.	Lgth.	Ht.	Direction.	Dist.
1	24		2	From—to—	—
2	20		2	N.	54
3	18		2	N.	45
4	16		2¼	N.	40
5	24		3	N.	72
6	12	130	1½	N.	33
7	18		2	N.	36
8	17		2½	N.	15
9	15		2½	N.	48
10	15		2	N.	30
11	16		2½	N.	75
12	13½	45	1⅔	N.	33
13	14		3	N. by N. E.	30
14	17		2	N. by N. E.	125
15	12		1½	N. by N. E.	24
16	24		2	N. by N. E.	24
17	19		3	N. by N. E.	170
18	24		3	N. by N. E.	90

No. 1. (Southernmost.) Skeleton, adult, seated; small, animal-shaped vessel of pottery.

No. 2. Bones of a child. These and last badly preserved.

Most of the series contain bone fragments, and many have a layer of charcoal and ashes a few inches above the human remains; also, small stones somewhat burned.

No. 11. An arrow-point, flint-chips, small boulders.

JOHNSON COUNTY—*Continued.*

No. 6. A circular mound with long oval mound attached. No relics.

No. 12. Somewhat like *No. 6.* Unexplored.

The general material of all is yellow, homogeneous loëss, with dark earth above. No dug holes in the neighborhood. All are wooded.

Davis,[40] apparently in reference to this same group, states that when skeletons were found they were usually sitting, or lying down with legs bent as if for sitting; the skeletons were covered with wood ashes from 1 inch to 1½ inches deep; one male adult cranium was small, although the upper jaw was very large.——In this reference a clay vessel or jug is said to have been found with a child's skeleton (cf. Webster's mound *No. 1?*) This vessel is described here and also by How.[79] It is grayish-black, with a round body 3 inches in diameter; on one side is a circle with two cross-lines and some dots; the top part narrows to a neck and is developed to resemble a turtle's beak; a spout or aperture on one side has about the diameter of a man's finger; the material is pounded stone with clay; the vessel is hard-burned, and is rough and unglazed.

FIG. 16.

On the other side of the valley and further down is a group of five round mounds upon a high ridge.[189]

At the mouth of Turkey Creek is a circular mound on the brow of a limestone cliff 100 feet high.[189]

JOHNSON COUNTY—*Continued.*

Near the mill one-half mile north of Iowa City are two series of lines of circular mounds upon the top of a high, narrow ridge; the mounds are 20 to 21 feet in diameter and 30 feet apart; in their arrangement they follow the form of the ridge.[189]

One-half to three-fourths of a mile north-west of the mill there are from fourteen to sixteen long and circular mounds; many have been plowed away.[189]

White [193] mentions mounds along the bluffs of the Iowa River between Iowa City and Columbus Junction (Louisa County); he particularly mentions a numerous group just below the mouth of the English River; these may be in Washington County—not in Johnson.

KEOKUK COUNTY.

Bassett [162] describes stone and copper implements from Keokuk County.———Morgan [161, 210] reports the finding of pottery at a depth of 20 inches in a mound near Richland; the mound was 250 feet in base circumference and 2 feet high; some of the vessels were very large and shaped like "a common dinner-pot;" around the rim was, frequently, a narrow band divided into triangular spaces filled with parallel lines running vertically and horizontally in alternate triangles. These largest vessels are said to have been 9 feet in circumference, and to have contained human bones.

LEE COUNTY.

Myers [98] reports mounds near *Wever* and *Jollyville;* one near the latter place is on the property of John Junge; one in Layton's meadow had a diameter of 32 feet, a length of 50 feet, and a height of 7 to 9 feet.———The same author reports on the Myers Farm, *Green Bay Township*, some fifteen or twenty mounds; there are others on adjoining farms. All are oval, 12 to 30 feet in diameter, and 2 to 7 feet high; some yielded flint, pottery, and human or animal bones; some of the human bones were charred or burned.———In one mound thirty-two skeletons were found, sitting, in limestone vaults made by setting slabs on edge and covering them over with other slabs; some of these slabs weigh 250 to 275 pounds; no limestone beds are nearer than one and one-half miles.

LEE COUNTY—*Continued.*

Six miles north of *Fort Madison*, according to Negus,[104] are mounds 30 feet by 15 feet. They are described as divided into compartments, each occupied by a skeleton, seated, with heads on knees; articles of flint, stone, and bone were buried with them; bones of animals and birds and charcoal were found; the floors, sides, and roofs of the compartments were of limestone slabs. This is apparently the same locality as the preceding.

Negus [104] and Norris [174] mention mounds at or near *Montrose*. The latter author also mentions some near the junction of the Des Moines and Mississippi Rivers. Thomas [221] states that these last contained only decayed human bones, potsherds, and stone chips; some yielded articles of intrusive burial.

LINN COUNTY.

Starr [164] describes a shell-heap in *West Cedar Rapids*, on a knoll near the Cedar River. The layer of shells is almost 1 foot thick; it is overlaid by dark soil and underlaid by sand. *Unio metanevrus*, *U. alatus*, and *U. rugosus* were recognized; one or two bone fragments, flint chips, and potsherds were found; also two flint implements at surface.

Bettisworth [22] locates several mound groups near *Cedar Rapids*. The list is as follows:

Group.	Location.	Number of Mounds.
1.	N.-W. ¼ S.-W. ¼ Sec. 35, Twp. 83, R. 7.	11.
2.	S. ½ S.-E. ¼ Sec. 16, Twp. 83, R. 7.	14.
3.	S. ½ N.-W. ¼ Sec. 16, Twp. 83, R. 7.	11.
4.	N.-W. ¼ N.-E. ¼ Sec. 17, Twp. 83, R. 7.	3.
5.	N. ½ N.-W. ¼ Sec. 20, Twp. 83, R. 7.	11.
6.	E. ½ Sec. 18, Twp. 83, R. 7.	11.
7.	W. ½ Sec. 18, Twp. 83, R. 7.	11.
8.	N.-W. ¼ N.-W. ¼ Sec. 24, Twp. 83, R. 7.	12.

Group 1 is situated upon a divide crest running north and south; the mounds are about 30 feet in diameter and 3 feet high; usually they are separated by about two diameters; counting from the south, numbers 6 and 7 are nearer together. Groups 2, 3, 5, and 6 are quite similar to 1. Group 4 is on a bottom instead of upon a divide. In group 7 there are eight mounds in line, then a valley, and then three more mounds on the next

LINN COUNTY—*Continued.*

ridge north. Group 8 comprises twelve mounds on the crest of a divide passing around the head of a ravine; the line follows the curve of the divide.

LOUISA COUNTY.

Gass [63] states that groups of mounds are thickly scattered along the bluffs overlooking the Mississippi Bottom for many miles. Quite extensive investigations have been carried on in *Grandview Township* by Gass and Blumer. [23] The descriptions lack definiteness; a carefully made map of the district is desirable.

Sec. 11 (Wagner Farm). Gass [71] locates here a group of thirty-six mounds; the largest are 6 feet high. Many had been previously opened with no results; he opened seven.

(*a*). At 6 feet down an ash-bed was found, with fragments of pottery and two implements of igneous rock.

(*b*). The largest of the group; at 6 feet down, on the east side, was a large piece of limestone with a few pieces of pottery upon it, with an arrow-head, and a clay figure of a human head an inch in diameter and showing action of fire; on the west side was a piece of limestone with a small stone axe and a discoidal stone near it. In the other five nothing was found.

Sec. 13. Gass [71] explored two mounds in this section; they were about 4 feet in height.

(*a*). Bed of ashes containing bits of pottery and flints was found.

(*b*). Yielded potsherds.

A group of ten or more mounds occurs in the north-east corner of the north-west quarter of the section, on Viblen's Farm. Gass [63] explored four of these with some result:

(*a*). Thirty feet in diameter; 3 feet high. At 3 feet down some bones were found.

(*b*). Fifteen feet distant from (*a*); 30 feet in diameter; 2½ feet high. At 2½ feet down were one arm-bone and one leg-bone.

(*c*). Oval; 15 feet by 30 feet. At 3 feet down were two skeletons in clay.

(*d*). Twenty-five feet in diameter; 2½ feet high. A few decayed bones were found.

Kallenberger had opened six others of the group without finding anything of interest.

LOUISA COUNTY—*Continued.*

Sec. 13 (S.-W. ¼). Gass [63] describes here three mounds, which are numbered by him as a northward continuation of a group in Sec. 24. They are one and one-half miles north of those.

No. 8. Three hundred yards from the edge of a bluff in the centre of a number of smaller ones; it is 80 feet in diameter and 6 feet high; the upper covering is of mixed soil; at 6 feet were three horizontally-placed skeletons, one with the head toward the east, the others with head west; the skulls were badly decayed; south of these were ashes and coals, with burned clay and flint fragments; no relics.

No. 9. On Gast farm, one-eighth mile south of No. 8, in the N.-W. ¼ N.-W. ¼ Sec. 24. It measured about 80 feet in diameter and 6 feet in height; it was isolated, at two hundred yards from the edge of the bluff; at 6 feet down were ashes and charcoal, [71] also two arrow-heads.[63]

No. 10 (N.-E. ¼ N.-W. ¼ Sec. 24). On the Godfrey Farm; two hundred yards from No. 9, at the edge of a bluff overlooking the valley of the Mississippi; 25 feet in diameter; 4 feet high. At 1 foot a mass of decayed bones forming a bed 5 or 6 feet across and 3½ feet thick; [71] also [63] emitting a stench.

Sec. 14 (S.-E. ¼). On the bluff facing and overlooking the Mississippi River, one-fourth mile back from the edge of the bluff, Gass [70] describes two earth-walls from ravine to ravine; the southern wall is 24 rods long; the northern one is 21 rods; the south wall is now 6 feet high, and the ditch on its north side is 20 feet wide and 5 feet deep; the north wall is 5 feet high, and on its north side is a ditch 12 feet wide and 5 feet deep. The ravines are steep-sided and are 100 feet or more deep; on the ravine slope, near the top, at three rods south of the south wall, is a circular excavation nearly 100 feet in diameter and 15 to 20 feet deep, partly excavated, partly on down-side built up; at the lower end is a passage-way through the wall, of doubtful antiquity. At the bottom of the ravine to the west are two springs, the north one pure and cold, the south one sulphureous; the area is overgrown with large trees.

This locality may be the one referred to by Stevenson.[168] He speaks of a group of twenty-five or thirty mounds arranged appa-

LOUISA COUNTY—*Continued.*

rently in parallel lines, the whole being in a plot twenty-five or thirty rods in diameter. It is at the south of Muscatine slough. From this group an earthwork or causeway extended west to another row of mounds about forty rods distant. This earthwork runs in a straight line, but it has a jog or break in it where is found a depression in the ground about 80 feet in diameter. The ends of these two lines are about a rod apart, but both walls follow the same direction.

Sec. 24 (N.-E. ¼ N.-W. ¼). Godfrey Farm; mounds opened here at different times by Gass;[63, 71] two, about 4 feet high—

(*a*). At 4 feet a horizontally-placed skeleton, with the head west; a small flint knife was obtained here.

(*b*). Twenty-four paces south of the preceding; at 2 feet down was a bed of ashes 1 foot thick; the clay above it was burned; in the ash-bed were several small, white stones, like unfinished pipes, which crumbled; they were apparently limestone. Two other mounds yielded a sandstone bird pipe, a copper axe, and a large copper bead.

Sec. 24 (S.-E. ¼ N.-W. ¼). On the Schleicher Farm; Gass[63] opened two mounds.

No. 1. About 75 feet in diameter; 4 feet high; at 4 feet depth were two leg-bones and fragments of pottery and flints.

No. 2. Thirty-five feet south of last; 50 feet in diameter; 3½ feet high; yielded a few bones.

No. 3. On Godfrey Farm, thirty feet south of *No. 10*; 30 feet in diameter; 3 feet high; at 3 feet down were two skeletons.

No. 4. Thirty-five feet north of No. 2 (?); 30 feet in diameter; at 1½ feet deep the earth became a burned clay; at 1½ feet deeper it was a soft brick-like material; below this was an ash-bed of oval form, 4 feet by 5 ½ feet, 11 inches thick; near the centre of this bed was a small copper axe showing action of fire; no bones.

No. 5. Thirty-six feet north from last; 30 feet in diameter; 3 feet high; at 4 feet depth were human bones, broken pottery, flint implements.

No. 6. Forty-six feet from the last; 30 feet in diameter; 3 feet high; at 3 feet down a few bones.

No. 7. Forty-five feet north-west, on Rothrock Farm; 100

LOUISA COUNTY—*Continued.*

feet in diameter; 6 feet high; at 2 feet down were three badly decayed (intrusive?) skeletons; on the south side were two skeletons, male and female, heads west and east respectively, and feet meeting at the centre. The material for 6 feet was mixed black earth and clay.

Sec. 24 (N.-W. ¼ S.-E. ¼). Group of six mounds in crescent, on prominent point of bluff; west of the group is a field containing hundreds of mounds. Two of the group are particularly mentioned by Gass.[63]

(*a*). The southernmost of the group, in the extreme northwest corner of the S.-E. ¼ of the section. It is about 100 feet in diameter and 8 feet in height; for 6 feet—"down to original soil"—it consists of mixed earth with flint fragments; next a layer 1½ feet thick of clay and sand, in which was a flint knife and a perforator; below this were four skeletons with heads west, and some bones and skull fragments; near the second skeleton was a dark red stone pipe and a small copper axe; another excavation on the east side yielded two skeletons, with two pipes near the skulls, a portion of the bones of a child, and a few copper beads.

(*b*). Forty-five feet north-east of the last; 45 feet in diameter; 3½ feet high; at 4 feet down were three badly decayed skeletons with heads toward the west; fragments of flint and pottery were found. These two mounds were excavated by Mr. Kallenberger.

Sec. 25 (S.-W. ¼ N.-E. ¼). Blumer [23] reports regarding the mounds at the extreme edge of the prominent point of the bluff; ravines open into the valley at either side.

No. 1. It is a flattened cone, 30 feet in diameter and 3 feet high; the first 1½ feet were of hard clay showing here and there fire action; next came a layer of hard red burned clay, oval in form, 5 feet in shorter diameter, 3 feet thick at centre, diminishing to 3 inches at the edges; then came a body of ashes, 13 inches thick at middle and diminishing outward to the edges; in this bed, a few inches from the bottom, were a part of a carved stone bird pipe, a small copper axe, and an elephant pipe.

No. 2. Farm of P. Haas, fifty yards west of No. 1, in the second row of the group, extending north and south, approxi-

LOUISA COUNTY—*Continued.*

mately parallel to the edge of the bluff; the mounds about here are arranged in several somewhat irregular rows, all running the same way. This mound is 15 feet in diameter, and 1½ feet high; it was of mixed earth to a depth of 3 feet, where was natural yellow clay; at bottom were parts of a badly decayed human skeleton and some splinters of flint.

No. 3. Close to bluff-edge in first row, at fifty yards south of *No. 1*, 20 feet in diameter; 2 feet high; at 2 feet from top was an excavation into the natural soil, 1½ feet in diameter and 2 feet deep, full of ashes and charcoal.

No. 4. Fifty yards south of *No. 5;* with a diameter of 25 feet, it has a height of 3 feet. It consisted of mixed soil for 3 feet, and then of a hard layer of white clay eight inches thick.

No. 5. Ten yards west of *No. 4*, and in the second row; it is 25 feet in diameter and 3½ feet high; it consisted for 2½ feet of mixed soil resting on white clay 11 to 15 inches thick; below this but to one side of the middle was a small quantity of ashes and charcoal; in the centre at 2 feet or so down was a sitting skeleton; no relics.

No. 6. At nine yards north from *No. 5*, in the second row; it measured 20 feet in diameter and 2½ feet high; it consisted of a mixture of common soil resting on hard natural clay; a few fragments of decayed bones were found, but no relics.

Numbers 4 to 6 are on Stoddard's farm. The rest of this series are probably on Haas' farm.

No. 7. Sixty rods north from last, on the second row; 15 feet in diameter; 1½ feet high; composed of soil like *No. 6.* No bone fragments and no relics.———Gass [63] speaks of eight mounds in this quarter-section, and enumerates as relics from them a plain red pipestone pipe, a few shell beads, an obsidian arrow-head, a number of flint implements.

At *Blackhawk,* opposite Mercer County, Illinois, near the Mississippi River, on a high bluff facing New Boston, are seven or eight mounds, the largest in this part of the West. They are 4 to 5 rods in diameter, and 12 to 15 feet high; one yielded numerous partly decayed bones, also pottery, flint implements, and flint clippings. On the high level plain back of the mounds was an old embankment enclosing some 5 or 6 acres; it is now

LOUISA COUNTY—*Continued.*

nearly gone, but potsherds, flint chips and flint implements are picked up within its area; the pottery paste is of river mud mixed with pounded fresh-water shells (Shaw [157]). Probably the following description by Stevenson [138] refers to this same locality. He describes it as in the vicinity of Toolesboro:

"A raised circular earthwork; it resembles a horseshoe. The open part abuts upon the edge of the bluff among a group of mounds. The surface and soil are covered or supplied with an immense quantity of broken pottery and flint chips and implements. These last are nearly all small, uniform in shape and size; they are like a half-cone in form and are 1¼ inches long, ¾-inch wide at broadest part, ⅜-inch thick at thickest" Apparently "the circular enclosure of 10 acres" mentioned by Alexander.[2]

This work is also described by Toole [179] and by the Davenport party. The latter give considerable detail, thus: One-fourth mile north-west of these mounds was an earthwork enclosing some 15 or 20 acres; octagonal in form, the sides are curved and the inner edge is circular; the embankment, once about 2 feet high, is now nearly obliterated; the area is strewn with flint chips and potsherds; in a few hours fifty or more flint implements were found, among them a few arrow-heads; most, however, were well worked, plano-convex objects, from 1 to 2 inches long, about half as wide and ¼-inch thick, rounded at each end but with one more tapering than the other, even bluntly pointed at times; (the form is somewhat like a flat-iron without a handle). The pottery from this site is unlike that from the mounds; it is grayer, and composed of mixed earth and shell; broken handles are common.

Remains somewhat like stone walls also occur.[138]

Three miles south of *Toolesboro*, near Iowa River, are outlines of three ancient structures in which stones were used. The material was granite bowlders from the river below. There were five or six such structures in a line, nearly parallel to the river bank, about twenty feet from it, about 6 feet square and some 20 feet apart. Few stones are left; the best preserved showed evidences of fire upon being opened; the bottom was rather dark and burned almost to brick for 2 inches in depth; a double row of slight depressions, less than two feet deep, alternate with these

LOUISA COUNTY — *Continued.*

remains; in some were charcoal, flint chips, and split and broken bones of animals.[138]

Toolesboro. Parties from the Davenport Academy [127, 204, 205] explored a group (*a*) of mounds on the edge of the bluff overlooking the Iowa River bottom two and one-half miles from its mouth. Three-quarters of a mile south is another group of six or seven mounds (*b*).

(*a*). Mounds from 40 to 80 feet diameter and from 6 to 10 feet in height, composed of a hard mixture of clay and black soil, both of local origin. They are burial mounds but the bones contained in them were not numerous and were poorly preserved. Most of them contained oak logs 6 to 8 inches in diameter placed at or near the bottom of the mound and much decayed; the bones were most frequently immediately beneath these. Some mounds were opened. In *No. 1* a few flint chips and scattered human bones were found. In *No. 2* the decayed wood was found at depths of 6 to 9 feet. The logs showed no arrangement; but skeletons were found more frequently below them than elsewhere. Portions of skeletons (including a child's skull) were found, all too badly decayed to be of use. Near one skull was a neatly carved pipe of gray pipestone representing a bird, with eyes of pure copper; also a copper awl about six inches long, hammered square instead of round and bent at right angles and flattened near one end. Mound *No. 3* was opened fully. It was composed of mixed earth; the large sticks of wood were found near the base in positions showing no arrangement. There were many irregular layers of about $\frac{1}{10}$ inch thickness looking like white ashes; such were usually found in contact with the wood on the under side. The mound was built of firm, hard, light-colored clay, apparently the original earth of the locality stripped of its black soil. A layer of tough yellow clay about an inch thick was placed upon this. The bones, implements, etc., were directly upon this layer. No such clay layer was in *No. 1* or *No. 2*. Two or three very fragile skeletons were here; a large marine shell — *Cassis madagascarensis* — 7½ x 10½ inches, holding about 5½ pints and cut out to serve as a vessel; with it and near one skull were parts of four earthen vessels; these were crushed or fragile. They had contained river shells. A few feet from this was an-

LOUISA COUNTY—*Continued.*

other skull and other portions of the skeleton. Near the head, as if laid upon the chest, was a smoothly-wrought copper axe, showing impressions and traces of cloth; some two hundred poorly-preserved beads of shell and some pearls were about the head and in the skull; a few feet away were two carved stone bird pipes, one of red pipestone with pearl eyes; close by were two more copper axes.

No. 4. Another copper axe, a copper awl, and several small sandstone implements were found in a mound on the bluff by Mr. Freeman; they were exposed by washing away of the bank. An arrow-head of flint was found in each of these mounds where any other relics were found.

No. 5, on Mrs. Mallory's property,[205] was explored in 1866. Probably its original height was 8 to 10 feet. It was composed of very hard mixed earth, with minute bits of charcoal scattered through it; at 4 feet 4 inches down was an evenly spread layer of quite clean yellow clay ½ to 1 inch thick; this was slightly below the original surface. At half-way down a small rough chert knife or scraper was found; at the west end were poorly-preserved human bones, including a frontal bone of remarkably low and brutal character; here also was a much broken turtle shell. At the middle of the mound was a finely made plain gray pipestone pipe; no remains were near it. The clay floor was found to stop (on the west and south?) along a sharply defined diagonal line. In the part of the mound beyond it was a grave, 20 inches or so deep, containing a much decayed adult skeleton with its head to the north-west, and some child bones; another adult skeleton lay at right angles to the first; the grave pit containing these was irregular in form, measuring 8 feet along the south-west side, 7 feet on the north-west, and 6 feet and 5 feet along the others.

No. 7 [205] was symmetrical, one of the largest of the group; circular, with a diameter of 85 feet; the height, reduced by cultivation, was about 10 feet. The excavations brought to light about 500 square feet of the base. The construction showed that a floor of light-yellow sandy clay had been laid upon the original subsoil of pure clay. The mound was raised upon this to a height of about 4 feet when it was covered—at least on its south half—with logs of oak irregularly laid on. Some white ash-like mate-

LOUISA COUNTY — *Continued.*

rial is found in this part though there is no charcoal or other evidence of fire. On the north side the logs are lacking, but there is a thin layer of pure clay. The material of the mound above this layer of wood and clay was a very compact stiff clay loam, with scattered patches of purer clay. In the northern part some flint chips were found. About midway of the trench and two feet from the floor some human bones were found (two femurs, a clavicle, several bones of the left forearm and hand) all in a heap, and with them a small worked flint. Several feet west of the trench a copper awl was found standing upright and firmly imbedded in the clay base. Two feet beyond this and to the south (?) were found four copper axes, two curved base pipes (one cylindrical bowl was of calcite, the other of catlinite, hawk-shaped, with pearl eyes), a large block of mica in loose sheets, a second awl, a crushed skull with skeleton attached. Under this skull one of the axes lay, wrapped in a covering of cloth and bark. Another copper axe lay under the left shoulder of the skeleton, and many dull and fragile beads of shell and pearl were taken from the region of the neck and chest. Further excavation in this same mound revealed an adult skeleton, male, with face up and head to the north-west; close by the right side, with head on the level with the shoulders of the larger skeleton, was the skeleton of a child of ten years. Beyond it was a third copper awl; about the legs and feet were shell beads. Three more copper awls pierced the floor and stood upright in a line, from 18 inches to 36 inches from the feet of the skeletons; the awls were about two feet apart; these awls were from 4 to 7 inches long, hammered square except at lower pointed end; they are turned abruptly at the top; their diameter is about ⅛-inch. They may have served to peg or pin down a skin or cloth covering placed over the dead. The hard floor appears to have been basin-shaped.

No. 8. Two hundred feet west of *No. 7;* this was the largest of the group. It has been used by white men as a building site. It has a diameter of 140 feet; a height of 11 feet. At 9 feet down was a floor of yellow clay ½-inch thick, laid upon the original black loam surface; just above this clay floor was black earth. Parts of four much decomposed skeletons were found, but no relics.

LOUISA COUNTY—*Continued.*

Four other mounds here were opened by Toolesboro gentlemen in 1875. They were situated on the edge of a bluff; the region was covered with a growth of oak. The farm was owned by Mr. J. J. Parsons. The structure was much as in those already described.

(*a*). Largest of those opened; 40 feet in diameter, 8 feet high; the bulk of the mound—140 cubic yards—was removed; at the level of the natural surface was a thin layer of sand on which were a large copper axe of 2½ pounds weight and of unusual form, a thin flat perforated bone implement, and several round stones; several skeletons also.

(*b*). Half as large as last; no floor layer. Five copper awls, one flat-sided square-edged axe, a carved pipe of mottled red pipestone, representing a panther or lynx, several flint arrows, a large lump of galena.

(*c*). Small mound; considerable quantity of broken pottery, a number of pieces of elk (?) horn several inches in length, 1¼ inch in diameter, and rounded over one end as if used for pestles.

(*d*). 25 x 50 feet in diameter; 5 to 6 feet high; quantity of human bones at 2½ to 6 feet deep; all crumbling. An unfinished pipe of soft whitish stone; several horn implements like those from *c*. One of a group on the other side of the village back from the bluff, opened in 1880 by Hindman.[204] It was 30 feet in diameter; 3 feet high. A skeleton, two earthen vessels, (one near the head, the other opposite the middle of the body) badly crushed, lay at its right; the one near the head contained ashes and earth; a foot above the head a large piece of mica and a piece of obsidian (two pounds weight), were found near the centre of the mound at the same level with the skeleton.

Stevenson also mentions investigation here.[168] Two companion mounds excavated; out of line and away from bluff some forty rods. They were about 40 feet diameter and 5 feet or more high. ——— In one (*a*) a copper celt among fragments of bones, charcoal, and a decayed mass of wood; it was 5⅛ inches long, from ⅞ to 2¼ inches wide, and ⅝ inch thick; weight 1 pound.——— On a level with the axe but 8 feet from it a beautiful earthen pot, 5 inches deep and 6 inches diameter, with rounded base. Close to it a miniature pot in bad condition. Near the vessels, many

LOUISA COUNTY — *Continued.*

fragments of bone and teeth, and beneath them charcoal and flint chips. In the other mound (*b*) at about 6 feet depth, a fragment of sheet copper weighing 260 gr. It was 4⅛ inches long, 2 inches wide, and about the thickness of ordinary tin. It was slightly curved and found in the bottom of the mound lying in puddled clay. This bottom was dish-shaped, rounding up at the edge, 1 foot deep and 6 or 8 feet across. It lay below the original surface.

Gass [71] mentions a tablet found in a Toolesboro mound by Mr. Potter; it was taken from a depth of 13 feet where it lay on a small pile of bones; it is made of white sandstone, 2 feet by 3 feet, and 3 inches thick, is rounded at corners and bears some old signs or pictures on one side; some English letters have been recently added.

The second "Elephant pipe" in the Academy's collection came from Louisa County and was found by Peter Mare in his cornfield.[142]

The material regarding the Toolesboro mounds is somewhat confused. Numbers 1 to 4 of the group A are so numbered for convenience here and may not have been so numbered by the original investigators.

LYON COUNTY.

Thomas [174] cites Wakefield as to mounds on sections *13 and 24, Twp. 100 N., R. 49 W.*, and Fulton [59] speaks of mounds with circular terraces, 15 to 20 feet in elevation, and of remains of redoubts and breastworks.——More definite is the work of Starr and Lewis.

The former [167] describes mounds and stone circles a mile beyond Brown's Station (La Valley) near the Little Sioux River and close to the Dakota line. The mounds are mostly round, 30 to 50 feet in diameter, 3 to 8 feet high; a few are oval and larger. On the summit of the ridge are stone circles or ellipses made with some care with bowlders. Some mounds lie among the bowlder circles but most are outside the circle-bearing area. The whole ridge top is strewn with flint-flakes, arrow-heads, scrapers, potsherds, etc. Good stone mauls are not uncommon. White and Starr opened two mounds. *No. 1* was of hard gravel with patches

LYON COUNTY—*Continued.*

of ashes. At 2 feet down was a skeleton with head to the north; the bones were well preserved; no relics found.

No. 2. Above was gravel; then black soil; then ashes and black soil; lastly gravel. Some fragments of bones and potsherds were in the black soil and the ashes and black soil.———Two other mounds previously opened by Nash and Cotton lay on south side of railroad.

No. 3. On a lofty ridge; two adult and one child skeletons; also the bones of a horse; also a pipe here. Lower down was an adult skeleton, with a dog's skeleton wrapped in buckskin; here were six iron bracelets, fifteen feet of wampum, a grinding stone, and a red pipestone disk pipe. The skeleton had copper ear ornaments the oxydation of which had preserved the skin and hair in contact with them. This mound was within a stone-circle.

No. 4. Yielded a finely made discoidal stone, an arrow-head, a small maul of reddish granitic rock, part of a jar, and some hard bone fragments. Two lines of stones, six or seven feet apart, crossed the ends of this mound. The discoidal stone is of fine-grained, dark material, beautifully polished; the two round faces are concave and the truly circular outer rim is convex; the specimen is about 6 inches in diameter and is perforated by a central hole of about half an inch in diameter; the thickness varies from less than half an inch at the inner edge to 1½ inches at the thickest part. For fuller particulars regarding the stone circles see references. [165, 167]

FIG. 17.

Lewis [85] redescribes the bowlder circles and rings described by Starr. ———South of the track he mentions a large inclosure or fort, with low walls. Within are *no* circles though there are some without.———Less than a mile north of this locality is another, where stone circles formerly existed. Many have disappeared. One part circle being visible the rest was dug out from the soil which had covered it. This one was 33 feet diameter.———In another paper

LYON COUNTY — *Continued.*

the same author gives further particulars.[87] He states that the mounds north of the railroad number one hundred and five and that one of them is a rude effigy, which measures 55½ feet in greatest length and 2½ feet in height (Fig. 17). He also describes the enclosure south of the track more fully. It encloses an area of about 15 acres; the walls are from 1½ to 2 feet high and average 18 feet in width; the fort was built after the mounds and seven of these are within or about the fort.

MARION COUNTY.

Robinson mentions mounds in the county. Kimberling[109] examined mounds at *Knoxville.* They occur in groups of five to ten in a straight line or a circle and always on bluffs or highland; in one case there was a raised way some 20 rods long, 8 or 10 feet wide, and 1 foot high, leading to an abrupt bluff. The mound structure is described thus: "2 feet of soil; 16 inches of hard baked clay, ashes and charcoal; 5 feet below the clay layer, a hearth, 2 feet by 4 feet and 10 inches deep, full of ashes and charcoal; the walls of 'the furnace' were glazed by heat; the arch is 12 feet in diameter and its height such that a tall man might stand under it. In the centre of the mound was a piece of cement with a crushed human skull below it."

MILLS COUNTY.

Dean[41] and Proudfit[138, 139, 140, 141] have made considerable investigations. Mounds and lodge circles are common on the loëss bluffs of the Missouri River. The mounds are usually small, simple, conical, from 20 to 100 feet in diameter and from 2 to 15 feet high; they yield an occasional chip of flint or fragment of pottery; they are almost always associated with lodge circles.——— These last are circular excavations from 20 to 60 feet in diameter, with a present depth of 5 feet to 4 feet; the original floor was the bluff clay; this often lies buried under 2 feet of black soil; the soil removed in excavation is sometimes piled up in a ring, still remaining as a wall along the outer edge; in one case an oak stump 18 inches in diameter was found in the centre of the lodge circle; these circles are usually on a divide, sometimes on a south slope. A single lodge is an exception; usually they occur in groups.

MILLS COUNTY—*Continued.*

Oak Township, S.-E. corner S.-W¼, Sec. 8, Twp. 73 N., R. 43 W., Allis Farm, on a spur of the bluffs, fifty feet above the plain, some four hundred feet north of a deep ravine, is a group of five lodge circles. The depressions are fairly marked, vary from 20 feet to 30 feet in diameter, and, although considerably filled, from 1½ feet to 2 feet deep. The ground about is strewn with chips, sherds, and occasional arrow-heads, knives, etc.; fragments of an arrow-straightener of sandstone, some paint stones and some mussel-shells were also found.———On the site of another lodge, south of the ravine, was a catlinite pipe.

One mile west of *Glenwood*, partly on the T. D. Tipton farm, is a series of seven lodge circles extending along a crescentic ridge for three-fourths of a mile. With these is a mound. This is located five and a half miles south and two miles east of the preceding locality, near N.-W. corner, N.-W. ¼ S.-E. ¼, Sec. 10, Twp. 72 N., R. 43 W. The bluff is 300 feet high and overlooks the surrounding country in every direction. The mound is elliptical at base, measures 70 feet from north to south and 40 feet from east to west; it is composed of local material taken from a spot about 125 feet to the south, where there is a depression 35 feet square and 5 feet deep. At 7 feet from the top was found a layer of ashes half an inch thick; then came a layer of stones from 2 inches to 11 inches thick and weighing from 20 to 30 pounds; (these were probably brought eight miles from across the river); this layer of stones was probably placed upon the original surface and the mound then heaped over it to a height of 6 feet; an earlier exploration found a second layer of stones at that height and the original mound perhaps was several feet higher than that. No implements, bones, or traces of fire were found in the mound. ———A few flint chips and a large implement, perhaps for agricultural purposes, were found near by.———Trenching across the lodge circles showed, in one case, black soil 3½ feet deep over the floor; in a second case 2 feet of black soil. In both cases potsherds, charcoal, and flint chips were found and in the latter, at the centre, a conical heap of burned earth in which was a large vessel of pottery, which was broken in the excavation.

One-half mile south of *Glenwood*, on the fair-grounds, are four still distinct lodge-circles; they are situated upon a flat,

MILLS COUNTY—*Continued.*

enclosed on three sides by heights and opening to the south upon Keg Creek. Potsherds are abundant over the area, and arrow-heads, drills, scrapers, celts and a "turtle-back" were found; the arrow-heads were small but well made.———On the crest of the south end of the encircling ridges is an ancient workshop; the place is strewn with flint chips and potsherds; at the base of the hill were found a drilled tooth for a bead, a bone implement, mussel-shells, bones, and worked flints.———On the west bank of the stream, a little east of the group of circles, was a pottery factory; great numbers of fragments occur here together with pieces of tempering stone.———The pottery of the district is rude, made of clay tempered with pounded stones; ornamentation consists of curved lines, indentations, checker-work, cob-marking and circle marks.

Half a mile east of the Tipton mound is another unopened mound, with a group of three or four circles about it.——— North and west of Glenwood about four miles, on the old Pacific City road, is a low mound with accompanying lodge circles.—— Five miles north of Glenwood, on the Glenwood and St. Mary's road, is a mound with several lodge circles.———Seven miles north-west of Glenwood, at the head of Indian Hollow, is a group of three small mounds and one lodge circle. This locality is four miles north of the Tipton mound.

East of Glenwood, at eight miles distance on Silver Creek are several small mounds of little elevation upon a high ridge on the east side of the creek near Lem's Mill. One mound excavated revealed great quantities of red burnt earth scattered through the mound with an occasional lump of black earth and some charcoal. No other relics. Indian graves occur on neighboring hills and corn-pits were found here early.

Three miles north of Pacific City and four miles north-west of the Tipton mound, upon a high divide, lies a mound 100 feet by 70 feet and 15 feet high; composed of surface soil, with scattered flint chips, charcoal and ashes in it, no results of interest came from its excavation. A large lodge circle is located one hundred yards south-west. A turtle-back celt is reported as found on the bluffs five miles north of Pacific City; large grooved implements have been found at Glenwood.———Of particular interest is the

MILLS COUNTY—*Continued.*

pottery vessel, entire but broken, found at 6 feet down in loëss at Glenwood (Fig. 18). It is of dark gray clay tempered with

FIG. 18.

micaceous quartz. A few bits of burned clay and pottery were found later at the same place.

Proudfit describes scrapers of flint (pink and white) well worn by use or weather, found by him at foot of bluff, one mile above the mouth of Indian Hollow, in a vertical face of exposure, 6 feet below the surface.

Remains of *Elephas americanus* have been found in the loëss of Mills County at a railroad cut (C., B. & Q.) two miles south of Glenwood and at Malvern, nine miles east of Glenwood.

This author believes that great physical changes have occurred in the region since occupied by man.———He also mentions an ancient trail running for many miles along the west crest of the bluff which is, at times, worn deeply into the surface.

MUSCATINE COUNTY.

Pine Creek. (*a*). Group of six mounds, on a high ridge, two miles above Pine Creek. Lindley [88] opened one composed of yellow clay; in it were found river shells and charcoal, human skeletons lying east and west, and forty-one beads.

(*b*). On slope of same ridge a group of mounds forming an irregular circle. One opened was about 15 feet high and 100 feet

MUSCATINE COUNTY — *Continued.*

wide at base. Four feet below surface were two layers of flat stones. Between two of these large stones and in a cavity of the lower one was a large jet-black arrow-head. A broken skull was found, with walls one-half inch thick; one leg-bone was notched as if repeatedly struck with a sharp instrument.[88]

Witter[199] describes mounds in *Montpelier Township*, Sec. 22, Wm. Lowry Farm; group of nine mounds on top of sharp ridge running W. 10° N. One, probably the largest, opened; it was seventy-two rods from the river's low water edge, and ninety feet above it. Mounds numbered from the west. No. 1 is down the point, which slopes to the west to a creek about 40 rods distant. From the centre of No. 1 to that of No. 2 is 3.2 rods. The rise between them is about 6 feet. From 2 to 3 is 1.5 rods. 2 and 3 form a sort of double mound. From 3 to 4 is 4 rods. No. 4 was the mound opened. From 4 to 5 is 4 rods; from 5 to 6 is 4.5 rods; from 6 to 7, 3.6; from 7 to 8, 2.5, and from 8 to 9 is 6.5 rods. From No. 6 the mounds diminish almost to invisibility. No. 4 is about 70 feet diameter and 7 feet high (8 feet to undisturbed bottom). Graded down by scraper for about 3 or 4 feet. At 5 feet a quantity of flat, argillaceous limestone, averaging perhaps 10 inches in each direction. These were set on edge and in a circle, although one-third or one-half the circle on the north was wanting. This circle was 8 to 10 feet diameter and apparently surrounded the centre of the mound. The stones were nearly all at the same depth and appeared to be collected in little groups a foot or so apart. Sticks of charred wood, two feet or more in length and three or four inches in diameter, with some pieces apparently of oak trees a foot or more in diameter, were with the stones on the south side, and some of the stones were burned red with the charcoal lying on them. Near the stones and apparently forming a circle was a red material three or four inches thick and about the same in depth (apparently burned stone). Charcoal was common, flint chips *scarce*. A little inside the circle of stones and perhaps a foot below were these relics: two large marine shells, *Sycotypus perversus*, one-half of the last whorl of each. These are each 9.5 inches long with spire wanting. Their diameters are 6 and 5.5 inches. Nearly one entire whorl was found close to one shell, apparently part of another shell. (The shells were probably

MUSCATINE COUNTY — *Continued.*

four feet apart—lying horizontally.) One valve of *unio?* about a foot from one of the sea-shells. A cluster of shell beads, globular, three or four inches in diameter and containing 200 to 300 beads; badly decayed; they vary from 3/8 x 1/4 inch to 1/4 x 1/4. Two feet from one sea-shell and four from the other were two vessels, round, with round bottom. (1). Uniformly 1/8 inch thickness; thicker at rim; firm, fine clay, mica, and shell fragments; no sand; many minute cavities; dark in color; somewhat polished on exterior; neck smooth; rest of surface with V ornamentation. Inside measures: at top, 3.75; 1/4 inch down, 3.25; 2 1/2 inches down, 5.4; 5 inches deep; capacity 1 quart.

(2). Coarser, more fragile; from 1/8 to 1/4 inch thick. Reddish clay and crushed granite; no shells; not porous; grains of quartz and feldspar (?); light red; blackish near top. Plain; 5.25 inches at rim; 6 inches at 3 inches down; 6.5 inches deep; tapers below like small end of egg; capacity 2 quarts.

(3). Fragments of a third; red clay, sand and shell; better than (2); some indentation ornament. Human teeth were taken from two points at about the same depth as the relics. Apparently from two individuals, 8 to 10 feet apart. Two teeth are in the posterior part of the right side of the lower jaw.

Davenport parties excavated a mound in the Lowry farm group in 1875. Considerable charcoal was scattered throughout the earth of which the mound was composed; no ashes were seen; at 7 feet down was a part of the forward portion of a human skull from which at least seven *rondelles* had been cut; the bone was well preserved. No other objects were found except scattered fragments of bones within 2 or 3 feet of the surface, and a single small shell bead at 6 feet down.

(*c*). One-half mile below Pine Creek a group of about fifteen mounds on a high ridge. One of them is nearly 20 feet high. North of it are two elongated mounds about 4 feet high, 5 feet wide and twenty feet long. One conical mound yielded, at about 2 feet depth, two-thirds of an earthen vase; at 14 feet, remains of six persons. The bodies had been arranged radiatingly, feet inward, about a large sea-shell—*Cassis madagascarensis.*[88]

Harrison [74] examined these, opening the second one in size; it was circular, 50 feet in diameter, 9 feet high; it was composed

MUSCATINE COUNTY — *Continued.*

of light clay mixed with dark earth; from 6 feet depth downward were ashes scattered through the mass, and burned clay here and there. An ash bed of irregular form and varying thickness, dividing into two branches at about the centre of the mound was found at 9 feet down; this rested upon the natural soil; scattered pieces of sandstone, some showing signs of burning, lay above this bed; no charcoal was found; only one relic—a piece of worked bone 4 inches long, ½-inch wide, ¼-inch thick.

Stevenson [168] states that from a point near Drury's Landing, a few miles east of Muscatine, to a point near Toolesboro and New Boston, a distance of some twenty miles, mounds occur on all the higher points; the groups contain from 2 to 100 or more mounds from 15 to 150 feet in diameter and from 2 to 15 feet high. He estimates that there are 2,500 mounds in this area in the two States of Iowa and Illinois.——Near the limits of Muscatine itself he claims fifty mounds and long earthworks.——Nine out of ten of the works in this vicinity are circular mounds; the long ones are from 6 to 20 feet in length and 5 feet wide and are placed end to end with a gap of 5 feet between. They are made of local material; those on the ridges of clay and sand, those on Muscatine Island of sand and gravel. Sometimes they show evidence of fire action.——A map of groups is given and some notes of explanation:

Group 1. Containing 20 mounds of which 10 were opened with no result except an occasional bit of charcoal or a fragment of a shell.

Group 2. One skeleton, badly preserved, in a horizontal position, and small potsherds.

Group 3. On the bluffs, overlooking Whiskey Hollow. One badly decayed skeleton, with a stone axe weighing 2½ pounds under its head.

Group 4. On Muscatine Island; nearly leveled; pottery fragments, small triangular arrows very similar in style, and flint chips are strewn over the surface of the area.

The heads of skeletons here are almost always to the north. Some mounds have a hard crust arch over the remains.

Witter [155] mentions an arrow-head and spear-head from the

MUSCATINE COUNTY — *Continued.*

loëss at Muscatine; a piece of *Elephas* tooth was found at the same locality. Also [225] flint chips from loëss on Mad Creek.

On Schmale's Farm below Muscatine Gass [72] examined a group of five mounds 65 feet or so in diameter and from 5 feet to 8 feet high.

(*a*). The westernmost; 5 feet high; at bottom were two horizontal skeletons, with heads to the east and west; the bones were badly preserved. Pieces of charcoal and pottery found.

(*b*). One skeleton.

(*c*). Eight feet high; at a depth of 7 feet was a pit 2 by 3 feet and 1 foot deep, with human leg and arm-bones and skull fragments.

(*d*). Six feet high; at 3 feet down were three skeletons covered with pieces of wood; at their sides were pieces of pottery and marine shells.

(*e*). Smallest of the series; in it were a few human bones.

All were composed of very hard clay.

One mile west of the last group, on the Hershey farm, the same writer describes a group of forty-six mounds in four concentric semi-circles; all but two are simple conical mounds; one is oval; one is long and narrow. They vary in height from 2 to 6 feet. Twelve were explored, of which some were burial mounds; there was seldom more than one skeleton present; the bones were badly decayed; ashes and charcoal occurred in all; a few arrow-heads and potsherds were found.

At the river close by relics from an old village site—potsherds, flints, bones of animals and perhaps human beings constantly wash out. They come from a depth of 2½ feet, between the black soil and the sand.

Stevenson [168] mentions eight or ten mounds in two parallel lines on the Cedar River nine miles north of Muscatine.

Also at nine miles south-west from Muscatine on high bluffs—Group G on the map—eleven mounds in a line along the bluff edge. They are about twenty feet apart; consist of clay and gravel, the lower part mainly the latter. Seven were opened. Most gave no objects. The largest yielded flint chips and charcoal; in one, at 18 inches depth, was an intrusive burial, while 2 feet lower was a skull above a stone axe.

MUSCATINE COUNTY—*Continued.*

Near *Wyoming Hill* Gass [39] describes a mound on a small area of bottom land between and close to the confluence of two little creeks, almost surrounded on every side by high bluffs, opening in front toward the Mississippi River. The base is just above high water mark. Oval in form; long diameter nearly 200 feet; more than 30 feet height; it is small and rounded on top; thirty-three layers of earth, clay, sand and gravel clearly defined; scattered charcoal fragments, some large, through it. In the bottom of the mound is an immense pile of slabs of sandstone, two or three inches thick and several feet across, disposed in layers of which, the bottom one resting on the clay extend almost to the outer edge of the mound; the next smaller and so on for about 20 layers to about 8 feet in height, ending in a very broad, flat, pyramidal form. Is this really artificial?

POTTAWATOMIE COUNTY.

Council Bluffs. Two grooved axes, taken from bluff deposits one eight feet below surface, one twelve feet, both near Council Bluffs. Owned by Dr. Stillman.[138]

Stillman explored the bluff 1½ miles north of Council Bluffs on the Mynster Springs road where a cut had been made. An opening about three feet across was driven into the bluff to a distance of four feet, and 5 feet below the soil surface. A large fragment of an elk's antlers; a shoulder-blade, fashioned into a rude implement; fragments of bone; a pipe; a piece of deer antler, 4½ inches long, polished at one end; several flint scrapers; potsherds; a charred corn-cob; several large mussel-shells; many fish-bones; several vertebræ; small bowlders showing fire action; a stone paint mortar of rough red quartzyte, were found.[138] This find was on the western face of the bluff, 40 feet above the Missouri bottom, and not far from a lake that touches the foot of the bluff just north of this point. Above the find the bluff rises to a height of one hundred and fifty feet, with a gradual slope to the crest.

South of this point, a half-mile or so nearer the city, is an exposure at a brick yard. It is at the mouth of a hollow or wide ravine, extending back into the hills for some distance. Here, under from 6 to 8 feet of bluff deposit, are ash-heaps of considerable size, with bones, mussel-shells and pottery.[138]

RINGGOLD COUNTY.

Jordan, [80] in an unsatisfactory article, reports a copper cup found in 1872 by Warner Ruby at Plum Creek, in Knowlton Township; the specimen is now lost. A number of mounds are reported in the neighborhood.———"Knowlton Mound" is described as 500 feet long, 130 feet wide, and 15 feet high; it is said to be serpentine on one side; near the centre black loam nearly 6 feet deep is underlaid by a coarse yellow sand. A skeleton was removed from here some years ago. The question of the entirely artificial character of this mound is raised.———A stone dam, the stones being regularly laid, causing a "ripple," is mentioned; it might well be natural (?).

SAC COUNTY.

Negus [104] mentions elliptical and circular mounds which yielded no returns to the investigator near *Sac City*. White [193] examined mounds on the "second bottom" well above the reach of river floods. Eight mounds with no regular arrangement extend north-east and south-west; two of them are oval and six are circular; they vary from 50 feet to 96 feet in diameter, and from 2½ to 3 feet high. No relics were found.

SCOTT COUNTY.

Pleasant Valley.—Ahrman [37] described a curious relic found by him in digging a post-hole on an old village site, of material resembling yellow clay, but hard as stone. Very smoothly carved though rude and incomplete human form; 6 inches long; face distinctly carved, forehead flat, hands resting on chest, lower limbs not carved out.——— Near the mouth of *Duck Creek* was a mound with about fifteen interments. Tiffany [178] found two lower jaws and the molar tooth of a bison.

The same explorer opened two mounds at *Gilbert;* one yielded an arrow-head, the other an arrow-head and flint chips.[178]

East Davenport.—Churchill [31] reports a group of three mounds on the edge of the bluff overlooking Camp McClellan; three hundred yards from the southern line and thirty yards west of the eastern boundary of the Russell estate in Davenport Township. The mounds are in a north-east and south-west line; they are from thirteen to eighteen yards apart. The eastern one is 15 yards in diameter and 3 feet high; the central and western

SCOTT COUNTY—*Continued.*

ones are about 9 yards in diameter and 2½ feet high; they are composed of earth, clay, and black soil, and are built upon the original surface; they yielded no remains or relics. Black oaks from 6 to 8 inches in diameter grow over the middle mound.

The shell-beds at East Davenport and on Rock Island, although they have yielded a bone awl, stone axe, hammer-stones, an arrow-head, etc., are believed by Pratt [131] to be natural formations made at times of high water. He, however, makes exception in favor of the one at the lower end of Rock Island, which is eighteen feet above the high-water level, and is irregular in position and thickness. Tiffany has described it; from it came a skull and human bones, as well as the point of an antler similar to specimens from some mounds.

Davenport.—A copper implement found in excavation for a gasometer, 400 feet north of the Mississippi River, at a depth of 11 feet, in a small fissure or depression in the Devonian rock. The locality is 19½ feet above low-water mark. The strata here are 2 feet black soil, 5 feet clay and sand, 2½ feet pebbles and bowlders (this probably continues to the rock). The implement is pointed at both ends, tapering from the middle, and is 4¾ inches long and ¼-inch in diameter. Much oxydized.[36]

Near Davenport (Capt. Hall's place).—Mound opened. Tiffany [178] found a copper axe covered with cloth, a stone pipe, four arrow-heads, one worked bone, and a broken crock; also fragments of obsidian, a lump of yellow ochre, flakes of mica, and parts of two skeletons.[36]

One mile below Davenport, on bank of Mississippi, bearing north-east and south-west (*Cook Farm*) two hundred and fifty feet from high water mark, though but 8 to 12 feet above it. [55]

No. 1. Apparently double on surface; diameter 30 feet; height 4 or 5 feet. The structure presents a foot of earth; a layer of stones, nicely joined, 1½ feet; 2 inches of shells; a foot of earth; shells 4 inches; under this, at 5 feet, five skeletons of adults, horizontal, parallel, and near together. Three lay from east to west, with skull of one on shoulder of next; the other two lay headed west. With the last two were a large sea-shell (*Pyrula perversa*) with axis and inner whorls removed; two copper axes, back to back, covered with cloth; one copper awl, a flint arrow-head, two pipes of stone—one frog, one plain.

SCOTT COUNTY—*Continued.*

No. 2. One hundred feet south-west of (1); like it externally. Inside, no layers of shells, but several layers of stone, with a few scattered shells; at 5 feet eight skulls and some fragments of bones; these were lying in a semicircle of five feet diameter and each skull was surrounded by a circle of stones the size of a small fist. The bodies had apparently been buried in a sitting position. Two copper axes; two small copper hemispheres; also one of silver; one bear canine; an arrow-head; red pigment; (bones of small snake, intrusive,); two skull fragments.

No. 3. One hundred and twenty feet south-west of the last. Largest of series. No layers of shells or stones. At 1½ feet, two adult skeletons, horizontal, covered with oak wood; with glass beads, fire steel, clay pipe, silver ear-ring, femur and tibia injured by some sharp instrument. These intrusive. Beneath them at 6 feet, under thin layer of ashes, bones of two adults and of one young infant, the latter covered with copper beads of several sizes and shapes and dyed deep green, and surrounded by a circle of small red stones arranged like the rays of the sun; five copper axes, all more or less cloth-covered; two stone pipes—one plain and one groundhog; teeth drilled and polished, several bear canines, incisors of gnawers, etc., one beaver incisor, fragment arrow-head; three broken pots with bones of river turtle adhering to inside; two pieces of galena; yellow pigment.

In the second excavation of this mound by Mr. Gass in 1877 two tablets of bituminous slate bearing engraved designs were found. These have caused much bitter discussion. Farquharson [56] carefully described them in an interesting article. Other writers, as Rust [149] and Seyffarth [156] discuss the meaning of the inscriptions they bear. Their authenticity has been questioned by Thomas in various articles, notably in his final report on mound exploration.[221] This is no place for a discussion of the matter, but it is proper to state that the members of the Academy generally have confidence in the genuineness of the specimens. A third tablet, of limestone, bearing curious designs, was found in Mound 11 of the group and has been described by Harrison.[73]

No. 4. Two hundred and fifty feet south-west of last; of simple construction. At 6 feet, under a layer of 6 inches of ashes, four adult skeletons lying close together; one copper axe.

SCOTT COUNTY—*Continued.*

"In the earth on which they lay, it could be distinctly seen that they had been enveloped in cloth or some woven material, and at a depth of four feet was a round heap or altar three feet high of stones joined neatly together."

No. 5. One hundred feet west of No. 1. In construction like No. 2; several strata of stones with loose shells between them. At 5 feet, parts of two skeletons, above which was a 6-inch layer of hard clay; at same level, three feet north-west, a round heap of stones about 4 feet high. On this lay two very strong thigh-bones and three ribs placed diagonally across each other. Also a few bones leaning against the heap at one side. Stones show fire traces and some are burned, but bones unburned. Some charcoal by these stones. Four or five feet south, confused mass of human bones. Still south 3 feet, under 6 inches of shells, two broken pots, an arrow-head, a stone pipe, and some skeletons. Still south 4 feet, a skeleton lying east and west, and 6 inches above its skull a copper axe. Also animal teeth, incisors of rodents, bear canine, and a *rondelle* 1 inch in diameter.

No. 6. One hundred feet south-west of No. 5. Smaller and lower than others; fewer stones, but more shells. At scarcely 3½ feet depth, perhaps four skeletons. Only one lay with bones in connection. The others had them more or less separated. Two broken pots, a stone pipe, a stone knife, an arrow-head.

No. 7. Out of line with rest. Fifty feet west of No. 6. Small. A layer of stones and under it a thin layer of shells; 3½ feet below latter, much crumbled bones, two pots—one much broken, one nearly entire,—some arrow-heads.

No. 8. Somewhat larger and higher than average; two hundred feet west of No. 6. At 4½ feet (stones, earth, shells,) two skeletons, woman (?) and child; near together; east and west. To right of the adult were two broken pots, eight pieces galena, two small arrow-heads, stones of various sizes and shapes in a jagged or starlike circle; also piece of mica 6 x 3½ inches. Over and around all, loam of some decaying stuff, probably a covering.

No. 9. One hundred feet north by west from No. 1. Much (3 or 4 feet) reduced by cultivation, etc. Near present surface a few shells and scattered stones. At 3½ feet two skeletons, horizontal, east to west; much decomposed; skull of western skele-

SCOTT COUNTY—*Continued.*

ton preserved; one-half of lower jaw found three feet distant. Of the other skull only the copper-soaked jaw-bone preserved well, stained by axe. Between bodies, stone pipe; obsidian arrow-point, obsidian flakes, small arrow-points of white chert, near second head; also spoon of river turtle's scapula.

In several mounds broken pottery occurred between surface and deeper part as if pots had been placed on surface of mound.

No. 10.[65] Ninety-five feet north-west of No. 1, 100 feet north-east of No. 5. Smallest and least important; 15 feet diameter, 8 inches high. All in this row—7, 5, 10,—are less elevated than the others. At 6 inches depth was a closely-packed pile of stones, about 3½ feet long east and west, 2½ feet from north to south, 2½ feet high. The pile rested on a hard clay bottom, 3 feet from surface of ground. The cavity was about 10 feet long east to west, 6 feet wide, over 2 feet deep, rounded at corners and bottom. In the lowest layer of the pile was a flat stone 2 feet long, 10 inches wide, 2 inches thick, with smoother side downward. Beneath it were fragments of human leg-bones pressed down into the clay. Two to 2½ feet west of this pile, 1 to 1½ feet below the surface, a layer of river shells 3 feet long north and south, 2½ feet wide, 1 inch thick. This layer was arched, the north and south edges being curved downward. Shells badly decayed. Three or four inches below this layer, directly under the middle, several pottery fragments and three small polished stones. The pieces were nicely packed together in a little pile. No other relics or bones.

No. 11.[73] Sixty-five feet north of No. 1, twenty-five feet south-west of No. 9, of *slight* elevation. Dark soil and red clay mixed. At 14 inches, large, angular pieces of rock laid closely together, with smaller stones fitting places between, 2½ x 3 feet; under this a similar layer, etc. At about 3 feet down a flat, unwrought, irregular stone, 14 inches square, 1½ inches thick, horizontal. It covered a space, in which lay a tablet; cavity a little larger than tablet, and about 5 inches deep. The floor on which the vault stood was of yellow clay, hard and very compact. Tablet head lay east-north-east. Four flint arrows lay on the tablet with points directed inward—one at top, one at bottom, one at each side midway between top and bottom. On upper left hand corner

SCOTT COUNTY—*Continued.*

a *Unio pustulosus* with powdered red ochre. A quartz crystal in centre of tablet over the human figure. Outside of and around the vault were many decayed shells and some small potsherds. No bones.

Tablet, evenly stratified, non fossiliferous limestone; about 12½ inches long, 7½ wide, 1½ thick. Under side a natural cleavage. Upper side somewhat smoothed. An uncouth human figure, astride a circle. Over his head a copper axe; above this at corners are bird-pipes, with eyes of quartz set in with some white cement. Several characters, some like those on other tablets. All these are incised; lines in small figures are $\frac{1}{25}$ inch in depth; in large, 3 or 4 times as deep, wide and coarse. Colored deep, bright ochre red. Shows signs of heat, etc.

Allen Farm Group. Situated six miles down the river from Davenport, on the extreme edge of the bluff at a half mile from the river; the mounds are in a curve, following the bluff, with a general trend north-east and south-west. They are overgrown with brush. They are from one hundred to one hundred and fifty feet apart and range from 2 feet to 5½ feet in height. They are described by Pratt in three articles, [130, 218, 219,] and are numbered from the east end.

No. 1. Bones had been found herein previously.———Pratt describes the later exploration. The mound was 30 feet in diameter and 3 feet high. It yielded eight skulls and many bones; all were badly decomposed and were scattered except some long bones which were laid side by side; at about 2 feet depth were a number of large, flat, rough slabs of limestone, irregularly placed; six flint implements were found, some of them immediately below the long bones mentioned above; at three feet from the centre were a quantity of pottery fragments and near them a lot of charred human bones.

No. 2. At 4 feet down were four badly decayed and broken skulls, with other bones; no ribs or vertebræ were found and probably but parts of the bodies were buried here; the heads are west; a poor discoidal stone, two fragments of stone implements and two small beads of thin copper were obtained; there was no evidence of fire in the mound.

No. 3. Nearly circular; 30 to 40 feet in diameter and 2½ feet high; some arrow-heads are said to have been found.

SCOTT COUNTY—*Continued.*

No. 4. Originally 4 feet or 5 feet high, this had long been removed; bones of three skeletons, and a sea-shell were found.

No. 5. Had been removed to make room for a house. Remains of several skeletons, including one or two good shells, were found; one of these is broad at base, "gothic formed," and has had several *rondelles* cut from it on each side.

No. 6. Removed in part for a croquet ground; parts of several skeletons and two rather light, well-burned earthen jars.—— What was left of it was examined. It was of mixed clay and black earth, with a few small gravel stones, two or three flint flakes and a piece of limestone. This last is a rough fragment about 10 inches long, 3 inches wide and 1½ inches thick; it was near the south end of the mound, upright, with its upper rather pointed end about a foot and a half below the sod. Under 4 feet of the mixed earth the undisturbed yellow clay was met; this was the bottom of an excavation made to ½-foot below the natural surface; it was basin-shaped and from 6 feet to 8 feet across, being largest from north to south. Part of the body of a human cervical vertebræ was found in the mound; also a well made plain red and gray catlinite pipe, an oval stone about 1¾ inches by 1½ inches and 1 inch thick, and a potsherd. These were all at about 3 feet down.

Two mounds in *Rockingham* examined by Tiffany [178] contained decomposing skeletons to the number of about a dozen in each.——— In a mound in the same locality, already somewhat excavated, he found a small wheel like a pulley made of burnt clay and pounded shells, a red pipestone pipe, three sea-shells—*Cassis madagascarensis*. The bones found here were badly decomposed.

A low, ½-foot high, mound on the Heidt farm below Rockingham; it is alongside the River Road. The elevation consists chiefly of stone; under there is the usual mixed earth; a few poorly preserved bones and two flint arrow-heads were found.[37]

Staffelbach's Farm, seven miles below the city of Davenport; three-eighths of a mile from the river. A mound on crest of a spur bearing south of west from main bluff here prominent as Eagle Point. Mound about 25 feet long, 2 feet high. Surface of black soil for 6 to 12 inches; next a burnt indurated clay, in

SCOTT COUNTY—*Continued.*

color and texture like medium-burnt brick for 30 inches. Then charred human remains 6 to 18 inches. Then undisturbed loëss, imbedded in which a very few decomposed, unburnt bones. No implements of any kind.

Considered by Tiffany a cremation furnace.[36]

Cleona Township. Gass [66, 67] describes engraved stones imbedded in a creek twenty-two miles west of Davenport. Five in all; two were brought to the Academy. The others were removed later. The very large one left is not particularly important.

(*a*). Very dark colored, hard, heavy, coarse greenstone. Irregular; it bears a human head, a quadruped, a bird, a human form, parts of human face and form, some unrecognizable marks.

(*b*). Same material; almost regular oval form; twice the size of a man's head. Cut in sharp grooves is a human face.

(*c*). Same material; smaller; a few scratches or irregular lines.

(*d*). Weighs 100 pounds or more. Very hard, light-colored quartzite; an uncouth human head on one side, a rude tree on the other.

There are mounds near by. A copper implement was found among the stones two years earlier.

In the various articles regarding Scott County mounds published in the Proceedings of the Academy are figures showing construction and arrangement. These cuts have been loaned to other authors and some have not been returned. As the full series can not be published here all are withheld. (F. S.)

NOTES UPON SCOTT COUNTY SPECIMENS.

Physical Anthropology.—The bones from the Cook Farm Mounds were usually too badly decomposed for preservation. From Mound 2 were removed two fragments of skulls — only frontal bones, with nasal bones attached. Farquharson [55] says these indicate a highly-arched nose. From *No. 9* came a skull fairly preserved. It gave the following measurements: Horizontal circumference, 19.5; long diameter, 7; transverse diameter, 5.25; capacity, cubic inches, 76.2; distance of *foramen magnum*, 1.8; ratio of distance, 0.269; ratio of diameters, 0.752.

SCOTT COUNTY—*Continued.*

Objects of Copper.—The axes are of three shapes—with flat sides, plano-convex, double-convex. All are simply hammered from native copper.

No.	Mound.	Weight, lbs.	Shape.	Length.	Width.		Thick.
					a.	*b.*	
1	C. No. 3	1.0721	(*a*)	6⅞	2⅛	1	½
2	C. No. 3	1.1564	(*a*)	7½	2⅜	1⅛	⅜
3	C. No. 3	0.5387	(*b*)	4⅝	2⅜	1⅜	½
4	C. No. 3	0.1056	(*b*)	5¾	2¾	1½	⅜
5	C. No. 3	0.9961	(*b*)	5¼	2⅝	1⅝	½
6	C. No. 1	0.4242	(*b*)	3¾	2⅛	1⅜	⅜
7	C. No. 4	0.8114	(*a*)	5⅝	3	1⅞	¼
8	C. No. 1	0.4602	(*b*)	3⅝	2¼	1½	⅝
9	C. No. 2	0.8464	(*a*)	6¼	2¾	1¼	¼
10	C. No. 2	0.5085	(*b*)	3½	2¼	1⅜	⅜
11	C. No. 5	1.6575	(*b*)	6	3¼	1⅞	⅞
12	C. No. 9	0.8743	(*a*)	5	2⅜	1¾	¼
13	Princeton.	0.4987	(*b*)	4	2	1	4/10
14	Toolesboro.	0.8171	(*a*)	5¼	2⅝	1¼	7/16
15	Toolesboro.	1.7700	(*a*)	5½	2½	1⅜	⅝
16	Toolesboro.	1.6314	(*b*)	6⅞	3	1½	⅝
17	Toolesboro.	0.5143	(*b*)	4	2¼	1¼	7/16
18	Toolesboro.	0.2143	(*b*)	3½	1⅞	1	¼
19	Toolesboro.	2.4985	(*c*)	5¾	1⅜	1⅝	15/16
20	Toolesboro.	0.9257	(*a*)	4¾	2½	1½	⅜

Nos. 1, 2, 3, 4, 5, 12, 14, 16, 19, and 20 are more or less covered with cloth; 6 and 8, found together, were also cloth-covered, but were scraped on finding.

Eleven copper awls were found in mounds (with one exception). They are of ordinary types but some are bent at extremities.

Thin copper hemispheres; one, 0.8 inch diameter, weighs 34 grains; the other, 0.5 inch diameter, weighs 10 grains. With them was found a silver hemisphere 0.7 inch diameter and weighing 13½ grains. (These came from the Cook Farm Mounds—No. 2.)

A curious copper implement was found partly washed out from the Cook Farm Group—No. 3. It was produced by hammering

SCOTT COUNTY—*Continued.*

—apparently out of an already hammered bar. It is rudely spoon-shaped and weighs 86 grains; the total length is 82 mm.; length of blade, 22 mm.; breadth of handle, 8 mm.; breadth of spoon at widest, 14 mm.; average thickness of handle, 2 mm.; thickness of spoon part, 1 mm.; thickness of middle part of spoon, ½ mm. A spot of silver occurs on one side.

The copper beads are of thin beaten strips of copper rolled up into tubes varying in size and width.

Pottery.—Holmes [78] speaks in general of Northern Mississippi ware—dark paste, sand tempered (often granitic), rough fracture, rude finish. Shapes are comparatively simple, often long, tapering below, flat-bottomed. Ornamentation of cord impressions, incised lines, and implement indentations. He also describes the same Davenport specimens as Farquharson. (See [55].)

Ring; color almost black; fracture, dark gray; specks of shell in the paste. Well baked. The greatest diameter is $1\frac{1}{16}$ inches. thickness at the margin, ¾-inch; diameter of central aperture, ⅝-inch; thickness at edge of aperture, ½-inch; depth of groove about edge, ⅛-inch; width of groove, ¾-inch. From the groove, eight small holes pass to central aperture of pottery.

From the *Cook Farm* Pratt [132] describes a curious object:—Natural sandstone concretion, firmly attached and almost central upon a flat, thin base-piece of light brown flint. Resembles an animal with broad, flat snout. Lower part *carved* into a tail and limbs. Eyes of bits of quartz crystal set with some kind of cement. Flint base much worn.

Rondelles and post-mortem trepanation.

(*a*). *Rondelle* cut from squamous portion of the temporal bone. Found in *debris* of mound near Davenport (Cook Farm). Circular; an inch in diameter.

(*b*). Part of cranial vault from which seven circular pieces had been cut. Found in mound on Pine Tree Creek, Muscatine County, and alone occupied the base of the mound.

(*c*). Skull from which three *rondelles* had been cut. Found on Allen Farm, near Davenport, at the base of the largest mound in the group. (Farquharson.[54])

Elephant Pipe.—Farquharson [53] describes No. 1 with care:—Soft fragile sandstone; with dark external polish; weight, 164

SCOTT COUNTY—*Continued.*

grammes; extreme length (of head) 88 mm; height at shoulders, 39; girth, 85; thickness at shoulders, 24; circumference of trunk at extremity of lower tip, 33; length of trunk from tip to angle at mouth, 35; tail length, 29. The animal is represented with feet together, trunk coiled and resting on ground.

Mound-builders' Cloth.[37]—Each cord of the warp is composed of two double and twisted cords, and the woof of one, which passes between the two parts of the warp, the latter being twisted at each change, allowing the cord to be brought close together so as to cover the woof almost completely.

Holmes [212] also gives a cut of a cloth impression from a pottery fragment from Iowa. One series of strands appears to be quite rigid while the other has been pliable and appears in the impression only where they cross the rigid series.

Tablets.—Lack of space forbids any details regarding the tablets here. A careful study of them will be published in time.

TAMA COUNTY.

Beal and Loos [18] explored a mound three miles west of *Toledo.* Many bones and flint arrow-heads were found; the bones lay without arrangement; one skull had an arrow-head imbedded in it. The bones were all thick and heavy—particularly the small bones.

TAYLOR COUNTY.

Proudfit [138] mentions "a large grooved celt of unique design" from this county.

VAN BUREN COUNTY.

A group of mounds located upon a sharp ridge overlooks the town of *Doud,* near the Des Moines River, in the north-west township of the County.[174, 193]

Thomas further describes these in his final report.[221] There are eighteen mounds, circular in form and placed in a nearly straight line on the very crest of a sharp ridge.

No. 1 was 25 feet in diameter and 5 feet high; it yielded two gray disks each 4 inches in diameter, a grooved axe, and flint chips.

No. 7 was 20 feet in diameter and 3½ feet high; it had a central core of hard earth.

No. 12, with a diameter of 25 feet and a height of 4 feet, con-

VAN BUREN COUNTY—*Continued.*

tained, under the hard core and at depth of original surface, decayed human bones and three fragments of dark-colored pottery.

No. 14 yielded nothing.

No. 15, of same size as No. 12, contained scarcely more than traces of a skeleton which lay with head north, beneath a very hard core.

Negus [104] refers to mounds near *Kilbourne*. Two opened yielded human bones; the mounds were 130 feet in circumference and 6 feet high.

From far above Pittsburg to a point several miles below Keosauqua, according to Evans,[48] a continuous chain of works is to be seen.

The Dahlbergs [35] describe pottery found near the mouth of Chequest Creek at *Pittsburg*, on the Des Moines River; the paste was composed of clay and sand mixed with small pebbles; the pottery was hard, firm and durable; vessels of at least 18 inches diameter at the mouth appear to have been represented among the fragments; rude ornamentation of nodes and incised lines; some edges were crimped.———They also mention a bed of ashes and charcoal 3 inches thick and 2 feet from the surface, in the river bank.

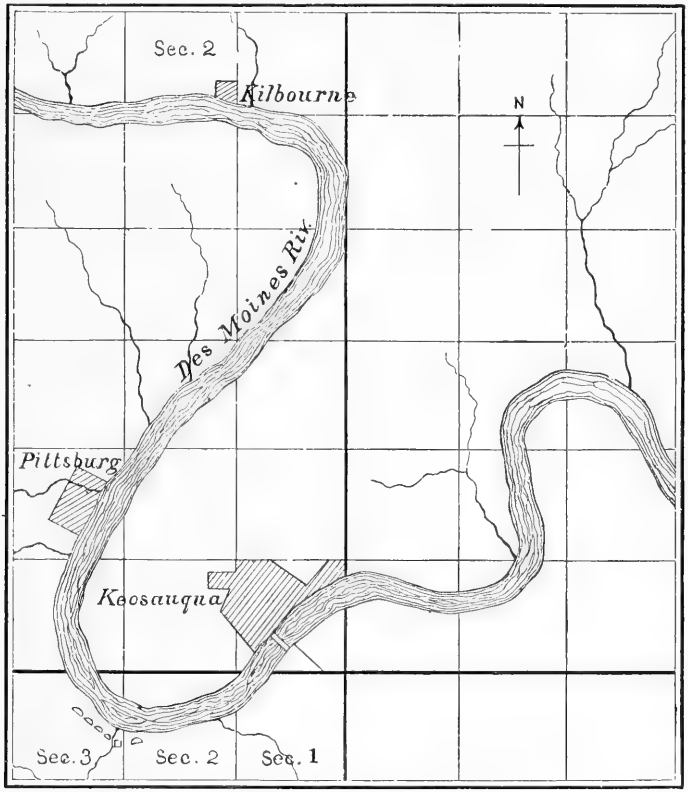
Evans [44] describes mounds between Pittsburg and *Keosauqua*. Thus in *N.-E.¼ S.E.¼ Sec. 3* (see map) is a mound on a bluff point, two hundred feet from the water's edge, and one hundred feet above the stream. In it, at 2 feet down, was found a human skeleton, except the lower jaw and leg-bones, with potsherds; the head of the skeleton was toward the south-east; the skull was somewhat Neanderthaloid.——Fifteen rods north 55° west from last, was a half-moon-shaped mound, about two hundred feet from the water's edge; thigh-bones were found in it.——Fifteen rods north 45° west from last was a mound, which yielded only a small fragment of pottery.

In the *N.-W.¼ S.-W.¼ Sec. 2*, (see map) at thirty rods south 45° east from the mouth of Ely's Creek, one hundred feet above the water and twenty rods from its edge, was a mound 60 feet in diameter and 5 feet 6 inches high. At 5 feet down was a thigh-bone; an upper arm-bone and fresh-water shells were also found.

White [195, 196] and Evans [44] describe the shell heap at *Keosauqua*,

VAN BUREN COUNTY—*Continued.*

on the Des Moines River, twenty rods north 55° west from the mouth of Ely's Creek; it is forty feet from the river's edge and twenty feet above its bed. About 4 feet in thickness, of silt-like material derived from floods, is crowded with *Unios* of a dozen species; bones of deer are common, and the long bones are split open for marrow; bones of bear, wolf, dog, and snapping-turtle



are also found. Flint flakes, arrow-heads, a greenstone axe and pottery fragments were found; the pottery is of common clay with sand tempering and is poorly burned; its ornamentation is simple, of lines or cord markings; pieces of limestone laid together show evidence of fire action.

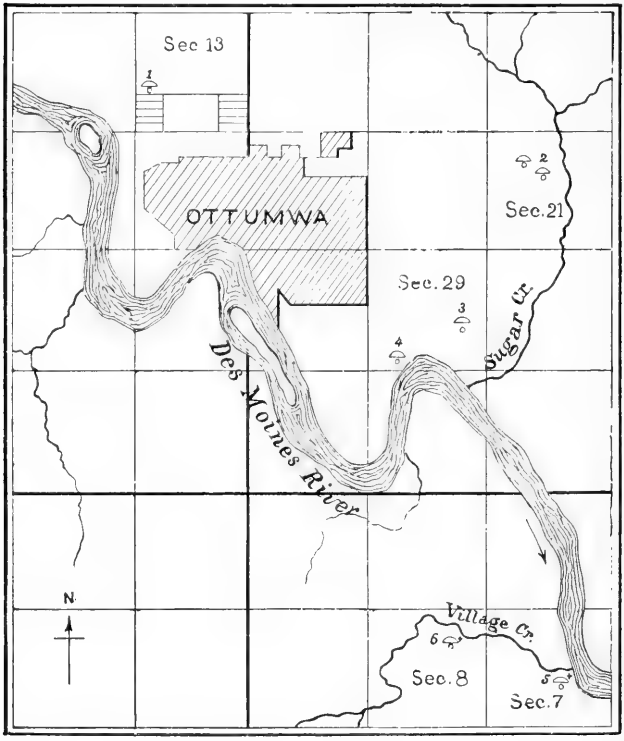
Wilson [198] reports five rude chipped implements from a depth of 2 to 5 feet in a clay soil, from near *Bonaparte.*

WAPELLO COUNTY.

Negus[104, 105] gives some indefinite statements regarding mounds in this county and Fulton[59] refers to some fully described by Evans. Ketterman[162] states that a line of mounds runs from north to south through the county and mentions those in *Twp. 72, R. 13 W.*———The only serious work is that of Evans.[44-48]

Near *Ottumwa*—to the north (see map) on the Hederick Farm—is a group of mounds. Two are prominent; one is 50 feet in diameter. No relics were secured except a few chips of flint.

Sugar Creek Mounds (see map). Two were examined.



No. 1. On the highest point about; overlooks the next one and the Trawell Group. In circumference 150 feet, it has a diameter of 50 feet and a height of 3½. It yielded bits of charcoal and decomposed ashes.

WAPELLO COUNTY—*Continued.*

No. 2 was 180 feet in circumference, 60 feet in diameter; it yielded a few bones but no relics. East of No. 1 and one-fourth mile away are the remains of an old hearth, near which a number of arrow-heads were found.

Trawell Group (see map). Consists of three mounds of same size and appearance as the last. From one was taken a small hatchet of greenstone.

Stiles Group (see map). Yielded a few broken arrow-heads, a small greenstone hatchet, and some bits of obsidian.

Village Creek Groups (see map). There are seven or eight mounds in each of the two groups; the eastern group is on a high ridge; the mounds are about 150 feet in circumference and 4 feet high; they are about one hundred and fifty feet apart. Structure as shown in them is: 1 foot earth; 2 inches of ashes, charcoal, and calcined bones; two other ash-layers at about 1 foot intervals; these ash-layers extend to the very edge of the mound.—— Similar evidences of fire action are found in the western group.

Cliffland. Six miles from Ottumwa, on a high site in view of the Village Creek Groups and on the opposite side of the river from them, are three mounds, about forty rods apart and ranging east and west; the easternmost is much like the Village Creek mounds, consisting of clay and ashes; it is 50 feet in diameter and nearly 4 feet high; in it were several small pieces of magnesian limestone, yellow and red sandstone, and a few bits of flint, all showing signs of having been heated. No bones were found, but a gray pulpy mass may be traces of them.

Near *Eldon*, in Washington township, one and a half mile east of the village, on level river bottom land are three east and west lines of mounds. There are five in each range; the ranges are about eighty yards apart; the mounds measure from 10 to 50 feet in diameter and from 1½ to 2½ feet high. They consist of loose sand and mould and are supposed to be fairly recent graves of Omaha Indians.

Thomas describes this region [221] and assigns a group of mounds south of Eldon to the Iowas and a group further south, and just north of Iowaville, to the Pottawatomies. Black Hawk's grave is with the former group. Near it also are three hard worn parallel tracks nearly a mile long—a race-course.

WARREN COUNTY.

Morgan [171, 214] mentions a mound in this county which contained a great number of skeletons.

WEBSTER COUNTY.

Aldrich [1] mentions several mounds on the Des Moines River, six or eight miles above Ft. Dodge. In one an arched structure was found.

Ft. Dodge.—Fulton [59] mentions at this locality mounds and an embankment, with gateways and openings, enclosing many acres. Williams [197] mentions excavations which yielded parts of thigh-bones, imperfect skulls, teeth, coals, pieces of burned wood, etc. He inclines to the belief that they are house sites.

The latter author also mentions mounds at forks of Boone River.

WOODBURY COUNTY.

Fulton [59] states that a mound in this county, measuring 65 feet by 100 feet, contained seventeen skeletons, one sitting, the rest lying feet to feet in two rows; at the head of the rows was an earthen vessel.———Skeletons and relics were found in a mound at Sioux City.[207]

WRIGHT COUNTY.

One mile north-east of *Clarion* were twenty pits in an elliptical form, within an area of one acre; the pits were 3 feet by 10 feet and from 2 to 3 feet deep and were spaced; an opening occurred in their arrangement on the south-east; many animal bones were found. (Fulton. [59])

A LIST OF COLEOPTERA FROM THE SOUTHERN SHORE OF LAKE SUPERIOR.

With Remarks on Geographical Distribution.

BY H. F. WICKHAM, M. S.

SINCE the publication in 1850 of Dr. Leconte's "General Remarks on the Coleoptera" in Agassiz's "Lake Superior," a good deal of attention has been bestowed upon the beetles of that region, partially because of the considerable number of new species brought to light by the explorations preceding the bringing out of the report, and perhaps more by the early-recognized fact that a number of the forms taken in the district have a wide Northern and Alpine distribution. In 1878 Messrs. Hubbard and Schwarz brought out their "List of Coleoptera Found in the Lake Superior Region," which contains the results of long-continued and careful collecting by the authors, with the addition of all the species taken by Dr. Leconte in his previous explorations. Over twelve hundred names are given of Coleoptera from various points on both shores of the lake and from some of the larger islands. Several short reports were afterwards published by Dr. Leconte, which contain lists of species taken by members of the Geological Survey of Canada, but only a few are additional to those enumerated in the Hubbard and Schwarz List.

My own collections were all made at Bayfield, Wisconsin, on the southern shore of the lake, and about sixty miles from the western end. Most of the work leading to the preparation of the lists mentioned in the preceding paragraph had been done far to the eastward, and to this fact may be due the large number of names—over 200—contained in my list and wanting in the others. About 500 of those I enumerate had already been found at some point in this basin.

Bayfield lies in a lumbering district and is surrounded by heavy forests of coniferous trees with their usual concomitants of underbrush, the whole making a closely-packed mass of vegetation almost impenetrable and so dense as to preclude the use of the beating or sweep-net

except in partially-cleared openings or along wood-roads. The face of the country is extremely rough, bold rocky hills alternating with deep ravines, most of which form the course of some small stream, or, failing this, there may be a series of small cold pools with boggy spots between. The lake shore is in most places bordered by high bluffs, but two or three fine beaches are within easy reach, and with the marshes lying back of them furnished quite a number of forms not found elsewhere in the vicinity. A peat-bog of several acres in extent also proved very productive of peculiar species. Very little farming has been carried on, and consequently we find few introduced species, so that almost the entire number of those enumerated may be considered indigenous.

The period covered by my collections is that between the middle of June and the end of July. This will account for certain deficiencies in the list which will be evident to every one who is familiar with the Spring fauna of our Northern States. Thus the poor showing in the Staphylinidæ, Pselaphidæ, and Scydmænidæ may be partially explained. The Carabidæ are tolerably well represented, but the curious absence of any species of the genus *Brachinus* is worthy of note, since a number of them are found in the Canadian provinces to the eastward. There is a good representation of the genus *Platynus* (as usual in our northern regions) and of *Harpalus*, while the Scaritini are but poorly developed, only three species of one genus (*Dyschirius*) appearing on the list. The Water Beetles were not found in such abundance as I had hoped from a perusal of lists from northern localities, and of those named in the present report a great part were taken not in water but under moss in damp spots—a peculiarity which I have noted in some species of *Agabus* collected on a previous trip to Alaska. Seining was very unproductive, but a good many things were washed up by the lake on stormy days, and might be picked up along the beach, some of them alive, others apparently drowned by the buffeting of the surf. Staphylinidæ were not given quite as much attention as some other families, and as the North American Aleocharini are for the most part undescribed, but few of them appear in the list. The absence of *Bledius* is of interest, and is to be noted as a companion incident to the dearth of Scaritini, mentioned above. Most of the small Silphidæ were taken in slime-moulds of the genus *Stemonitis*, though *Agathidium* may be taken on various fungi or in rotten wood penetrated by the mycelia. In the Coccinellidæ the occurrence of *Hyperaspis quadrivittata* is very interesting, as it is more essentially southern

in distribution. Only one specimen was obtained, and this may possibly have been blown from some vessel bearing freight from a southern port. The genus *Dermestes* was not met with, though traps for carrion beetles were quite productive of other kinds. *Saprinus lugens* has been found to extend its range into the Lake Superior basin, and the occurrence of *Cyllodes biplagiatus* in numbers may be worthy of note. Of the Elateridæ it is a pleasure to record the capture of a fine specimen of *Megapenthes rogersii*, a rare insect recorded hitherto only from Canada, while the fine development attained by the genus *Corymbites* should receive attention. But few Scarabæidæ were seen, only one of which, *Aphodius hamatus*, seems worthy of special remark, from its habit of living in the rotting vegetable mould of swamps rather than in animal excrement, as usual with this genus. The Cerambycidæ form nearly a tenth of the whole list; their great abundance may be directly traced to the forest-covered condition of the district, and the genera and species are, in the main, such as follow in their distribution that of the coniferous forests of the north. The Lepturini are especially noticeable, almost every umbelliferous flower-head having its specimens feeding, while sumach and certain Rosaceæ were also favorite haunts. Certain species seem to prefer certain flowers—for example, *Gaurotes cyanipennis* was found almost exclusively on sumach blossoms. Many Longhorns, that were not otherwise met with, were cast up alive by the waves, among them the rare *Monohammus marmorator*. Chrysomelidæ are rather few in species, and ordinarily in individuals as well, the occurrence of *Gonioctena pallida* is quite characteristic of the boreal element in the fauna. *Anthicus pallens* is a curious form, with a coloration resembling that of some sea-coast Anthicidæ; it is found under logs in the fine white dry sand of the beaches, and is interesting because of its being found on the sea-beaches of Florida and New Jersey as well. In looking over the list of Rhynchophora perhaps the most striking feature lies in the entire absence of the group Barini.

A perusal of the list of beetles which follows will show that the majority of them extend to the north and east into the Canadian provinces of Ontario and Quebec, since it is, in almost every case, from these parts of the Dominion that the records which are designated in my notes as Canadian, have come. The Michigan records are mostly taken from Hubbard, and refer chiefly to the lower peninsula, especially the region about Detroit. Those from Colorado are almost entirely confined to altitudes of above 6,000 feet, and are

drawn from lists of various writers, chiefly Schwarz, Bowditch, Putnam, Packard, and Cockerell, while the New Jersey ones come from the list of Smith. Dr. Hamilton has lately printed valuable compiled catalogues of Alaskan and circumpolar Coleoptera, which have been used freely and proved very helpful. In addition to the above, all the extensive faunal lists published in this country have been gone over, as well as most of the smaller ones, and nearly all of the monographic or synoptic works of systematists. It is, therefore, hoped that with the addition of many hitherto unpublished data derived from my own collection, a fair idea may be had of the distribution in this country of the species mentioned in this report. It is, however, a most unfortunate fact that there are immense stretches of country, even in thickly-settled districts, from which we have literally no information except shreds scattered through descriptive papers, and every collection of any size must, without doubt, hold much that is new to us in the way of distributional data.

The time for an accurate map of the faunal regions of the continent has not yet come—nor will it before another century at least of careful investigation has enabled us to fix approximately the range of the rarer forms of insect life. It is evident to any one who will read with care and with some understanding of the general principles of distribution, that many of the recent theories as to the division of our country into "life-zones" have very little foundation in fact. If better proof were wanting of this, we might point to that of authors changing from year to year their arbitrary arrangement of our zoögeographical regions—uniting to-day two or three of those of older authors, and separating them again a few months later on. All this may or may not be progress, but it will all have to be gone over again in the light of a wider knowledge than seems to be at present in the possession of certain writers who cannot rest without having first shown us that all previously conceived ideas are totally wrong, and that their explanation of the distribution of life is the only plausible one. A single group of animals may or may not indicate in a general way the lines of distribution followed by a larger number—but it is manifestly unreasonable to hope for a stable method of division of a country into life-zones before the life of that country is well known.

Local lists must form the basis of our work in this line for a long time to come, and in this direction the present report is offered and must here find its only value. For the sake of facilitating a comprehension of the affinities of the Bayfield fauna to certain others I have

made a few comparisons in tabular form which will show the number of genera and species common to their lists. Others might be made with profit, but these are sufficient to show that there is much less of a North-Pacific element in certain parts of the Lake region than might be supposed from a glance at bio-geographical maps, while a very large percentage of forms extend south-east and south. It will be noted that fewer species are common to the Bayfield list and that of Alaska than to Bayfield and Europe. The lists I have used in making the table are as follows. Each has approximately the number of species set opposite the name.

New Jersey, John B. Smith.....2,068
Michigan, lower pen., Henry G. Hubbard and E. A. Schwarz. 1,775
Alaska, compiled list, John Hamilton..... 547
Europe and Asia, compiled list, John Hamilton..... 594
Rocky Mountains, E. A. Schwarz..... 659
Canada (Ont. and Queb.), list issued by the Ent. Soc. of Ontario, with additions chiefly by Harrington and Kilman...2,500
Iowa, lists of Osborn and of my own, with additions from my unpublished records.....1,425

I have selected the list of Mr. Schwarz as being the largest of any of those from the Rocky Mountains, and being approximately of the same extent as my Bayfield catalogue. Of course if a compiled list were used which should include all the known forms from the mountains the number common to the two places would be much increased.

TABLE OF BEETLES.

COMMON TO BAYFIELD AND	SPECIES.	GENERA.
New Jersey.....	436	352
Michigan (Lower Peninsula)...	447	343
Alaska.....	71	139
Europe and Asia.....	92	...
Rocky Mountains (Schwarz list)	106	187
Canada (Ontario and Quebec)..	563	374
Iowa.....	335	303

No claim can be made that this table shows the exact relations of the fauna—the difference in size between the lists precludes even the possibility—but it gives at a glance what is not quite so evident in reading over the following record of the species taken at Bayfield. I have marked with an asterisk those that are not in the Hubbard and

Schwarz catalogue. It is with pleasure that I have to acknowledge the kind assistance of Dr. George H. Horn in making comparisons of specimens in difficult genera with those in his own collection. The identifications of all the species of *Hydroporus*, *Agabus*, and *Amara*, as well as most of those of *Harpalus*, are from him. Mr. Hayward has named the *Bembidia*, while Captain Casey furnished names of two or three Staphylinidæ and of *Anthicus*. The heavy task of looking over the literature of the subject for records has been shared and materially lightened by the ever ready help of my wife.

LIST OF SPECIES.

CICINDELIDÆ.

Cicindela longilabris Say. Can., Alaska (Yukon River), Hud. Bay Terr., Nova Scotia, Wis., Colo., Nebr., Mich., Utah, Mon., Cal., Oregon; the last four localities are for the green form. Mt. Washington, N. H.

Cicindela 6-guttata var, *patruela* Dej. Colo., N. Y., N. J., Pa., Md.; the other varieties occur in the Eastern U. S. generally, especially northward, and as far west as Nebr.

Cicindela purpurea et var. *limbalis* Klug.* Nev., Colo., New Mex., Iowa, N. Y., N. J., Ohio, Ky., Kans. In its many forms, *purpurea* is quite generally distributed in the U. S. and Canada.

Cicindela vulgaris Say. Kans., Nebr., Can., Mt. Wash., N. H., Iowa, Ohio, Vt., N. Y., Wyo., Nova Scotia, N. J., New Mex., Cal., Oreg., B. C., Md., Ky., and "in almost every part of the U. S." (Schaupp.)

Cicindela repanda Dej., et var. *12-guttata* Dej. Can., Mt. Wash., N. H., Iowa, Col., Mich., Ohio, Vt., N. Y., Wyo., Nova Scotia, N. J., Atlantic to Pacific, Hudson's Bay to New Mex. and Ariz.

Cicindela hirticollis Say. New Mex., Ariz., Cal., Kans., Nebr., Can., Iowa, Mich., Vt., N. Y., Fla., N. J., Tex.

CARABIDÆ.

Omophron americanum Dej. Kans., Nebr., Can., Iowa, Colo., (L V.,) Mich., Ohio, N. Y., N. J., New Mex., Va.

Omophron tessellatum Say. Can., Iowa, Ohio, N. Y., N. J., Atlantic Region in general.

Cychrus nitidicollis Chevr.* (var. near brevoorti Lec.) Can. and Maine. The other forms occur from "Hudson's Bay to Northern Virginia."

Cychrus lecontei Dej. Can., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, N. J. This is considered one of the forms of stenostomus which has a range from "Can. and Mich. to N. C."

Nomaretus bilobus Say. Iowa, N. Y., Mo., Ohio.

Calosoma frigidum Kirby. Can., Mt. Wash., N. H., Mich., N. Y., Indiana.

Calosoma calidum Fabr. Colo., Iowa, Kans., Nebr., Can., Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., Mont., New Mex., "U. S. in general."

Elaphrus clairvillei Kirby. Can., Iowa, Mich., N. Y.

Elaphrus ruscarius Say. Can., Iowa, Mich., Ohio, N. Y., Nova Scotia, N. J., Colo.

Blethisa quadricollis Hald. Can., N. J., Ill.

Loricera cærulescens Linn. Can., Alaska, Cal., Mich., Nova Scotia, "Northern U. S. and Europe."

Notiophilus æneus Hbst. Can., Iowa, Mich., N. J., "Northern U. S."

Notiophilus hardyi Putz.* Can., Colo. (9,400–13,000 ft.), Mich., Ohio, Newfoundland, N. Y., Idaho, Mont.

Nebria pallipes Say. Can., Mt. Wash., N. H., Iowa, Mich., N. Y., N. J., Pa., Va.

Dyschirius æneolus Lec. Iowa, Colo. (G., A.), Mich., Can., Cal., B. C.

Dyschirius globulosus Say. Can., Iowa, Ohio, N. Y., Fla., N. J., Idaho, New Mex.

Dyschirius setosus Lec. Can., Mich., N. Y., Mass., Pa

Nomius pygmæus Dej. Can., N. Y., Ga. to Cal., Ala., N. C., Colo., Wash., (Hamilton). Also in Europe.

Bembidium carinula Chaud. Can., Colo. (8,000 ft.), N. Y.

Bembidium coxendix var. *nitidulum* Dej.* Can., Iowa, Ohio, Vt., Colo., N. J.

Bembidium concolor Kirby. Can., N. Y.

Bembidium chalceum Dej. Can., Iowa, Mich., Ohio, N. Y., N. J.

Bembidium nitidum Kirby. Kans., Nebr., B. C., Custer County, Colo., Vt., N. Y., N. J.

Bembidium transversale Dej. Can., Colo., Mich.

Bembidium sp. aff. *variegatum* Say.

Bembidium flavopictum Mots.* Alaska, So. Cal., Baja Cal., Arizona. Region west of Miss. River generally. Can., B. C., Iowa, Ohio, N. Y., Ill.

Bembidium scopulinum Kirby. Can., Mt. Wash., N. H., Vt., Mich.

Bembidium quadrimaculatum Linn.* Nev., Kans., Neb., Can., N. H., Iowa, Mich., Ohio, Vt., N. Y., N. J., Europe, Algeria, Siberia.

Tachys nanus Gyll. Can., Alaska, U. S. generally. Found also in Europe, Asia, and Northern Africa.

Tachys flavicauda Say.* Kans., Nebr., Can., Mich., Iowa, Ohio, Vt., N. Y., Fla., N. J., Pa.

Tachys incurvus Say. Kans., Nebr., Can., Colo. (Custer Co.), Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., New Mex., Texas.

Patrobus longicornis Say. Can., Iowa, Colo. (G., L. V.), Ohio, Vt., N. Y., N. J., Tex., Pa.

Trechus chalybeus Mann. Alaska, B. C., Wash., Ore., Cal., Colo., New Mex., Mich., N. H., Mass., Vt., Labrador, Mont.

Myas cyanescens Dej. Can., Mich., Vt., N. Y., N. J., Pa.

Pterostichus adoxus Say. Can., Iowa, Mich., N. J., N. Y., Ga., Pa., Md., Va., D. C., Wyo.

Pterostichus coracinus Newm. Can., Mt. Wash., N. H., Iowa, Mich., Ohio, Vt., N. J., N. Y., Va., Tenn., Pa., Ill.

Pterostichus mutus Say. Kans , Nebr , Can , Iowa, Mich , Vt , N. J., Pa , Colo.

Pterostichus luczotii Dej. Colo , Oreg., Can , Alaska, B. C., Hud. Bay Terr , Me , N. Y., N. H , Pa , Nebr., Mich., Wyo., New Mex , Labrador, Dak.

Pterostichus patruelis Dej. Can , Alaska, Hud Bay Terr , N. Y , N. H , Pa., Mich , Iowa, N. J., Mont.

Amara lacustris Lec.* Can , Wyo., Colo.

Amara exarata Dej.* Can., Ohio, N. J , "Middle States," Pa., Iowa.

Amara septentrionalis Lec. Lake Superior (Lec), Manitoba

Amara polita Lec. Kans., Nebr., New Mex , Can., Colo. (Ckll.), Ohio, Mont.

Amara obesa Say. N. Y., D. C , Ind., Mich., Mont., Idaho, Hud Bay Ter., Colo., Nebr., Utah, Oreg., Wash , Kans., Can., Iowa, Vt., N. Y., N. J.

Amara musculus Say. Penn., Ohio, Ill., D. C., N. C., Nebr., Arizona, Iowa, Mass., Kans., New Mexico, Can., Colo. (Ckll.), N. J., W. Va.

Diplochila laticollis Lec. Kans., Nebr., Can., Iowa, Mich., N. Y., Fla., N. J., Ill., Ind., Dak.

Badister pulchellus Lec.* Can., Iowa, Mich., N. Y., Ga., Ind., Idaho.

Calathus gregarius Say. Iowa, Kans., Nebr., Can., Mich., Ohio, Vt., N. Y., N. J. to Fla. and Tex.

Calathus impunctatus Say. Can., Mich., N. J., N. Y., Iowa, B. C., Dak.

Platynus decens Say. Can., Mich., N. J., N. Y., S. C., Pa., Ill.

Platynus sinuatus Dej. Can., Mt. Wash., N. H., Iowa, Mich., Ohio, Vt., N. Y., N. J., Oreg., Hud. Bay Regions, Labrador, B. C., Van. Isl., Mont., Idaho.

Platynus tenuicollis Lec. N. J.

Platynus anchomenoides Rand. Can., Vt., N. Y., B. C., Mass., Maine.

Platynus obscurus Herbst.* Can , Iowa, Mich , N. Y., Idaho, Vt., Mass , Ill., Kans., Oreg.

Platynus atratus Lec. Can., N. J., "Eastern and Middle States" (Lec.)

Platynus propinquus G. & H.* Can., N. J., Mass , Nova Scotia.

Platynus affinis Kirby.* Can., Colo. (?) (Ckll.), Mich., N. Y., N. J., Mass.

Platynus carbo Lec. Hud. Bay Region.

Platynus metallescens Lec. Can., N. J., Hud. Bay Ter.

Platynus cupripennis Say. Nev., Cal., Can , N. H., Iowa, New Mex , Colo., (A.,) Mich., N. Y., N. J , Oreg., Mont., Wyo., Wash., Van. Isl.

Platynus excavatus Dej.* Can , Mich., Ohio, N. Y., N. J.

Platynus ferreus Hald.* Can., Mich., Ohio, N. Y., N. J.

Platynus placidus Say.* Colo., New Mex., Can , Iowa, Mich., Ohio, N. Y., N. J., Maine, Dak.

Platynus obsoletus Say. Colo., Can., Alaska, B. C., Hud. Bay Ter., Mich., N. Y., Iowa, Mt Wash , N. H., Vt., Oreg. If this is the same as *bogemanni* Europe and Siberia may be added.

Platynus quadripunctatus De Geer Can., Alaska, Hud. Bay Ter , N. Y., Pa , Mich., Idaho, Colo , Mont , New Mex., Mt. Wash , N. H., Siberia and Europe.

Platynus punctiformis Say.* Kans , Nebr., Tex., Can., Ohio, N. Y., Fla., Miss., N. J., Ga., La., Va.

Platynus picicornis Lec. Jasper House, Alberta.

Platynus ruficornis Lec. Can., Alaska, Iowa, Mt. Wash., N. H., Mich., Ohio, N. Y., N. J.

Platynus retractus Lec.* Can., Mass., Pa.

Platynus picipennis Kirby. Can., Mich., N. Y., N. J., Mass., Kans., Pa.

Olisthopus parmatus Say. Can., Iowa, Mich., Ohio, N. J., Pa., N. Y., Ind., Ga., Minn.

Galerita janus Fabr.* Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Kans., Nebr.

Lebia atriventris Say.* Can., Iowa, Mich., Ohio, N. Y., N. J., Va., Pa., Dak.

Lebia viridis Say. Colo., Tex. (Mex. boundary), Kans., Nebr., Can., Iowa, Ariz., Mich., Ohio, N. Y., Utah, Fla., N. J., Va., "Maine to Oregon and south to Guatemala" (Horn).

Lebia pumila Dej. Kans., Nebr., Can., Mt. Wash., N. H., Iowa, Mich., Ohio, Vt., N. Y., N. J., Maine, Ga.

Lebia fuscata Dej. Can., Mich., Ohio, N. Y., Fla., N. J., Mo.

Lebia furcata Lec. Kans., Nebr., Can., Colo., New Mex., Ohio, N. Y., Fla., Cal., Mo., Idaho, Tex. (Mex. boundary).

Dromius piceus Dej. Can., Iowa, Mich., Ohio, N. Y., N. J., Cal., Mass.

Apristus cordicollis Lec.* N. J., N. Y., Middle States and Can.

Blechrus nigrinus Mann. Can., New Mex., Colo., (Ckll.,) Iowa, Mich., N. J., N. Y., Cal., Van. Isl., Wyo., Dak., Mo.; perhaps the European-Asiatic *glabratus*.

Pinacodera limbata Dej.* Iowa, Mich., Vt., N. Y., N. J.

Cymindis cribricollis Dej. Colo., Oreg., Kans., Nebr., Can., Wash., N. H., Mich., B. C., Newfoundland, N. Mex., Mont., N. Dak., N. W. T., Wyo.

Cymindis borealis Lec.* Vt., North Red River, Nova Scotia.

Chlænius sericeus Forst. Cal., Nev., Kans , Nebr., New Mex., Can., Iowa, Colo., Mich., Ohio, Vt., N. Y., Wyo , N. J. Everywhere in U. S. and Canada; also in Mexico.

Chlænius pennsylvanicus Say. Cal., Nev., Kans., Nebr., N. Mex., Can., Iowa, Colo., Mich., Ohio, N. Y., Fla., N. J., Oreg., Wash., Ariz.

Chlænius tomentosus Say. Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., east of Rocky Mountains generally.

Brachylobus lithophilus Say. Kans., Nebr., Colo., Iowa, Can., Ohio, N. Y., N. J., Tex., Dak., Oreg.

Geopinus incrassatus Dej. Kans., Nebr., New Mex., Can., Iowa, Mich., Ohio, N. Y., N. J.

Agonoderus pallipes Fabr. N. Mex., Tex., Can., Colo., Iowa, Mich., Ohio, Vt., N. Y., N. J., U. S. generally.

Agonoderus partiarius Say. Can., Iowa, Mich., Ohio, N. Y., N. J., U. S. generally.

Harpalus vulpeculus Say.* Can., Ohio, N. J., N. Y.

Harpalus calignosus Fabr.* Ariz., Utah, Kans., Nebr., N. Mex., Can., Iowa, Mich., Ohio, Tex., Vt., N. Y., N. J., So. Dak., Ala.

Harpalus pennsylvanicus De Geer. Kans., Nebr., New Mex., Can., Iowa, Mich., Ohio, Vt., N. Y., Utah, Fla., N. J.

Harpalus fallax Lec.* New Mex., Vt., N. J., Atlantic States, Van. Isl., Wyo., Nev.

Harpalus innocuus Lec. Can., Alaska, N. W. T., Mich., B. C., Wash., Idaho.

Harpalus rufimanus Lec. Can., B. C.

Harpalus lewisii Lec. Can.

Harpalus sp. incog.

Harpalus oblitus Lec. vel sp. aff., determination uncertain. *H. oblitus* is found in Nev., Kans., Nebr., New Mex., Colo. (9,500 ft.), B. C.

Stenolophus fuliginosus Dej. Can., Iowa, Mich., N. J., N. Y., Wash.

Stenolophus conjunctus Say. Can., N. H., Colo., Iowa, Mich., Ohio, N. Y., N. J., "from Atlantic to Pacific" (Lec.)

Stenolophus ochropezus Say. So. Cal., Baja Cal., Ariz., New Mex., Kans., Nebr., Can., Iowa, Mich., Ohio, N. Y., Fla., N. J., Atlantic Region generally. A variety occurs in Kamtschatka.

Tachycellus nigrinus Dej. Can., Alaska, B. C., Queen Charlotte Isl., Cal., Colo.

Anisodactylus rusticus Dej.* Kans., Nebr., New Mex., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "east of Rocky Mts. generally," Colo.

Anisodactylus harrisii Lec. Can., Mich., Ohio, Newfoundland, Pa., Ind.

Anisodactylus discoideus Dej. Can., Iowa, Mich., Ohio, N. Y., N. J., "Pa. to Mo."

Anisodactylus baltimorensis Say. Kans., Nebr., Can., Iowa., Colo., Mich., Ohio, Vt., N. Y., N. J., Atlantic Region generally.

Anisodactylus terminatus Say. Kans., Nebr., Can., Iowa, Mich., N. Y., N. J., Vt., Va., Colo.

Anisodactylus sericeus Harr. Can., Iowa, Mich., Ohio, N. Y., N. J., west to Nebraska.

HALIPLIDÆ.

Haliplus ruficollis De Geer, Laramie, Wyo., Iowa, Col., (7,600–8,000 ft.), Can., Ohio, Vt., N. Y., N. J., Hud. Bay, New Mex., Europe, and Siberia.

DYTISCIDÆ.

Laccophilus maculosus Germ. Eastern U. S. generally, south to Ga., west to Kans., Can., New Mex., (Ulke.)

Bidessus sp. incog. This species I have been unable to identify; and Dr. Horn, to whom it was submitted, remarks that it is different from any in his collection.

Cœlambus impressopunctatus Schall. Can., (north to 55°,) N. Y., Mass., Pa., Mich., Ill., N. J., Wyo., Alaska; also in Siberia and Europe.

Hydroporus dimidiatus G. & H.* Nebr., Kans., Wyo., Tex.

Hydroporus tenebrosus Lec. Can., N. J., B. C., Labrador, Idaho, Mts. of Ariz.

Hydroporus despectus Sharp.* Can.

Hydroporus longiusculus G. & H. Alaska. "Identified by description only, as I have no type," (Horn in litt.)

Hydroporus tartaricus Lec. Colo., (alpine), Hud. Bay Region, Alaska, Mich.; also found in Siberia and Europe.

Hydroporus stagnalis G. & H. Can., Iowa, N. J., Vt.

Hydroporus terminalis Sharp.* Cal.

Ilybius pleuriticus Lec.* Iowa., Pa., N. Y., Colo.

Ilybius angustior Gyll. Alaska, Can., (north to 65°), Labrador, Kans; also in Europe, Lapland.

Ilybius biguttalus Germ. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., Pa., Ga.

Agabus intersectus Cr.* Colo., (Custer Co.,) Cal., Wyo., Utah, Oreg., Ind. Ter.

Agabus stagninus Say.* Can., Ohio, Pa.

Agabus semipunctatus Kirby. Alaska, Can., Mich., Mo., N. Y., Labrador.

Agabus æneolus Cr. Can., Mich., N. Y., Pa., Newfoundland, Labrador, Oreg., Wash.

Agabus confinis Gyll. Alaska, Can., (north to 54°), Vt., Mich., Kans., Hud. Bay. Europe, Siberia.

Agabus anthracinus Mann. Alaska, Can., Hud. Bay Region, B. C., Van. Isl., Mt. Wash., N. H.

Agabus morosus Lec.* Nev., Colo, San Francisco, Cal.

Agabus obsoletus Lec.* San Diego, Cal.

Agabus reticulatus Kirby. Can., Labrador, Mass., N. H., Siberia, Europe.

Agabus nigroæneus Er. B. C., N. W. T.

Rhantus binotatus Harr. Cal., Baja Cal., Hud. Bay Region south through Can., N. H., Mich., N. Y., Utah, N. J., Kans., Nebr., New Mex., Colo., (Ckll.) B. C.; Mexico, Labrador?

Colymbetes longulus Lec.* Can., Kans.

Colymbetes sculptilis Harr. Can., Iowa, Mich., N. Y., B. C., N. J., Nebr., Idaho, Oreg., Cal., Labrador, Wyo., Man., Ill.

Dytiscus verticalis Say. Can., N. J., Pa., Ga.

Acilius mediatus Say.* Iowa, N. Y., Nebr., Pa., Ga.

Graphoderes cinereus Linn. Can., Iowa, Mich., N. J., Pa., N. Y., Ind., Mass., Mo., Cal., Wash., Man., Europe and Siberia.

GYRINIDÆ.

Gyrinus minutus Fabr. Can., Mich., Vt., Labrador, Wash., Oreg.; also in Europe and Siberia.

Gyrinus ventralis Kirby. Can., Iowa, Mich., B. C., N. J., Pa., N. H.

Gyrinus maculiventris Lec. Iowa, Mich., New Mex., N. Y., Mont., Colo.

Gyrinus affinis Aubé. Can., Iowa, Vt., N. J., N. Y., Cal., (Lec.) Labrador, Colo., Mont.

Dineutes assimilis Aubé. Can., Iowa, Mich., Ohio, N. Y., N. J., Kans., Tex.

HYDROPHILIDÆ.

Helophorus lacustris Lec. Can., Colo., (G., A.,) Mich., N. Y., N. J., Mts. of Ariz.

Helophorus inquinatus Mann. Can., Alaska, Van. Isl.

Helophorus tuberculatus Gyll. Can., Alaska, B. C., Mich., N. Y., N. J., Wash.; also Europe and Asia.

Hydrochus squamifer Lec. Can., Iowa, Mich., N. Y.

Ochthebius holmbergi Mann. Cal. to Nev., Colo., Wyo., Can. and Alaska.

Tropisternus lateralis Fabr. Can.; Atlantic Region generally; through Tex. to Mex. and So. Amer; Baja Cal., New Mex.

Tropisternus glaber Herbst. Can. to Fla., and New Mex., Kans., Nebr., Iowa.

Hydrocharis obtusatus Say. Can., Iowa, Mich., Vt., N. Y., N. J., N. H., Idaho.

Laccobius agilis Rand. Kans., Nebr., Iowa, Can., Colo., Mich., Ohio, N. Y., Utah, N. J., Cal., Oreg.

Philhydrus nebulosus Say.* "Can. to Tex.," Ariz., Cal., Baja Cal., Kans., Nebr., Iowa, Mich., Ohio, N. Y., Fla., N. J.

Philhydrus hamiltoni Horn.* N. J., Can., Mass., Northern Cal., Oreg.

Hydrobius globosus Say.* Can., N. Y.. N. J., New England.

Hydrobius fuscipes Linn. Can., Alaska, B. C., N. H., Iowa, Colo., Mich., N. Y., N. J., southward to Colo. Riv.; occurs also in Europe and Siberia.

Creniphilus subcupreus Say. Kans., Nebr., Iowa, Can., Colo., Mich., Ohio, Vt., N. Y., Utah, Fla., N. J., Oreg., Cal., Ariz., Tex., Va.

Cercyon prætextatum Say. Can., Iowa, Mich., Ohio, N. Y., Fla., N. J., Kas., D. C., Utah.

Cercyon ocellatum Say. Mich., Vt., Fla., N. J., Utah, Colo.

Cercyon anale Payk. Iowa, Mich., N. J., Pa., Ill., La.; also in Europe, Algeria, and Siberia.

Cryptopleurum minutum Fabr. Can., Iowa, Mich., Ohio, N. Y., Md., Europe, Siberia, the Amoor country, and Japan.

SILPHIDÆ.

Necrophorus orbicollis Say. Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., Nova Scotia, Fla., N. J.

Necrophorus marginatus Fabr.* Ariz., New Mex., Kans., Nebr., Iowa, Can., Colo., Mich., Ohio, Vt., N. Y., Utah, Nova Scotia, N. J., Cal., So. Dak.

Necrophorus vespilloides Hbst. Can., N. H., Utah, Ariz., Man., Alaska, B. C., Hud. Bay Ter., to Nova Scotia and N. J.; also China, Europe, Siberia.

Necrophorus tomentosus Web.* Kans., Nebr., Iowa, Can., Vt., Mich., Ohio, N. Y., Nova Scotia, N. J., Va., So. Dak.

Silpha surinamensis Fabr. Kans., Nebr., Iowa., Can., Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., Va.

Silpha lapponica Herbst. Alaska, Wash., B. C., Oreg., Can., Colo., New Mex., Nev., Cal., Kans., Nebr., Van. Isl., Labrador, Vt., Mich., Iowa, N. Y., Wyo., Nova Scotia, N. J., Idaho, Utah, Europe and Siberia.

Silpha noveboracensis Forst.* Can., N. H., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., Va.

Silpha americana Linn. New Mex., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va., "Hudson's Bay to Texas and eastward of that line," (Horn.)

Choleva basillaris Say. Kans., Nebr., Can., Alaska, B. C., Cal., Nev. to Colo., White Mts., N. H., Hud. Bay Ter., Ohio, N. J.

Choleva clavicornis Lec.* Can., Iowa, Ohio, N. J., Mich., Tex., Colo.

Choleva terminans Lec. Can., N. J., Mass., Va., Ill.

Ptomaphagus brachyderus Lec.* Mich., Nova Scotia, N. Y.

Colon magnicolle Mäkl. Alaska, Van. Isl., Mich., Pa.

Anisotoma assimilis Lec. N. H., Mich., Can., Colo., Van. Isl.

Liodes blanchardi Horn.* Ohio, Mass.

Liodes basalis Lec. (var.) Can., Iowa, Ohio, Pa., Ill.

Agathidium oniscoides Beauv.* Can., Iowa, Mich., Ohio, N. Y., N. J., Ga.

Agathidium difforme Lec. White Mts., N. H.

SCYDMÆNIDÆ.

Scydmænus sp. incog. A few taken under pine boards along the shore of the lake.

PSELAPHIDÆ.

Batrisus spp. 3. All these came from beneath the loose bark of dead pine logs.

STAPHYLINIDÆ.

Falagria dissecta Er.* N. Y., Iowa, Mich., N. J., Can.

Falagria sp. incog.

Aleochara bimaculata Grav.* Can., N. Y., Colo., Utah, New Mex., Ariz., Iowa, N. J., Man.

Oxypoda sp. incog.

Gyrophæna. Two species were taken in abundance.

Gymnusa brevicollis Payk. Can., Mich., Mass., Europe, and Siberia.

Dinopsis americanus Kraatz. Iowa, Mich., Can.

Acylophorus pronus Er. N. Y., Fla., Mich., N. J., "all over U. S. on both coasts;" also in Can.

Quedius peregrinus Grav.* Ohio, N. J., Iowa, "Can. to the Carolinas," (Horn.)

Quedius sp. incog.

Listotrophus cingulatus Grav.* Can., N. Y., Iowa, Ohio, Mich., N. J., "everywhere east of the Rocky Mts., and in Vancouver." (Horn.)

Creophilus villosus Grav.* N. H., N. Y., Colo., Utah, Iowa, Ohio, Fla., Mich., N. J., "from Alaska southward over our entire territory" (Horn), Europe, Asia, Northern Africa.

Staphylinus fossator Grav.* N. H., Mich., N. J., Ga., Can.

Tympanophorus puncticollis Er. Can.

Philonthus æneus Rossi.* Can., N. Y., Iowa, Ohio, Mich., N. J., Pa., Mass., Nova Scotia, Hud. Bay, Kans., Colo., Alaska, La., Europe and Asia.

Philonthus furvus Nord.* Wash., Colo., "Newfoundland to Vancouver, southward to Mexico," but probably not in the Eastern States.

Philonthus varians Payk.* N. J., Cal., Colo., Ariz., "nearly cosmopolitan." Europe, Asia, Africa.

Philonthus cyanipennis Fabr. Can., N. Y., Iowa, Ohio, Mich., N. J., Ill., east of Mississippi River generally. Europe and Asia.

Philonthus blandus Grav. N. Y., Iowa, Ohio, Mich., N. J., Can. to Va. and Ill.

Actobius sp. incog.

Xantholinus obsidianus Melsh. Can., Iowa, Mich., N. J., N. H.

Xantholinus obscurus Er.* Can., N. Y., Ohio, Mich., N. J., Pa., Utah, Colo., New Mex., to Cal.

Stenus flavicornis Er. Can., N. Y., Iowa, Ohio, Mich., Mass., N. J., Ind.

Stenus femoratus Say.* Mich., Ill., Wash, Can.

Stenus colonus Er.* Mich., Fla., Mass., Cal., Ariz., Can.

Stenus sp. incog.

Euæsthetus sp. incog.

Lathrobium punctulatum Lec. Can., Iowa, Ohio, Fla., Mich., N. J., Kans., Ga., Colo., Mass., varieties in Europe and Asia. *L. terminatum* Grav. is the oldest name.

Lathrobium simplex Lec.* Can., N. Y., Mass.

Lathrobium tenue Lec.* Mich., N. Y., Can., Colo.

Lathrobium collare Er. Iowa, Ohio, Mich., N. J., Can., "Middle States to Vancouver."

Stilicus dentatus Say.* Iowa, Ohio, Mich., N. Y., Mass., Can.

Lithocharis confluens Say. N. H., N. Y., Can., Iowa, Ohio, Mich., N. J.

Pæderus littorarius Grav. N. Y., Iowa, Ohio, Mich., N. J., Can.

Sunius longiusculus Mann.* N. Y., Iowa, Ohio, Mich., N. J., Oreg., Cal., Can.

Tachyporus jocosus Say. N. Y., Iowa, Ohio, Mich., New Mex., N. J., Kans., Ga., Can., Europe and Siberia.

Tachyporus chrysomelinus Linn. N. Y., Iowa, Ohio, Mich., N. J., New Mex., Colo., Kans., Can., Ga., Europe and Asia.

Erchomus ventriculus Say. N. Y., Iowa, Ohio, Can., Fla., Mich., N. J., "everywhere east of Rocky Mts." (Horn.)

Conosoma littoreum Linn. Ohio, Mich., Mass., Nova Scotia, Europe and Siberia.

Conosoma knoxii Lec. Mich., Pa.

Conosoma crassum Grav. N. Y., Iowa, Ohio, Fla., Mich., N. J., Can. to Gulf States.

Boletobius niger Grav.* Ohio, Mich., Pa., Can., Ill.

Boletobius cingulatus Mann. Mich., N. J., Can., Pa., Oreg., B. C., Va., Europe.

Boletobius intrusus Horn. Iowa, Ohio, Can., Mich., N. J., Pa.

Boletobius cincticollis Say. Can., N. Y., Iowa, Ohio, Mich., N. J., Pa., to B. C. and Cal.

Boletobius cinctus Grav. N. Y., Iowa, Ohio, Mich., N. J., "nearly everywhere east of Rocky Mts., and westward to B. C." (Horn.)

Mycetoporus flavicollis Lec. N. Y., Ohio, Mich., Fla. Ga.

Mycetoporus splendidus Grav. Lake Superior Region and B. C., "Pa., Mich., N. H., Colo., Europe, Asia, North Africa."

Platystethus americanus Er. N. Y., Colo., Utah, Iowa, N. J., Cal., B. C., Can.

Oxytelus rugosus Grav.* Mich., N. J., N. Y., Can., Mass., Pa.

Oxytelus fuscipennis Mann. Alaska, B. C., Kans., Ill., Pa., south to Guatemala; Europe and Siberia. The oldest name is *O. laqueatus* Marsh.

Trogophlœus sp. nov.

Trogophlœus sp. incog.

Lesteva pallipes Lec.* Iowa, Ohio, Pa., Ala., Md., Mass., N. H. (Mt. Wash.), Can.

Acidota subcarinata Er. Mich., Mass., Can.

Homalium lapponicum Zett.* Alaska, Can , Colo., Siberia and Europe.

Homalium florale Payk.* Mich., Pa., Oreg., Can., Europe, Asia and North Africa.

Anthobium pothos Mann.* Alaska, B. C., Cal., Oreg., Mt. Wash., (N. H.), Pa., Can.

TRICHOPTERYGIDÆ.

Ptenidium sp. incog.

SCAPHIDIIDÆ.

Scaphidium quadriguttatum Say. Several examples were taken of this species, together with the variety *piceum* Melsh. Kans., Nebr., Tex., Iowa, Can., Mich., Ohio, N Y., N. J., Va., La.

Scaphisoma convexa Say. Can., Iowa, Mich., Ohio, Fla., N. J., "Entire Atlantic Slope, west to the Mississippi" (Casey).

PHALACRIDÆ.

Stilbus apicalis Melsh. Can., Iowa, Colo., Mich., Ohio, N. Y., Fla., N. J., Tex., Cal.

Olibrus pallipes Say.* Kans., Nebr., Dak., Man., B. C., Tex., Pa., N. Y.

CORYLOPHIDÆ.

Orthoperus scutellaris Lec. Colo., N. J., B. C.

COCCINELLIDÆ.

Anisosticta strigata Thunb. Can., Iowa, Mich., N. J., Van. Isl., Ill., Idaho, Hud. Bay, Europe and Siberia.

Hippodamia 5-signata Kirby. Cal., Nev., Can., B. C., N. Y., Kans., Hud. Bay, Man., New Mex., Ariz.

Hippodamia 15-maculata Muls. Mo., Nebr.

Hippodamia convergens Guér.* Cal., Nev., Baja Cal., Ariz., New Mex., Colo., Utah, Can., Nebr., Kans., Iowa, B. C., N. J.

Hippodamia 13-punctata Linn. Cal., Nev., Idaho, B. C., Nebr., Kans., Can , Alaska, "all America north of Mexico," West Indies, Europe, Asia.

Coccinella trifasciata Linn. Can., Alaska, Van. Isl., Hud. Bay., Mich., Colo., New Mex., Wash., Oreg., Cal., Europe and Siberia.

Coccinella 9-notata Herbst. Nev., Colo., New Mex., Kans., Nebr., Can., Alaska, B. C., and Atlantic Region generally into Central America.

Coccinella transversoguttata Fabr. Nev., Cal., Colo., New Mex., Can., Nebr., N. H., Alaska, B. C., Hud. Bay., Greenland, Mich., Iowa, Kans., Rocky Mts. to Mts. of Mex., Siberia, Japan, China, and Europe.

Coccinella sanguinea Linn. U. S. and Can. generally, Baja Cal., West Indies, Europe.

Adalia bipunctata Linn.* Nebr., Kans., Iowa, Can., Mich., Vt., Ohio, N. Y., N. J., Nova Scotia, New Mex., Ariz., B. C., N. H., Europe, Siberia.

Harmonia picta Rand. Colo., Can., Mt. Wash., (N. H.), N. Y., Wyo., N. J., Oreg., Hud. Bay, Nova Scotia, Mexico, Pa., New Mex., Van. Isl.

Harmonia 14-guttata Linn. Can., Minn., New England, Mich., Europe and Siberia.

Anatis 15-punctata Oliv. Can., Iowa, Mich., Ohio, N. Y., Nova Scotia, N. J., West Indies, Europe, Siberia. Said to be *A. ocellata* Linn., which is the older name.

Psyllobora 20-maculata Say.* Eastern U. S. and Can. generally. Replaced in the West (from Oreg. to Baja Cal.) by *tædata* which may be a varietal form.

Chilocorus bivulnerulus Muls. Can., Iowa, Mich., Ohio, N. Y., Vt., Fla., N. J., Kans., New Mex.

Brachyacantha ursina, var. *10-pustulata* Melsh. Nebr., Kans., Iowa, Can., Colo., Mich., Ohio, Vt., N. Y., N. J., Tex.

Hyperaspis signata Oliv. Can., Mt. Wash., (N. H.), Iowa, Vt., Mich., Ohio, N. Y., N. J., Ill., Ga., Nebr.

Hyperaspis 4-vittata Lec.* Kans., Nebr., New Mex., Ill., Cal.

Scymnus tenebrosus Muls.* Mass. to N. C., Ohio.

Scymnus sp. incog.

ENDOMYCHIDÆ.

Lycoperdina ferruginea Lec. Can., Colo., (Ckll.,) Iowa, Mich., Ohio, N. Y., N. J., "Middle and Southern States."

Aphorista vittata Fabr. Can., Iowa, Mich., Ohio, N. Y., N. J., Vt., "Middle and Southern States."

Mycetina perpulchra Newm. Can., Mich., Ohio, N. Y., N. J., Mo., "Southern States."

EROTYLIDÆ.

Tritoma humeralis Fabr.* Can., Mich., Ohio, N. Y., N. J., Pa., Ill., Iowa, Mo.

Tritoma thoracica Say. Can., Iowa, Mich., Ohio, Vt., N. Y., Fla , N. J., Hud. Bay, Ill., Va., Wash., Ga., Tex.

COLYDIIDÆ.

Cerylon castaneum Say. Kans., Nebr., Iowa, Can., Mich., Vt., Ohio, N. Y., N. J., "Atlantic to Pacific, Hudson's Bay to Texas." (Horn.)

CUCUJIDÆ.

Silvanus bidentatus Fabr.* Can., Iowa, Ohio, Fla., N. J. Cosmopolitan.

Silvanus planatus Germ.* Kans., Nebr., Can., Iowa, Ohio, N. J., N. Y., Cal.

Pediacus fuscus Er. Can., Alaska, B. C., Van. Isl., Mich., Nev., Nebr., Colo., New Mex., Siberia and Europe. Cosmopolitan.

Læmophlœus fasciatus Melsh.* Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J.

CRYPTOPHAGIDÆ.

Antherophagus ochraceus Melsh.* Can., Iowa, Mich., N. Y., Ohio, Colo., N. J., Va.

Henoticus serratus Gyll. Can., Alaska, B. C., N. H., south to Va., Colo., So. Cal., Mich. Also found on the Amoor River (Asia) and in Europe.

Atomaria ephippiata Zimm. Can., Iowa, Mich., Ohio, N. Y., N. J.

Cryptophagus sp. incog.

MYCETOPHAGIDÆ.

Mycetophagus flexuosus Say. Can., Iowa, Mich., Ohio, N. Y., N. J., Vt., Ind., Ala., Va.

Litargus didesmus Say.* Iowa, Mich., Ohio, N. J., "Middle and Southern States."

Litargus tetraspilotus Lec. Can., Iowa, Mich., Ohio, N. Y., Fla.

DERMESTIDÆ.

Byturus unicolor Say.* Can., Mt. Wash., (N. H.), Iowa, Ohio, Vt., N. Y., N. J.

Anthrenus musæorum Linn.* Can., Iowa, Mich., Ohio, Vt., N. J., Europe and Siberia.

Orphilus glabratus Fabr.* Can., Iowa, Mich., Ohio, N. Y., Utah, Cal., Fla., N. J., Va., Europe and Asia.

HISTERIDÆ.

Hister fœdatus Lec.* Can., Mich., Vt., N. Y., "Can. to Ga. and westward to Vancouver and Oreg." (Horn.)

Hister abbreviatus Fabr. Kans., Nebr., Can., Colo., Iowa, Ohio, Mich., N. Y., Fla., N. J., Ga., Mont.

Hister depurator Say. Kans., Nebr., Can., Colo., (Ckll.,) Iowa, Mich., Vt., N. Y., Fla., N. J.

Hister furtivus Lec.* Can., Iowa., Mich., N. Y., N. J. to Ga.

Hister bimaculatus Linn.* Can., Iowa, Mich., Vt., N. Y., N. J., Europe.

Hister americanus Payk. Kans., Nebr., Can., Iowa, Mich., Vt., Ohio, N. Y., Fla., N. J., Ga., Ill.

Saprinus lugens Er.* Oreg. eastward to Colo., Kans., south to Tex., Ariz., Baja Cal.; Ohio.

Saprinus pensylvanicus Payk. Can., Iowa, New Mex., Colo., N. J., N. Y., "everywhere in U. S. east of Rocky Mts." (Horn.)

Saprinus oregonensis Lec. Oreg., Cal., Baja Cal., Can., Colo., (Ckll.,) Utah, New Mex., Wyo., Ariz.

Saprinus sphæroides Lec. Mich., N. J., "Middle States and Canada," (Horn.)

Saprinus fraternus Say. Can., Colo., (8,000 ft.,) Mich., N. Y., Ohio, N. J., Mass., R. I.

Plegaderus sayi Mars. Can., Colo., (9,400 ft.,) "Middle States." (Horn.)

NITIDULIDÆ.

Carpophilus niger Say.* Can., Mich., Ohio, N. Y., N. J., Cal., Ariz.

Carpophilus brachypterus Say. Can., Mich., Ohio, N. Y., N. J., Pa., Cal.

Colastus truncatus Rand. Can., Iowa, Mich., Ohio, Fla., N. J., Tex., Cal.

Conotelus obscurus Er.* Can., Iowa, N. Y., Ohio, Vt., Fla., N. J.

Epuræa immunda Sturm. Mich., "Alaska to Mass.," Europe. Dr. Hamilton replaces the name by *terminalis* Mann.

Epuræa avara Rand.* Mich., Ohio, N. J., "all over U. S. and Can." (Horn.)

Epuræa truncatella Mann. Can., Alaska, B. C., Wash., Colo., Cal., New Mex., Mich.

Epuræa erichsonii Reitt. (?) Doubtfully recorded from Colo., (9,400 ft.) Found in Mich., Ohio, "Can. to Ga." (Horn.)

Phenolia grossa Fabr.* Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., N. J., Va., Tex.

Omosita colon Linn.* Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., Fla., N. J., Europe.

Cyllodes biplagiatus Lec. Mich., N. Y., Mass.

Ips fasciatus Oliv. Kans., Nebr., Can., N. H., Iowa, Mich., Vt., Ohio, N. Y., N. J., Van. Isl., "entire region east of the Rocky Mts." (Horn.) Also in Europe (*4-guttatus* Fabr.), Hamilton.

Rhizophagus scalpturatus Mann.* Alaska, Van. Isl., Nev., N. Y., Colo.

LATHRIDIIDÆ.

Lathridius. Several species. These have not been studied lately and the identification of North American species is a matter of much uncertainty.

Corticaria. The species of *Corticaria* are now in confusion. A few were taken more or less abundantly.

TROGOSITIDÆ.

Tenebrioides collaris Sturm. Ga., Can., Mich., N. J.

Peltis ferruginea Linn. Can., Vt., Maine, Pa., Hud. Bay., Cal., Oreg.; also Europe and Siberia.

Thymalus fulgidus Er. Can., Iowa, Mich., Vt., N. Y., N. J.

Monotoma picipes Herbst.* N. J., "Middle States to Tex. and Cal., probably introduced from Europe."

BYRRHIDÆ.

Pedilophorus subcanus Lec. Wash.

Cytilus trivittatus Melsh. Can., Mich., Northern U. S.

Byrrhus americanus Lec. Can., Colo., (9,400 ft ,) Mich., Vt., N. Y., N. J., Labrador.

Byrrhus cyclophorus Kirby. Can., Alaska, Hud. Bay, Mich., B. C., Colo., N. Y.

PARNIDÆ.

Helichus striatus Lec. Can., Cal., Ariz., New Mex., Colo., Vt., Iowa, N. Y., N. J.

HETEROCERIDÆ.

Heterocerus undatus Melsh., et var. *substriatus* Kies. Can., Iowa, Ohio, N. J., to Wyo. and southward.

DASCYLLIDÆ.

Eucinetus terminalis Lec Several specimens taken in slime-moulds of the genus *Stemonitis*. Can , Colo, (Ckll.,) Iowa, Mich., Ohio, N. Y.; N. J., Vt., Ill.

Cyphon obscurus Guér.* Can., Iowa, Ga.

Cyphon variabilis Thunb. Can., Alaska, Van. Isl., Hud. Bay, south to Fla. and Tex.; also occurs in Europe, Asia and Algeria.

ELATERIDÆ.

Deltometopus amœnicornis Say. Pa., N. Y., Ohio, Ind., Iowa, Can., Mich., Vt., Fla., N. J.

Dromæolus harringtoni Horn.* Can., N. H., N. Y.

Fornax orchesides Newm.* N. Y., Can., Iowa, Ohio, Vt., New England.

Adelocera aurorata Say. N. H., Can., Iowa, Mich., Ohio, N. Y.

Adelocera brevicornis Lec. Lake Superior, Can.

Cardiophorus convexulus Lec. Maine, Can., Colo., Utah, (9,500 ft.,) Mich., Ohio, Vt., White Mts., (N. H.), Mass.

Cryptohypnus bicolor Esch. Considered a small form of *nocturnus*. Alaska, Oreg., Hud. Bay, Dak., Idaho, Utah, Mont., Colo., New Mex., Can., Labrador, N. H., Northern Asia.

Cryptohypnus abbreviatus Say. Nova Scotia, Can., N. Y., Pa., Mass., to Oreg. and Alaska; Mich.

Elater hepaticus Melsh.* Pa., Vt., Can., Ohio, N. J., "Middle and Western States" (Lec.).

Elater pedalis Germ. Pa., N. Y., Can., Mt. Wash., (N. H.), Vt., Ohio, N. J., Mich., B. C.

Elater rubricus Say. N. Y., N. H., Va., Can., Iowa, Mich., N. J.

Elater apicatus Say. Can., Northern U. S. generally, Mt. Wash., (N. H.), Mich., Vt., N. Y. to Colo., Wash., Cal., Oreg.

Elater obliquus Say.* N. Y., Pa., Iowa, Can., Mich., Ohio, N. J., Ill., Ga.

Megapenthes stigmosus Lec. Cal., Oreg., B. C., Alaska, Can., Colo., Wash.

Megapenthes rogersi Horn.* Canada.

Agriotes stabilis Lec. Lake Superior, Can., Mich., N. Y.

Agriotes fucosus Lec. Vt., Can., Mich., N. Y., "North-eastern States through Can., Hud. Bay Ter., B. C., Oreg., Cal." (Lec.).

Agriotes pubescens Melsh. Pa., Iowa, Can., Mich., N. Y., N. J., Ohio.

Agriotes limosus Lec. Lake Superior, Can., Mt. Wash., (N. H.), Newfoundland.

Dolopius lateralis Esch. Cal., Nev., Baja Cal., Arizona, Kans., Nebr., B. C., Van. Isl., Can., Iowa, Colo., Tex., Ark., Atlantic States generally. Very variable.

Melanotus scrobicollis Lec. N. Y., Pa., Can., Mich. Synonymous with the following species, according to Dr. Hamilton.

Melanotus castanipes Payk. Can., Mich., Ohio, Vt., Colo., Pa., N. Y., N. H.; also in Europe and Siberia.

Melanotus communis Gyll. Kans., Nebr., Can., Cal.; common over most of the region east of the Missouri River.

Limonius plebejus Say.* N. Y., Pa., Can., Mich., N. J.

Limonius æger Lec. Described from Lake Superior specimens. Can., N. J.

Campylus denticornis Kirby. Maine, Pa., Can., Mt. Wash., (N. H.), Mich., Ohio.

Athous rufifrons Rand. N. Y., Pa., Can., Mich., Ohio.

Corymbites virens Sch. Maine, Can., north to 65°, Mt. Wash., (N. H.), Mich., Man., Northern Asia.

Corymbites resplendens Esch. Maine, N. H., Newfoundland, Alaska, Queen Charlotte Isl., Vt., Mich.

Corymbites spinosus Lec. Lake Superior, Can., Mt. Wash., (N. H.), Iowa.

Corymbites falsificus Lec. Canada.

Corymbites medianus Germ. Can., Mt. Wash., (N. H.), N. Y.

Corymbites triundulatus Rand. Maine, Can., Mt. Wash., (N.H.), Colo., (8,000 ft.,) Vt.

Corymbites hamatus Say. N. J., Can., Vt., N. Y.

Corymbites propola Lec. N. Y., B. C., Can., Mt. Wash., (N.H.), Vermont.

Corymbites hieroglyphicus Say. Ohio, Maine, Can., Mt. Wash., (N. H.), Iowa, Mich., Vt., N. Y., Nova Scotia, N. J.

Corymbites æripennis Kirby. Maine, N. H., Can., B. C., Oreg., Idaho, Van. Isl., Colo., (Red Cliff, Veta Pass), N. Y., Nova Scotia.

Corymbites aratus Lec. Lake Superior, Can.

Corymbites metallicus Payk. Lake Superior, Can., Iowa, Colo., (8,000–9,400 ft.,) Mich., N. J., Mass., Europe and Siberia. Dr. Hamilton calls it *nigricornis* Payk.

Asaphes indistinctus Lec.* The determination is by Dr. Horn. Ohio, N. C., Georgia.

Asaphes memnonius Herbst.* Maine, Ohio, Iowa, Ala., Can., Pa., Mich., N. Y., Nova Scotia, N. J., Colo.

THROSCIDÆ.

Throscus punctatus Bonv. Canada to Georgia.

Throscus constrictor Say. Middle and Southern States and Canada. These two species have lately been referred to *Aulonothroscus* by Dr. Horn.

BUPRESTIDÆ.

Chalcophora virginiensis Drury. Can., Colo., (Ckll.,) Mich., N. Y., Nova Scotia, Fla., N. J., Mass., Va. Perhaps the European *C. mariana* may be the same, (cf. Hamilton t. c.).

Dicerca prolongata Lec. Kans., Nebr., Can., Colo., (Ckll.,) N. J., Mass., N. H.

Dicerca divaricata Say. Can., Iowa, Mich., Ohio, N. Y., N. J., Vt., Mass., N. H.

Dicerca tenebrosa Kirby. Can., Mass., N. H.

Dicerca tuberculata Chevr. Can., N. H., Mass.

Dicerca punctulata Sch.* N. Y., N. J., Mass.

Pœcilonota cyanipes Say.* Kans., Nebr., Colo., Can., Mass., Iowa, Mich., N. Y., N. J.

Buprestis nuttalli Kirby. Can., N. J., Mass.

Buprestis maculiventris Say. Kans., Nebr., Can., Mt. Wash., (N. H.), Colo., (Ckll.,) Mich., Vt., N. Y., Utah, Mass.

Buprestis fasciata Fabr. Canada, North-eastern U. S. generally. The variety *langii* is found in Alaska, B. C. and the mountains of the Western States.

Buprestis striata Fabr. Can., Pa., Mich., N. Y., N. J., Mass.

Melanophila longipes Say. Can., Alaska, Van. Isl., Hud. Bay, south to Va., Ky., New Mex. and So. Cal. If this is *appendiculata* Fabr., add also Siberia, China and Europe.

Melanophila drummondi Kirby.* Maine to Alaska, Cal., New Mex. Dr. Hamilton calls it *guttulata* Gebl., which is known from Northern Asia.

Melanophila æneola Melsh. Can., Middle and Southern States.

Chrysobothris femorata Fabr. "Can., all the U. S., extending into Mex." (Horn).

Chrysobothris dentipes Germ. Can., Mt. Wash., (N. H.), Iowa, Mich., "all the States east of the Mississippi and from Missouri westward to Oregon," (Horn).

Chrysobothris scabripennis Lap. and Gory. Can., N. Y., Mt. Wash., (N. H.).

Agrilus otiosus Say.* Canada and New England, west to Kans., south to Tex. (Horn).

Agrilus bilineatus Web. Maine, west to Rocky Mountains, south to Texas. (Horn).

Agrilus granulatus Say.* New England to Missouri.

Agrilus anxius Gory. Mass. and N. H., west to Colo.

Agrilus politus Say. Can. and New England, west to the Pacific Coast, Kans., Colo., New Mex., Ariz., Nev., Cal., on Atlantic Coast south to Maryland and the Ohio River (Horn).

LAMPYRIDÆ.

Celetes basalis Lec. Can., Mt. Wash., (N. H.), N. Y., Fla., N. J., "Atlantic Region."

Cænia dimidiata Fabr. Can., N. Y., N. J., "Atlantic Region." (Lec.).

Eros thoracicus Rand. Can., Iowa, Mich., Ohio, N. J., Maine.

Eros aurora Herbst. Can., Alaska, Oreg., Hud. Bay, Eastern U. S. south to Ga. and Miss., Colo., (Ckll.,) Iowa, Ohio, N. J.; also in Europe, Siberia, North Africa.

Eros sculptilis Say.* Can., Mt. Wash., (N. H.), Mich., Ohio, N. Y., "Southern States," (Lec.).

Eros humeralis Fabr. Can., Mich., Vt., N. Y., "Atlantic Slope." (Lec.).

Eros crenatus Germ. Can., Vt., N. Y., Maine.

Plateros canaliculatus Say.* Can., Iowa, N. Y., Fla., N. J., Pa.

Calochromus perfaceta Say. Can., Ohio, Vt., N. Y., N. J., Va., "Atlantic Region" (Lec.).

Lucidota atra Fabr. Can., Mt. Wash., (N. H.), Iowa, Ohio, Vt., Mich., N. Y., Fla., N. J., Ga.

Ellychnia corrusca Linn. Kans., Nebr., Can., Mt. Wash., (N. H.), Colo., (Ckll.,) Iowa, Mich., Ohio, N. Y., Nova Scotia, Va., N. J., Hud. Bay.

Pyropyga fenestralis Melsh.* Pa. (?), Cal., Colo.

Pyractomena borealis Rand. Can., Colo., (Ckll.,) Mich., Ohio, N. Y., Maine, Mass., Tex., Mont.

Photinus ardens Lec. Can., Mich., N. Y., Mass., Kans.

Lamprohiza inaccensa Lec. Mich.

Photuris pensylvanica De Geer. Kans., Nebr., Tex., Can., Iowa, Mich., Ohio, N. Y., Nova Scotia, Fla., N. J.

Podabrus nothoides Lec.* Can., Mass.

Podabrus diadema Fabr. Can., Mt. Wash., (N. H.), Iowa, Vt., Mich., N. Y., N. J., "Atlantic Region."

Podabrus modestus Say. Can., Iowa, Mich., Ohio, N. Y., Pa., N. J., Ga.

Podabrus punctatus Lec. Can., Iowa, Pa.

Telephorus fraxini Say. Can., Alaska, "Sitka to New Mex.," (Hamilton), "Hudson's Bay, southward to Virginia," Colo., Ohio, Vt., N. Y., N. J., Labrador.

Telephorus lineola Fabr. Can., Iowa, Mich., Ohio, N. Y., N. J., Tex., Fla.

Telephorus rectus Melsh. Can., Iowa, Mich., N. Y., N. J., Ill., Fla., Pa.

Telephorus flavipes var. *dichrous* Lec. Kans., Nebr., Can., Ohio, Mich., N. Y., N. J., Ill., Tex.

Telephorus rotundicollis Say. Can., Mich., Vt., N. Y., N. J., Va., Ill.

Telephorus curtisii Kirby. Mt. Wash., (N. H.), Iowa, B. C., Hud. Bay.

Malthodes fuliginosus Lec.* Mt. Wash., (N. H.).

MALACHIDÆ.

Collops vittatus Say. Baja Cal., Ariz., New Mex., Colo., Tex., Mex. boundary, Nev., Cal., Can., Mich., Wyo.

Anthocomus erichsoni Lec. Can., Mich., Ohio, N. Y., "Middle States."

Pseudebæus oblitus Lec.* Can., Mich., Fla., N. Y., N. J., Ga.

Attalus morulus Lec.* Colo., (7,600–8,000 ft.,) Mich., Ohio, Vt., Fla., N. J., Kans., D. C.

CLERIDÆ.

Trichodes nuttalli Kirby.* Kans., Nebr., Iowa, Can., Mich., Vt., N. Y.

Clerus quadriguttatus Oliv. Can., Iowa, Colo., Mich., Ohio, N. Y., N. J.

Clerus ichneumoneus Fabr.* Can., Ohio, Pa., Fla.

Thanasimus trifasciatus Say.* Can., N. Y.

Thanasimus undatulus Say. var. *nubilus* Klug. Can., N. W. T., Alaska, N. H., Mich., Kans., Colo., (9,500–11,500 ft.,) New Mex., Vt., N. Y.

Chariessa pilosa Forst.* Kans., Nebr., Mo., Iowa, Can., N. Y., Ohio, Fla.

PTINIDÆ.

Ptinus quadrimaculatus Melsh.* Pa., Iowa.

Hadrobregmus pumilus Lec.* N. J., Can.

Xyletinus lugubris Lec.* Mich., Can.

Dorcatoma setulosum Lec.* Pa., Ga., N. C., Lake Superior, Ohio, Mich., N. J., Can.

Dorcatoma pallicorne Lec. Mt. Wash., (N. H.), Mich., Can.

Ptilinus ruficornis Say. Iowa, Fla., N. Y., Ohio, Mich., N. J., Canada.

Dinoderus porcatus Lec.* N. Y., Fla., N. J., Can.

CIOIDÆ.

Cis sp. incog.

LUCANIDÆ.

Platycerus quercus Web. Kans., Nebr., Can., Iowa, Mich., Vt., Ohio, N. Y., N. J., Pa., N. C., D. C.

Platycerus depressus Lec. Can., Mt. Wash., (N. H.), Mich., N. Y., Dak., Colo., Hud. Bay Region.

Ceruchus piceus Web. Can., Iowa, Mich., Ohio, N. Y., N. J., Pa., D. C., Va.

Nicagus obscurus Lec.* Can., Ind., Mich., N. Y., N. J.

SCARABÆIDÆ.

Onthophagus hecate Panz.* Kans., Nebr., Iowa, Mich., Tex., New Mex., Can., Ohio, Vt., N. Y., Fla., N. J., Va., entire region east of Rocky Mountains, (Horn).

Atænius imbricatus Melsh.* Mich., Fla., N. J., "Mass. to Tex.;" also from Mexico to Brazil and West Indies.

Aphodius hamatus Say. Canada, Maine to Oregon; mountains from New Mexico to Hudson's Bay.

Aphodius fimetarius Linn.* Can., Eastern U. S. generally, Iowa, Kans., Mich.; introduced from Europe.

Aphodius granarius Linn. U. S. and Canada generally, Baja Cal., British Columbia, Europe.

Geotrupes blackburnii Fabr.* Can., Mich., Ohio, N. Y., N. J.

Hoplia trifasciata Say. Can., Mich., Vt., Pa., N. Y., N. J.

Dichelonycha subvittata Lec. Can., Iowa, Ohio, Vt., N. Y.

Dichelonycha albicollis Burm. Can., Mich., N. Y., N. J.

Serica vespertina Gyll. Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, Fla., N. J.

Serica sericea Ill. Kans., Nebr., Can., Iowa, Mich., Ohio, Va., N. Y., N. J.

Diplotaxis sordida Say. Can., Mich., N. J.

Diplotaxis tristis Kirby.* Baja Cal., Texas, Colo., Can.

Lachnosterna grandis Smith.* Nova Scotia to D. C., Ga., Texas, Iowa, Nebr., Wis., Can.

Lachnosterna hirticula Knoch.* Nebr., to N. C., north to Can.

Cotalpa lanigera Linn. Can., Iowa, Mich., Ohio, N. Y., N. J.

Aphonus tridentatus Say.* Kans., Nebr., New Mex., Can., Ohio, Iowa.

Trichius affinis Gory. Can., Mt. Wash., (N. H.), Iowa, Mich., Ohio, N. Y., Colo., Nova Scotia, N. J., Va.

CERAMBYCIDÆ.

Tragosoma harrisii Lec. Can., Colo., (Ckll.,) Ariz., (7,000 ft.,) Mich., "Newfoundland to Vancouver Island and through the Rocky Mountains into New Mexico," Vt., N. Y., N. J.; placed by Hamilton as a synonym of *depsarium* Linn., which has a European and Asiatic distribution.

Asemum mœstum Hald. Pa., Mass., Can., Alaska, B. C., N. Y., New England, the Eastern U. S. to Fla., west to La., and New Mex.; Iowa, Colo., (9,400 ft.,) Ohio, N. J.

Criocephalus agrestis Kirby. New Mex., Colo., Ariz., Kans., Nebr., Md., Va., Can., Vt., N. Y., Nova Scotia, N. J.

Tetropium cinnamopterum Kirby. Can., Alaska, B. C., Wash., Oreg., Cal., N. W. T., south to N. J. and Pa.; Mountains of Arizona, Vt.

Physocnemum brevilineum Say.* Kans., Nebr., Ark., Pa., Can., Iowa, Mich., N. Y., N. J.

Merium proteum Kirby. Can., Alaska, B. C., Hud. Bay, Pa., Colo.

Callidium antennatum Newm.* Can., Colo., Ohio, N. Y., N. J.

Elaphidion parallelum Newm. Can., Iowa, Mich., Ohio, N. Y., Fla., N. J.

Tylonotus bimaculatus Hald.* Pa., Can., Iowa, Ohio, N. Y., N. J.

Callimoxys sanguinicollis Oliv.* Can., Iowa, Ohio, N. Y., "U. S. east of Rocky Mountains."

Purpuricenus humeralis Fabr.* Kans., Nebr., Pa., Mass., Can., Iowa, N. J., Ohio, Mo., N. Y., Texas, Va.

Plagionotus speciosus Say. Mass., Can., Iowa, Vt., N. Y., Pa., N. J., Maine.

Calloides nobilis Say. Ariz., Can., N. H., Iowa, Mich., N. Y., Utah, N. J.

Arhopalus fulminans Fabr. Can., Iowa, Mich., Ohio, N. Y., N. J.

Xylotrechus colonus Fabr. Can., N. H., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "U. S. east of Rocky Mountains."

Xylotrechus sagittatus Germ.* New Mex., Can., Mich., N. Y., N. J., Ga., Fla., Pa., Mass., Ariz.

Xylotrechus undulatus Say. et var's. *lunulatus* Kirby, *interruptus* Lap. Kans., Nebr., N. W. T., Can., N. H., Iowa, Mich., N. J., Colo., N. Y., B. C.

Xylotrechus annosus Say. Idaho, Colo., Van. Isl., Mo., Mont., Cal., Texas, Maine, N. H.

Neoclytus muricatulus Kirby. Can., Colo., (Ckll.,) N. Y., Cal., N. H., Utah, Wyo., Hud. Bay, Mass., Va., Maine, La.

Neoclytus erythrocephalus Fabr.* Kans., Nebr., Texas, Iowa, N. C., Va., Pa., Mass., Can., Mich., Ohio, Vt., N. Y., N. H., N. J., La., Del., Ga. Accidentally imported into Europe.

Clytanthus ruricola Oliv. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., Va., Ill.

Cyrtophorus verrucosus Oliv.* Mass., Pa., N. C., Can., Mich., N. Y., N. J., S. C., Ga.

Desmocerus palliatus Forst.* Mass., Can., Iowa, Mich., N. Y., N. J., La., N. C., Conn., Va.

Rhagium lineatum Oliv. Colo., Ariz., New Mex., Can., Alaska, Queen Charlotte Isl., Atlantic district south to Florida in pine regions; Mts. of Arizona. Varieties occur in Europe and Asia.

Centrodera decolorata Harr. Can., Mich., N. Y., N. J., Mass.

Pachyta monticola Rand. Can., Alaska, Maine, N. Y., Pa., Mt. Wash., (N. H.), Vt., Mass., Anticosti Isl.

Acmæops proteus Kirby. Can., Mt. Wash., (N. H.), B. C., N. Y., Colo., (8,000–9,400 ft.,) Hud. Bay, Oreg., Mont., Kans., New Mex., Mass., Labrador.

Acmæops pratensis Laich. Can., Alaska, B. C., Alberta, through Rocky Mts. to Colo. and New Mex.; Wyo., Mich., Maine, Utah, Mont., Oreg., Siberia, China, Europe.

Gaurotes cyanipennis Say. Ark., Mass., Ky., Mich., Can., Mt. Wash., (N. H.), Iowa, Ohio, Vt., N. Y., N. J., Pa., Va., N. C.

Bellamira scalaris Say. Can., Mich., N. Y., N. J., N. H., Md., Pa., Va., La.

Typocerus velutinus Oliv.* Can., Iowa, Mich., Ohio, Vt., Fla., N. Y., N. J., Ga., Va., Pa., N. H., Dak., Ind. Ter., La., Maine.

Leptura plebeja Rand. Can., Mt. Wash., (N. H.), N. J., Mich., N. C., Maine.

Leptura subhamata Rand. Can., N. Y., N. H., Mich., N. J., Pa., Va., N. C., Ill., Mass.

Leptura lineola Say. Mass., N. Y., Pa., N. C., Miss., Can., Ohio, Vt., N. J., Va., Texas, Md., N. H.

Leptura americana Hald.* Pa., Iowa, Ohio, N. Y., Ind. Ter., Ga.

Leptura subargentata Kirby. Can., B. C., Alaska, Van. Isl., Wash., Cal., Mont., Nev., Colo., New Mex., Mich., Hud. Bay, N. Y., Mass., N. H., Utah, Ga.

Leptura nitens Forst.* Mass., Can., Iowa, Mich., N. Y., N. J., Pa., N. C., Ill., Texas, Ga.

Leptura sexmaculata Linn. Can., Mt. Wash., (N. H.), Mich., Colo., Van. Isl., Hud. Bay. Also in Europe and Siberia.

Leptura nigrella Say. Can., Hud. Bay, Mich., Wash., New Mex., Nev., Colo., Ga., Maine.

Leptura canadensis Fabr. New Mex., Kans., Nebr., Mass., Pa., Can., N. H., Colo., (Ckll.,) N. Idaho, Vt., N. Y., Nova Scotia, Mich., Va., Van. Isl., Mo., Ga., Oreg.; probably the same species occurs also in Europe and Asia.

Leptura rubrica Say. Kans., Nebr., Can., Iowa, Mich., N. Y., N. J., Mass., Va., Ga., Ill., Pa., Colo.

Leptura vagans Oliv. Can., N. Y., N. J., N. H., Mass., Maine, Pa., Va., N. C., Ga., Mich.

Leptura sanguinea Lec. Can., Colo., (9,400 ft.,) Wash., Cal., Van. Isl., New Mex., Nev., Mich., N. H., Oreg.

Leptura chrysocoma Kirby. New Mex., Wash., Colo., (Ckll.,) Can., Utah, Nova Scotia, Hud. Bay, Mich., Idaho, Maine, Van. Isl., N. Y., Oreg., Cal., Nev., N. H.

Leptura proxima Say. Can., Iowa, Mich., Vt., N. Y., N. J., N. H., Va., Ga., Ohio, Mo., Ill., Mass., Pa.

Leptura octonotata Say.* Can., N. Y., N. J., Mass., Pa., Va., Ala., Miss., Ill.

Leptura pedalis Lec. Mt. Wash., (N. H.), Mich., Anticosti Isl.

Leptura vittata Germ. Mass., Ala., Can., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., N. H., Pa., Va., Ga., Ill., La., Maine.

Leptura pubera Say. Pa., Can., Iowa, N. J., N. H., Va., Mass., Ill., Ga., N. Y.

Leptura ruficollis var. *sphæricollis* Say. Can., Mt. Wash., (N.H.), Mich., Ohio, N. Y., Mass., Ky., Pa., Maine.

Leptura vibex Newm. Can., Mt. Wash., (N.H.), Mich., N. Y., Ohio, Conn., Pa., W. Va.

Leptura mutabilis Newm., et var. *luridipennis* Hald. Can., Mt. Wash., (N. H.), N. Y., Mass., N. J., Pa., Mich.

Monohammus titillator Fabr.* Ohio, N. Y., Fla., N. J., "Can. to Wash., and south to Fla." (Horn).

Monohammus scutellatus Say. New Mex., Alaska, (Yukon), B. C., Can., Van. Isl., Hud. Bay, "through North America generally in most pine regions" (Hamilton).

Monohammus confusor Kirby. Can., Mich., Ohio, N. Y., N. J., New England.

Monohammus marmorator Kirby. Can., Maine, Mich.

Acanthoderes decipiens Hald. Kans., Nebr., Iowa, Can., Ohio, Mich., N. Y., Fla., N. J.

Leptostylus aculiferus Say.* Kans., Nebr., Iowa, Can., Ohio, N. Y., Fla., N. J.

Leptostylus commixtus Hald. D. C., Mass., Can., Mich., Ohio, N. Y., N. J.

Hyperplatys aspersus Say.* Can., Iowa, Vt., N. Y., N. J.,

Urographis fasciatus De Geer. Can., Iowa, Mich., Ohio, N. Y., Vt., Fla., N. J.

Acanthocinus obsoletus Oliv. Can., Mich., Ohio, N. Y., N. J., Florida.

Pogonocherus mixtus Hald. Can., N. H., Colo., (Ckll.,) New Mex., (7,000 ft.,) Mich., N. Y., N. J.

Eupogonius tomentosus Hald.* Can., Iowa, Mich., N. Y., N. J., Florida.

Saperda obliqua Say.* Can., Mich., N. Y., N. J.

Saperda calcarata Say. Kans., Nebr., Can., Iowa, Ohio, N. Y., New Jersey.

Saperda vestita Say.* Mass., Pa., Mich., Can., Iowa, Ohio, Vt., N. Y., N. J.

Saperda tridentata Oliv.* Mass., Pa., N. Y., N. J., D. C., Ala., Iowa, Can., Mich., Ohio, Vt.

Oberea tripunctata Swed.* Mass., Pa., N. C., Can., Iowa, N. Y., Colo., Ga.

CHRYSOMELIDÆ.

Donacia subtilis Kunze. Can., Iowa, Mich., N. Y., N. J., Dak., Wis., N. Ill., Colo., Ohio, Pa., Mass., N. H.

Donacia distincta Lec. N. J., Mich., Mass.

Donacia rufa Say. Can., Mass., N. H., N. Y., Ohio, Texas.

Orsodachna atra var. *childreni* Kirby. The species crosses the continent from New England to Canada, extending southward mostly on mountain ranges. Iowa, Colo., N. C.

Zeugophora varians Crotch. Pa., Ill., Kans., Wash., Can., N. Y., N. J., Mich.

Syneta ferruginea Germ. Newfoundland, Can., N. H., Mass., N. Y., Mich., Nebr., Ohio, Md., Iowa, Colo., (11,500 ft.,) N. J., Vermont.

Chlamys plicata Fabr.* Can., Mich., N. Y., N. J., Fla.

Bassareus formosus Fabr.,* et var. *sulphuripennis* Melsh.* Ill., Mich., N. J., Pa., Ga.

Bassareus detritus Oliv.* Can., "Atlantic States."

Bassareus mammifer var. *sellatus* Suffr. Can., Iowa, Mich., Ohio, N. J., Middle and Western States.

Cryptocephalus 4-maculatus var. *notatus* Fabr.* Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. J.

Pachybrachys hepaticus Melsh. Kans., Nebr., Ariz., Fla., Colo., (Ckll.,) Mich., Ohio, "Atlantic and Pacific Regions" (Lec.).

Pachybrachys sp. aff. *atomarius* Melsh.

Diachus auratus Fabr. Oreg., Cal., Mts. of Ariz., Texas, Baja Cal., Can., Van. Isl., Rocky Mts. of Colo., Mich., Ohio, N. Y., Utah, Fla., N. J.

Diachus catarius Suffr. Can., Mich., Van. Isl., Ill., Ga.

Adoxus obscurus Linn., var. *vitis* Fabr. Cal. and Nev., (form *obscurus*) more rare eastward. The form *vitis* occurs in Wash., Colo., Utah, eastward to N. H., (Mt. Wash.), Alaska, Europe, Northern Asia.

Chrysochus auratus Fabr.* Can. to N. J. and southward, Colo., Kans., Dak., Ariz.

Graphops pubescens Melsh. Mass. to Georgia, Iowa and Texas; Canada, N. J.

Colaspis brunnea Fabr.* "Entire region east of Rocky Mountains, extending to Arizona" (Horn). Canada.

Prasocuris varipes Cr. Mich., Vt., N. Y., N. J.

Doryphora 10-lineata Say. New Mex., Colo., Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., N. J.

Chrysomela elegans Oliv. Wyo., Can., Ohio, Iowa, Mich., Vt., N. Y., Nova Scotia, N. J., Oreg.

Chrysomela scalaris Lec. Kans., Nebr., Iowa, Ohio, Mich., Vt., N. Y., Fla., N. J.

Chrysomela multipunctata Say. Cal., Nev., Kans., Nebr., Can., Colo., (7,000–8,000 ft.,) Ohio, Vt., N. Y., N. J., Iowa.

Chrysomela philadelphica Linn. Kans., Nebr., Can., Mich., N. Y., N. J.

Plagiodera viridis Melsh.* Can., Iowa, Vt., N. Y., Fla., N. J.

Gastroidea polygoni Linn.* Can., Iowa, Mich., Ohio, Vt., Nova Scotia, N. Y., N. J.; also in Europe and Asia.

Lina lapponica Linn. Can., Alaska, Hud. Bay, Atlantic and Pacific Regions of U. S. Also found in Siberia, China and Europe.

Gonioctena pallida Linn. Minn., Hud. Bay, Lake Superior Region in general; also Europe and Siberia.

Phyllodecta vulgatissima Linn. Can., Iowa, Mich., N. Y., Pa., Ohio, perhaps in Alaska; Mt. Wash., (N. H.), N. J. Also in Europe and Asia.

Phyllobrotica decorata Say. Ill., Colo., Can., Iowa, Mich., N. Y.

Diabrotica 12-punctata Fabr. Canada to Texas and eastward; extending into Arizona and Southern California on the west.

Trirhabda canadensis Kirby. Hud. Bay Region, Can., Kans., N. J., Nebr., Colo., Utah, Cal., Iowa, Mich., N. Y.

Galeruca cavicollis Lec.* Can., New England, Pa., N. C., N. Y.

Galeruca decora Say. Can., Mass., Iowa, N. Y., Colo. This distribution is that of the pale form to which my specimens belong. Black ones occur farther west.

Oedionychis limbalis Melsh.* Can., Iowa, N. Y., N. J., Mass., Ga., Texas.

Disonycha pensylvanica Ill.* Can., N. H., Iowa, Mich., N. J., N. Y., all over U. S.

Disonycha 5-vittata Say. Baja Cal., Colo., New Mex., Nebr., Kans., Can., Iowa, Mich., Ohio, entire region west of Miss.

Haltica bimarginata Say. Nebr., Kans., Iowa, Can., Colo., Cal., Mich., N. J., Texas, Alaska to Mexico.

Haltica ignita Ill. Baja Cal., Can., Iowa, N. J., Hudson's Bay to New England, south to Texas and Florida.

Crepidodera helxines Linn. B. C., Van. Isl., Oreg., Wash., Colo., Idaho, Nebr., Kans., Can., N. H., Iowa, Mich., Ohio, Vt., Fla., N. Y., N. J.; also in Europe and Siberia.

Crepidodera modeeri Linn. Mich., Can., Oreg., Cal., Kans., Europe, Siberia.

Systena frontalis Fabr. Can., Iowa, Mich., Vt., N. Y., Fla., N. J., entire region east of Rocky Mountains.

Longitarsus turbatus Horn.* Ill., Ala., Mich., Texas.

Glyptina brunnea Horn.* Ga., La., Texas, Wis.

Chætocnema irregularis Lec.* Colo., (8,000–9,400 ft.,) Cal., Oreg., Nev., Mich.

Chætocnema protensa Lec.* Colo., (7,000–9,200 ft.,) Mich., Maryland.

Psylliodes punctulata Melsh. Can., Iowa, Mich., N. Y., N. J., Mass., Wash., Van. Isl., Cal., Nev., Utah, Kans., Colo., Texas.

Odontota nervosa Panz. Nebr., Kans., Can., Iowa, Mich., Ohio, N. Y., Fla., N. J., Texas.

Chelymorpha argus Licht.* Can., Iowa, Ohio, N. Y., Colo., Fla., N. J., Eastern U. S. in general.

TENEBRIONIDÆ.

Nyctobates pensylvanicus De Geer.* New Mex., Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "Northern and Middle States to California."

Iphthimus opacus Lec. Can., Ohio, Nova Scotia, New England.

Upis ceramboides Linn. Can., Mt. Wash., (N. H.), Mich., Vt., N. Y., Nova Scotia, N. J., Mont., Hud. Bay, Pa., Maine, Manitoba, Europe and Northern Asia.

Xylopinus saperdioides Oliv.* Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va.

Tenebrio molitor Linn.* Can., Alaska, U. S. generally, near or in houses. Cosmopolitan; distributed by commerce.

Tenebrio tenebrioides Beauv.* Kans., Neb., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla. N. J. "abundant over our whole territory" (Horn).

Paratenetus fuscus Lec. Can., Colo., (Ckll.,) Iowa, Ohio, Vt., N. J., "States bordering the Great Lakes" (Horn).

Blapstines interruptus Say. Kans., Nebr., Can., Iowa, Mich., N. Y., N. J., Minn., Colo., Wyo.

Diaperis hydni Fabr.* Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va.

Platydema excavatum Say.* Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "entire district east of Rocky Mountains" (Horn).

Platydema americanum Lap. Can., Iowa, Mich., Ohio, N. Y., Vt., N. J., Va.

Hypophlœus parallelus Melsh. Can., Colo., (9,400 ft.,) Mich., N. Y., N. J., Ariz.

Boletotherus bifurcus Fabr. Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va.

Boletophagus corticola Say. Can., Mich., Vt., N. Y., N. J.

Boletophagus depressus Rand. Can., Ohio, Vt., N. Y., N. J.

CISTELIDÆ.

Androchirus erythropus Kirby.* Can., Mich.

Mycetochara binotata Say. Can., Mich., N. Y.

Mycetochara bicolor Coup. Can.

Isomira sericea Say.* New Mex., (Leconte) Mich., Ohio, N. Y., N. J., Mass., N. C.

Hymenorus niger Melsh. Can., Mich., Ohio, N. Y., Pa., Fla., Texas.

Hymenorus pilosus Melsh. Can., Iowa, Mich., Ohio, Mass., Va.

MELANDRYIDÆ.

Penthe obliquata Fabr. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J.

Synchroa punctata Newm. Can., Iowa, Mich., Ohio, Vt., Fla., N. Y., N. J.

Scotochroa atra Lec. Can., Mt. Wash., (N. H.).

Serropalpus barbatus Schall. Can., Alaska, B. C., Hud. Bay, Oreg., Maine, Rocky Mountains, south to New Mex., N. Y., Vt. Also in Siberia and Europe.

Mystaxis simulator Newm.* Mich., Ohio, Vt., N. Y., N. J.

Marolia fulminans Lec.* Oreg., Can.

Hypulus lituratus Lec. Can., Iowa, Mich., Ohio, Vt., N. Y., Va., Missouri.

Symphora flavicollis Hald. Can., Iowa, Mich., Ohio.

Eustrophus repandus Horn.* Can., Iowa, Mich., "New Hampshire and Virginia, to Pacific Coast as far south as the extreme north of California" (Horn).

Hallomenus punctulatus Lec

Orchesia castanea Melsh.* Can., Mt. Wash., (N. H.), Mich., Iowa, Ohio, N. Y., N. J.

Canifa pallipes Melsh.* Kans., Nebr., Can., Mt. Wash., (N. H.), Colo., (7,000 ft.,) Mich., Ohio, N. J.

PYTHIDÆ

Crymodes discicollis Lec. Can., Man., Colo., (Ckll.).

Pytho americanus Kirby. Pa., Can., N. Y., Mich., Ohio, Kans., Mts. of N. C., N. J. Dr. Hamilton thinks it the same as the European *P. depressus* Linn.

ŒDEMERIDÆ.

Asclera ruficollis Say. Can., Iowa, Mich., Ohio, N. Y., N. J.

Asclera puncticollis Say. Can., Iowa, Mich., Ohio, N. Y.

CEPHALOIDÆ.

Cephaloon lepturides Newm. Can., Mt. Wash., (N. H.), Ohio, N. Y., N. J.

MORDELLIDÆ.

Anaspis nigra Hald. Can., Mt. Wash., (N. H.), Colo., (8,000 ft.,) Hud. Bay, N. Y.

Anaspis flavipennis Hald. Can., Mt. Wash., (N. H.), Mich., Ga., N. Y., Minn.

Anaspis rufa Say. "Can. to Alaska and Tex.," Baja Cal., Colo., Mich., Ohio, Vt., N. Y., Utah, Fla., N. J.

Mordella scutellaris Fabr. Baja Cal., Can., N. H., Iowa, Colo., Mich., Ohio, Vt., N. Y., Fla., N. J., Cal.

Mordella borealis Lec. Can., Northern States.

Mordellistena biplagiata Helm.* Ohio, Ill., N. Y.

Mordellistena limbalis Melsh.* Can., Iowa, Ohio, N. Y., N. J., Middle States.

Mordellistena comata Lec.* Can., Iowa, Mich., Ohio, N. Y., N. J., U. S. generally.

Mordellistena tosta Lec. Can., Mich., Ohio, Ga., N. Y.

Mordellistena unicolor Lec.* Can., Iowa, Colo., (7,000-8,000 ft.,) Ohio, N. J., U. S. in general.

ANTHICIDÆ.

Corphyra lugubris Say. Can., Iowa, Mich., Ohio, N. Y., Wyo.

Notoxus anchora Hentz. Kans., Nebr., Can., Colo., Iowa, Vt., Mich., N. Y., N. J.

Anthicus floralis Linn. Can., Iowa, Mich., Ohio, N. Y., N. J.; said to be cosmopolitan.

Anthicus coracinus Lec. Can., Mich.

Anthicus cervinus Laf. Kans., Nebr., Can., Iowa, Mich., Ohio, N. Y., Utah, N. J.

Anthicus spretus Lec. (pale race). Can., Iowa, Mich., N. J.

Anthicus pallens Lec. Mich., Fla., N. J.

PYROCHROIDÆ.

Pyrochroa flabellata Fabr.* Can., Iowa, Mich., Ohio, N. J., Vt., New York.

Dendroides bicolor Newm. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., Fla.

Dendroides concolor Newm. Can., Mt. Wash., (N. H.), Mich., Ohio, N. Y.

MELOIDÆ.

Macrobasis unicolor Kirby. Very injurious to potatoes at Bayfield. Can., Iowa, Colo., Mich., N. Y.; Eastern U. S. generally, west as far as Colo., south to Florida.

RHINOMACERIDÆ.

Rhinomacer elongatus Lec. Can., Pa.

RHYNCHITIDÆ.

Rhynchites cyanellus Lec. Can., Mich., Mass., Ill.

ATTELABIDÆ.

Attelabus bipustulatus Fabr. Can., N. Y., Va., "Atlantic States."

Attelabus rhois Boh. Can., Iowa, Mich., N. J., south to Va.

OTIORHYNCHIDÆ.

Hormorus undulatus Uhler. Can., Iowa, Mich., N. Y., N. J., Md., Ill., Dakota.

Geoderces melanothrix Kirby. Canada, New York.

CURCULIONIDÆ.

Sitones flavescens Marsh. Can., Iowa, Mich., Ohio, N. Y., N. J., Pa., Fla., Ind., Ill., Nova Scotia, Europe, Asia, North Africa.

Apion segnipes Say.* Can., New Mex., N. J., Western and Southern States.

Apion sp. aff. *cavifrons* Lec.*

Phytonomus punctatus Fabr.* Can., N. Y., N. J., Pa., Ohio, Ind., W. Va., Europe, Asia, North Africa.

Lepyrus geminatus Say. Kans., Nebr., Can., Van. Isl., Colo., (8,000 ft.,) Mich., N. Y., "Ill. to Colo."

Listronotus callosus Lec.* Iowa, Mich., N. J., "N. Y., to Ga."

Listronotus caudatus Say.* Can., Iowa, Mich., N. Y.

Listronotus latiusculus Boh. Can., Iowa, Mich., Ohio, N. J., "Middle and Southern States."

Macrops sp.

Pissodes strobi Peck. Can., Mich., N. Y., N. J., "Lake Superior to Georgia."

Pissodes dubius Rand.* Can., Mt. Wash., (N. H.).

Hylobius confusus Kirby. Can., Alaska, Mich., N. Y., Mass.

Hypomolyx pineti Fabr. Mich., Can., Hud. Bay, Europe and Siberia.

Lixus caudifer Lec.* Ill., B. C.

Dorytomus laticollis Lec. Can., Iowa, Mich., N. Y., N. J.

Dorytomus brevicollis Lec. Can., Van. Isl., Mich., N. Y.,N. J.

Dorytomus sp. incog.

Bagous mammillatus Say. Mich., Fla., "Southern and Western States."

Magdalis pandura Say.* Can., Iowa, Mich., Ohio, N. Y., N. J., Pa., Ga., Mo.

Magdalis inconspicua Horn.* Can., Colo., (7,600 ft.,) Mich., Pa., N. Y.

Tachypterus quadrigibbus Say.* Can., Iowa, Mich., Ohio, Ill., N. Y., N. J., Mass., Texas, Cal. "Occurs probably over our entire territory" (Dietz).

Anthonomus signatus Say. Can., Mich., Ohio, N. J., "Mass. to Fla. and Texas."

Anthonomus scutellatus Gyll. Iowa, Mich., Ohio, N. J., Mo., Mass., Texas.

Anthonomus rufipennis Lec. Colo., (8,000 ft.,) Mich., Texas, Pa., Florida.

Orchestes rufipes Linn.* Can., Colo., (Ckll.,) (7,000-9,200 ft., Sz.,) N. Y., Vt., Cal.

Orchestes niger Horn.* Colo., (7,000-9,200 ft.,) Mich., Ohio, Ill., N. Y., N. J., Can., Nova Scotia, Pa.

Orchestes canus Horn.* Ohio, Mich., Colo.

Elleschus bipunctatus Linn. Can., N. J., Mich., Europe.

Piazorhinus scutellaris Say. Kans., Nebr., Can., Iowa, Mich., Ohio, N. Y., N. J., Atlantic States.

Piazorhinus pictus Lec.* Beaten from oaks. Can., Fla., N. J., Ill., Georgia.

Conotrachelus nenuphar Hbst.* Can., Iowa, Mich., Ohio, N.Y., N. J., Atlantic Slope generally.

Rhyssematus palmacollis Say.* Can., Ohio, Fla., Mo., N. Y., Texas.

Mononychus vulpeculus Fabr.* Iowa, Mich., N. Y., Ind., N. J., "Canada to Georgia."

Cnemogonus epilobii Payk. Slave Lake and B. C.; also in Europe.

Cœliodes acephalus Say.* Mich., Ohio, N. Y., N. J., "Middle and Western States."

Balaninus nasicus Say.* Can., Iowa, Mich., Ohio, N. Y., N. J., Ga., Kans., Pa., Ill.

BRENTHIDÆ.

Eupsalis minuta Drury. Can., Iowa, Mich., Ohio, N. Y., Texas, Fla., N. J.; "abundant from Lake Superior to Texas, and from New England to Colorado."

CALANDRIDÆ.

Sphenophorus costipennis Horn. Can., Iowa, Mich., N. J., Ill., Nev., Manitoba.

Dryophthorus corticalis Say. Can., Iowa, Mich., Ky , N. Y., Fla., N. J., "Atlantic district generally."

Cossonus subareatus Boh. Kans., Nebr., Iowa, "Middle States," (Horn).

Rhyncolus brunneus Mann. Can., Alaska, Van. Isl., So. Cal., New Mex., Vt., N. H., N. J.

SCOLYTIDÆ.

Pityophthorus materiarius Fitch. Can., Mich., N. Y., Fla., "Can. to Texas."

Pityophthorus minutissimus Lec.* Iowa, Mich., N. J., "Middle and Southern States."

Pityophthorus sp. incog.

Xyleborus cælatus Esch. Iowa, Colo., Mich., Ohio, N. Y., N. J., "Can. to Texas and Cal."

Xyleborus sp. incog.

Tomicus pini Say. Kans., Nebr., New Mex., Can., Mich., N. Y., Colo., N. J., Hud. Bay.

Phlœosinus dentatus Say. Can., N. J., "Middle and Eastern States."

Dendroctonus terebrans Oliv. Colo., Cal., Can., N. Y., Mass., Fla., N. J., Ga., Oreg., Wash., Ariz., Idaho, New Mex., Nev., Md., Pa.

Hylurgops pinifex Fitch. Can., Mich., N. Y., N. J., Ohio, Pa., W. Va., Queen Charlotte Islands. Also in Europe and Siberia. (*H. glabratus* Zett.) Hamilton.

ANTHRIBIDÆ.

Gonotropis gibbosus Lec. Can., Colo.

Allandrus bifasciatus Lec. Can., Colo., (8,000 ft.,) N. Y., N. J., Illinois.

Hormiscus saltator Lec. Can., Mich., Ohio, N. Y., N. J., "Middle and Western States."

STONE MOUNDS AND SERPENT OF HUGHES COUNTY, SOUTH DAKOTA.

BY JOHN M. HELMICK.

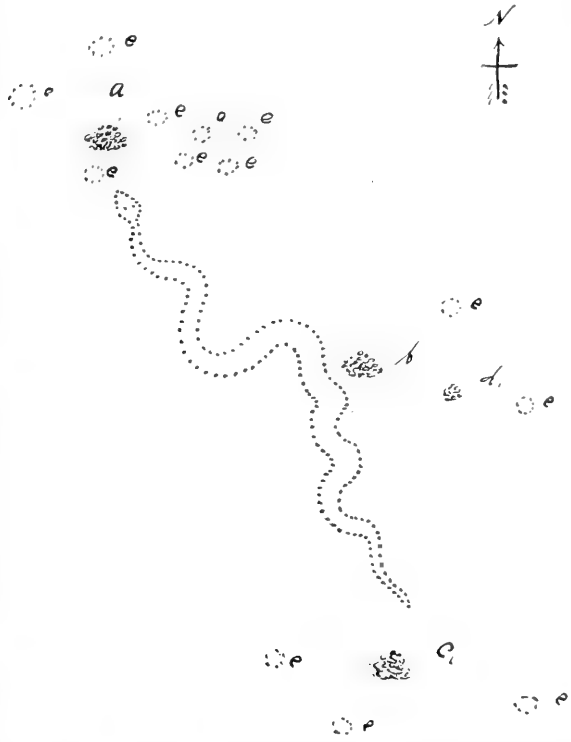
In the spring of 1883 a business trip took me to Blunt, a small town in the northern part of Hughes County, South Dakota. The town was then in its infancy. It is nicely located in a wide valley and almost surrounded by high hills. The group of hills at the south-west is called "Medicine Knolls." The highest one of these rises some 800 to 1,000 feet above the level of the valley and is distant some 3½ miles from the town. I wandered out to this group of hills in quest of jack-rabbits, and curiosity tempted me to ascend to the top of this highest knoll. There is no timber on these hills—only a few small bushes in the ravines. Grass and small herbs compose the only vegetation on the sides and top of the hills, which are composed of light soil, gravel, and boulders of all sizes. No mass or stratified rocks appear. The summit of this highest knoll comprises an area of some three acres in extent. On reaching this my attention was at once directed to three stone mounds, marked a, b, and c, and a small one, d. (See cut.) I at once advanced to mound a, then to d, and then to c. I then retraced my steps towards a, and when near mound b I crossed a line of stones, the curve of which I followed some distance, when I noticed a parallel line. I immediately retraced my steps, following the double line of stones toward mound c, and until the lines converged at the tail. I then returned toward mound a, thinking I was following a serpentine walk among the altars. As I approached mound e the lines again converged until near this mound, at which point I was surprised and delighted to behold at their terminus a large and well-formed head of a serpent. I had followed the outline of a large serpent, and not a causeway, as I had at first suspected.

I paced the distance between these mounds and estimated the distance from a to c at 300 feet. If the serpent were straight it would about span this distance. I noted my estimates and made a sketch of location, and entered these in my journal on returning to Blunt.

The stones of which this serpent is composed average 50 pounds in weight. They are placed about a foot apart in the lines, and the lines

are some five or six feet apart in the middle of the body and converge toward either extremity. The neck is two feet wide; the head, five feet. There are two stones representing eyes. The head is directed to the north-west. The stones are deeply imbedded in the ground, which is composed of sand and gravel and a light mould. After the grass begins to grow they would not be noticed except on close inspection.

The mounds a, b, and c are some ten feet in diameter and three feet high, and are composed of boulders of various sizes up to 100 pounds



or more in weight. Mound c had been disturbed, about half of the north side being torn away—evidently by some one exploring its contents. The others seemed to be undisturbed. Old grass was still clinging to the scanty soil between the stones. The small mound, d, similarly constructed, was not more than half the dimensions of the larger ones. There was no appearance of recent handling about these stones, no ashes visible, and the stones forming the serpent being

deeply imbedded in the ground, all indicated that these works were ancient. The stones were probably gathered from the level area on which the works are located, for this area is free from other stones, whereas the sides of the knoll, and the summits and sides of the others are strewn with similar boulders.

There are many small circles (marked e) scattered about these works. They are some ten to twelve feet in diameter, formed of stones a foot apart. There were still many modern Indians in this vicinity—Winnebagoes, Crows, and Sioux. I enquired of a Crow and a Sioux, and each denied knowledge of the existence of the mounds. At Blunt I enquired of an attorney, Mr. Charles Berger, who also said he knew nothing of such works and expressed surprise at their existence. I believe I am the first white man who ever saw the serpent. It would not be visible from the time the grass is a few inches high until after it was burned over, except on close inspection. I visited the knoll at the most favorable time for seeing the colossal serpent, remarkable in itself, and especially as being the only one known constructed of stone in the manner described.

This entire knoll is useless for agricultural purposes, and should be preserved as a park. It will exist for centuries as it is to-day if it escapes the hands of the willful vandal.

NOTE.—Since writing the above I have seen the article on this subject in *American Anthropologist*, Vol. II., No. 2. My notes were written on the spot, April 25, 1883, and I believe them correct. I used a compass in noting direction. Height of butte estimated. J. M. H.

A SHELL GORGET FROM MEXICO.

BY FREDERICK STARR, PH. D.

No CLASS of objects from our southern mounds are more beautiful and interesting than the engraved shell gorgets. They were first seriously discussed and adequately illustrated by W. H. Holmes in his paper — *Art in Shell of the Ancient Americans.* * These objects are thin, nearly circular, concavo-convex plates of shell, carefully smoothed on both surfaces and engraved upon the concave side. The shell which usually supplied the material was *Busycon perversum*, which is common along the Atlantic and Gulf coasts from Massachusetts to Mexico. The form of the shell and the quality of its material are such as to make the securing of flat plates of any size quite impossible; hence the concavo-convex form of the sides is a result inherent in the material itself. The designs engraved upon the concave surface are surprisingly well done. While they are clearly ornamental they are no less clearly symbolical as well. The types are comparatively few and the treatment is notably conventional. Holmes grouped these designs into a few classes — the cross, scalloped disk, birds' head and coil, serpent, spider, human face and human figure. These gorgets, which measure from 2½ to 5 inches in diameter, were worn as ornaments, probably suspended from the neck and hanging down upon the breast. Two holes for suspension are usually found near the upper edge, and, not infrequently, show marks of wearing due to the suspension cord. The specimens have come from stone graves and mounds in Tennessee, Missouri, Illinois, Georgia, and other southern states. Everywhere in art and function they embody one well-defined conception and are plainly related.

The most interesting are certainly those upon which is represented the human figure. Of such Mr. Holmes describes four. After his paper was printed, fragments of two others were found in one of the Etowah group of mounds in Georgia, by Mr. Rogan. These were illustrated in Cyrus Thomas' paper, *Burial Mounds of the Northern Sections of the United States.* † Still later Gates P. Thruston, in his *Antiquities of Tennessee*, reproduced all these figures, and added a

* Sec. An. Rept. Bureau of Ethnol., pp. 179-305.

† Fifth An. Rept. Bureau of Ethnol., pp. 103-104.

description and illustration of a curious specimen belonging to A. E. Douglass, of New York City. There are thus seven of these southern gorgets, bearing representations of human figures, illustrations of which are easily accessible to the student. No two of these are exactly alike. It is not necessary here to redescribe them, but a few points regarding each need emphasis:

(*a*). A curious piece, whereon the human figure is so crudely and conventionally represented that great pains are necessary to detect it at all, in what at first sight looks like a meaningless combination of lines. The joints of the arms and legs are quite unanatomical, and the feet are developed into single, well-defined talons or claws which fold upward against the knee. Perforations, from one-fourth to one-sixteenth of an inch in diameter, occur at several places, particularly at joints of the figure and at the junction of two or more lines. There are twenty-six of these. Tennessee.

(*b*). The same general idea occurs here, but the human figure is more easily recognized. The arms are curiously jointed; the hands are well defined. There are plume-like appendages along the arms and legs. The feet are developed into single claws. From the mouth, which is well supplied with teeth, there is a nondescript appendage, "which may be part of the costume, or, since it issues from the mouth, may possibly symbolize speech." There are five perforations, including the suspension holes. Tennessee.

(*c*). A sacrificial scene. An upright figure in profile, decked with ornaments. With arms extended, he is advancing. Before him he holds a severed human head with face downward. His head is large, occupying one-third the height of the whole figure. The face is tatooed diagonally across the face from below the eye to below the ear. The pupil of the eye is indicated by a pit-like depression. A peculiar apron-like object hangs from a belt at the waist, and a fan-like extension of the costume, somewhat like a bird's tail, descends between the legs. A peculiar object projects from the mouth. The severed head presents face tatoo marks and the curious mouth object. Missouri.

(*d*). Fragmentary. A remarkable piece of work. Two human figures, plumed, winged, and with feet like those of eagles are represented in profile, facing, and engaged in deadly combat. The great wings and the many feathered tails are notable. Tennessee.

(*e*). Fragmentary. Two figures, one erect the other prostrate. Both are tatooed. The victor has a zigzag line running from the root of the nose across the cheek to the neck; the other is marked

with a zigzag line from the hair over the temples vertically down the face. Both wear large ear-rings, and *appear* to have the curious mouth object. Georgia.

(*f*). Fragmentary. Winged figure kneeling. The nose is eagle-beaked. There is a peculiar tatoo (?) about the mouth. There is an object before the mouth somewhat like those already described, but *not* actually connected with it. It appears, however, to be attached to the head-dress. There is a belt and pendent at the waist. Georgia.

(*g*). The Douglass tablet from Missouri presents little of great significance for our comparison. Through Gen. Thruston's politeness it is here reproduced. Notice the belt and the suspended apron.

Of this gorget General Thruston says: *

"The very peculiar skirt or appendage hanging to the waist-belt appears in both the copper-plate figures from the Etowah mound, which had not

* Antiquities of Tennessee, p. 346.

been published in 1887 when this shell gorget was discovered. The curious complicated head-dress and long hair-tie, also suggest the Georgia figures, as does the long implement or object under the right arm, which appears to to be a duplicate of the object held in the right hand of the copper-plate figure. The fan-shaped scarf hanging from the waist, appears in several of these designs. The ear-ring, the breast ornament, the large beads upon the wrists and legs, the half-circles on the arms and lips, all suggest analogies."

With the pictures of these gorgets before him, anyone at all acquainted with Mexican art must notice curious analogies. Holmes recognized similarity. Of the scalloped disks he says:

"The student will hardly fail to notice the resemblance of these disks to the calendars of Mexico and other southern nations of antiquity. There is, however, no absolute identity with southern examples. The involute design in the centre resembles the Aztec symbol of day, but is peculiar in its division into three parts, four being the number almost universally used." Holmes, l. c. p. 279.

Of the bird pattern and loop pattern he remarks:

"A similar looped rectangle occurs several times in the ancient Mexican manuscripts. * * * * It is not a little remarkable that a cross occupies the enclosed area in all these examples." Holmes, l. c. p. 285.

" * * Gorgets of shell are a marked characteristic of the personal embellishment of the northern peoples. They may have been in use among the Aztecs, but do not appear among southern antiquities, and no evidence can be derived from history. This gorget belongs, in its general character as an ornament, to the north. * * * * * In all these features, together with its technical execution and its manner of inhumation, it is identical with the well-known work of the mound-builders. These analogies could hardly occur if it were an exotic. It is true, however, * * * * that the design itself has a closer affinity to Mexican art than to that of the north. * * * * * As an ornament, this Missouri gorget is a member of a great family that is peculiarly northern, but the design engraved upon it affiliates with the art of Mexico, and so close and striking are the resemblances, that accident cannot account for them, and we are forced to the conclusion that it must be the offspring of the same beliefs and customs and the same culture as the art of Mexico." Holmes, l. c. 305.

We have now to describe another engraved gorget of shell on which a human figure is represented. The specimen is part of the Ryerson collection, now at the University of Chicago. It was collected near Morelia, in the state of Michoacan, Mexico, by Abadiano, probably in the year 1882. It is remarkably well preserved and has been somewhat cleaned, but of its authenticity there is absolutely no question. As the United States specimens it is a thin, concavo-convex plate. The inner, concave face, is the one carved. The gorget is nearly circular measuring 106 mm. in height and 100 mm. in breadth.

In thickness it measures from 3 to 4 mm. In the catalogue of the collection the design is said to represent "a warrior seated and speaking." The cut here given reproduces the object admirably. The carved figure occupies a roughly circular space at the centre of the gorget. A narrow plain band surrounds this; outside of it is a broader band occupied by six flattened circular ones inclosing a smaller circle surrounding a pit-like depression, alternating with six ornamental mo-

tives of uncertain significance. In this band much of the shell between these designs (represented in black in the illustration) has been cut entirely out. Twenty-four such open spaces occur in this band. Outside of all is a narrower plain band. The engraved design itself represents a warrior seated. His head is surmounted by a head-dress. The hair is well drawn; the eye is represented by an ellipse sharpened at one end with a pit-like depression for the pupil. A great ear ornament is represented with a central depression. The nose is large and connected with it is a curious mark, which may be tatooing or a

nose skewer. A zigzag tatoo line runs from below the nose across the cheek to the ear. The mouth is open, the teeth of the upper jaw are indicated and a curious object projects from the mouth. The body is curiously stiff and formal. The arms are extended and the left hand grasps some object. The right one (somewhat distorted in the cut) projects beyond it to the very border of the design. The legs are extended forward. The foot is claw-like. Plumes are attached to the arms and legs. Part of a rectangular object, apparently a belt, is seen and from it in front an apron-like pendent apparently projects, while, if I mistake not, a tail-like appendage hangs down below the figure, apparently after having passed between the legs. What appears to be a shield with a downward hanging fringe of plumes is on the warrior's back and over it is an object which resembles somewhat a war club although it may be an *atlatl* or spear-thrower. At several places within the design are pit-like cavities sometimes surrounded by circles. There are ten apertures cut through the shell within this area.

Many points of similarity might be found between this design and those from the United States. The stiff and formal trunk may be compared with those of (*a*) and (*b*). The clawlike foot recalls the Tennessean specimens. The curious object at the mouth is apparently in nature like that in (*b*), (*c*), and (*e*). The curious perforations are present in several. Tatoo markings are the rule in these designs but those on the Mexican specimens and the Georgian piece (*e*) are almost identical. The belt and curious apron-like projections are comparable with those in (*c*) and (*g*).

The finding of such an object in the heart of Mexico is of much interest. Form, function, character of this Michoacan specimen are plainly the same as those of the pieces from Tennessee, Georgia, and Missouri. It can no longer be said that the type is essentially northern nor that it belongs exclusively to the "Mound-builders" of the United States. We must modify Mr. Holmes' statement and may say of the Missouri gorget (*c*)—"it is a member of a great family, *not* peculiarly northern." We may emphasize this other statement—"*the design upon it affiliates with the art of Mexico and so close and striking are the resemblances that accident cannot account for them, and we are forced to the conclusion that it must be the offspring of the same beliefs and customs and the same culture as the art of Mexico.*" In fact there are greater differences between the Tennessee specimens themselves, or between the Missouri specimens alone, than there are between the United States specimens, as a class, and this Mexican gorget.

REVISION OF THE TRUXALINÆ OF NORTH AMERICA.

(*Read before the Academy, November 29th, 1895.*)

BY JEROME McNEILL.

It is proper to state that this paper is based largely upon the material of the United States National Museum, to whose officers I am much indebted for the generosity with which the collection was placed at my disposal for study during the three months which I was able to spend in Washington. For these and other favors I am deeply indebted to Dr. C. V. Riley and Dr. L. O. Howard. Dr. S. H. Scudder has placed me under great obligations by sending me many of the rare and sometimes unique specimens of his less-known species. I have also received help in the way of types and other specimens, as well as valuable notes, from Prof. R. S. Morse, which I gratefully acknowledge. I am indebted to the kindness of Mr. Coquillett for valuable notes on his very interesting collection of *Orthoptera* made in Southern California and now included in the collection of the National Museum. Finally, I owe to the generosity of Mr. Ashmead the possession of a small but valuable collection of *Orthoptera* from Florida.

My own collection of *Orthoptera* contains all the species of the *Truxalinæ* found west of the Alleghenies, east of the great plains, and north of Texas and Florida and a large portion of the other species of North America outside of Mexico and Central America. I regret extremely that I have not been able to see more of the Mexican species of Saussure and Walker, but the types are not easily accessible and without them the often meagre descriptions are insufficient for the certain determination of their species. With the single exception of *Alpha*, I have not accepted the genera proposed by Brunner in his excellent *Révision du Système des Orthoptères*. The brief descriptions given in his key and the failure to name the species (except in the case noted above) upon which his genera were founded, together with the fact that many Mexican forms were unknown to him, have made it impossible to satifactorily identify these genera.

The *Truxalinæ* constitute a sub-family of *Acrididæ*. They are more closely related to *Œdipodinæ* than to any other group of equal rank,

and though they present on the whole a very different appearance and, in fact, are different in a large number of characters from *Œdipodinæ*, the connecting links between them are so numerous that it is difficult to find any clearly definable characters which will serve to separate these sub-families.

KEY TO THE AMERICAN SUB-FAMILIES OF ACRIDIDÆ.

A.[1] Tarsi not furnished with a pulvillus. Pronotum extending to or beyond the end of the abdomen.....1.—*Tettiginæ.*

A.[2] Tarsi furnished very generally with a pulvillus. Pronotum much exceeded by the abdomen.

B.[1] Antennæ shorter than the anterior femora.....2.—*Proscopinæ.*

B.[2] Antennæ longer than the anterior femora.

C.[1] Prosternum unarmed or, if furnished with a more or less distinct tubercle or spine, the lateral carinæ of the pronotum or the lateral foveolæ of the vertex are present and well developed.

D[1] Vertex of the head generally horizontal or a little ascending. Viewed from the side, the vertex forms an angle, more or less rounded, with the front, which is very generally moderately or strongly oblique. In no case is the median carina of the pronotum crested or cut by more than one sulcus and the posterior margin of the metazone is never sharply angulate....3.—*Truxalinæ.*

D.[2] Vertex of the head very generally declivent. Viewed from the side, the vertex is nearly always roundly and not angulately united with the front, which is sub-perpendicular, rarely decidedly oblique. In the rare cases where the head is truxaline, the pronotum and the tegmina are strongly œdipodine, *i. e.*, the lateral carinæ are obsolete, the median carina is cut by more than one incision or is crested, or the metazone is sharply angulate and the tegminæ are everywhere densely and regularly reticulate.....
.....4.—*Œdipodinæ.*

C.[2] Prosternum armed with a tubercle or spine.

D.[1] Front very oblique. Lateral foveolæ meeting in the median line so as to form the anterior part of the roof of the vertex.....
.....5.—*Pyrgomorphinæ.*

D.[2] Front rarely very oblique, frequently sub-perpendicular. Lateral foveolæ, if present, never meeting nor forming a part of the roof of the vertex..... .....6.—*Acridinæ.*

The following comparison may help to show that in spite of the difficulty of separating these sub-families there are really very distinct truxaline and œdipodine characters of the head, the pronotum, the tegmina, and the wings. Unfortunately, for classification, a truxaline head does not always go with truxaline pronotum and tegmina. It will usually be found, however, that when one set of characters are strongly presented in one part the opposite set will be no less strongly indicated in the other two regions. Thus while *Acrolophitus* and *Machaerocera* have truxaline heads, they have the typical œdipodine pronotum, tegmina and wings. I have, accordingly, on account of the preponderance of the last mentioned characters followed Dr. Scudder in excluding these and allied forms from the sub-family under discussion. *Boopedon*, on the other hand, has an œdipodine head, but it too has the characters of the head reversed in the pronotum, tegmina, and wings. There still remain certain genera, as *Psoloessa*, *Stirapleura*, *Aulocara*, and their allies, in which the opposing characters of these two sub-families are so evenly blended that in the end it is a somewhat arbitrary line that divides the *Truxalinæ* from *Œdipodinæ*. I hope, however, that the character I have chosen (the presence of but one transverse incision which cuts the median carina) will not prove altogether unnatural. In accordance with this character I have removed *Psoloessa*, *Stirapleura* and some allied forms, as well as one species of the genus, *Aulocara*, from *Œdipodinæ* and included them in *Truxalinæ*.

CHARACTERS OF THE HEAD.

TRUXALINÆ.	ŒDIPODINÆ.
1.—Vertex horizontal or ascending and, when seen from the side, this and the face form an angle rather than a regular curve.	1.—Vertex declined and, when seen from the side, united with the face by a curved line.
2.—The front is decidedly oblique.	2.—The front is sub-perpendicular.
3.—The lateral foveolæ are frequently absent or invisible from above.	3.—The lateral foveolæ are present and visible from above.
4.—The antennæ are very frequently depressed, acuminate, triquetrous, or clavate.	4.—The antennæ are very rarely anything but filiform.

CHARACTERS OF THE PRONOTUM.

5.—The width of the pronotum is little greater at the posterior than at the anterior end.	5.—The width of the pronotum is much greater at the posterior than at the anterior end.

6.—The lateral carinæ are distinct.
7.—The median carina is always cut by one sulcus, and it is never crested.
8.—The prozone is not shorter than the metazone.
9.—The posterior angle of the metazone is never sharp or acute angled, generally very obliquely and roundly angulate or straight.
10.—The surface is generally smooth, not wrinkled or tuberculose.
11.—The lateral lobes are generally plainly narrowed below, the anterior or posterior margin (one or both) being oblique.

6.—The lateral carinæ are obsolete.
7.—The median carina is cut by one, two, three, or no sulcus, and it is often crested.
8.—The prozone is shorter than the metazone.
9.—The posterior angle of the metazone is very frequently sharp or acute angled, never straight.
10.—The surface is generally wrinkled or tuberculose.
11.—The lateral lobes are generally not narrowed below, but both the anterior and posterior margins are sub-perpendicular.

CHARACTERS OF THE TEGMINA AND WINGS.

12.—The intercalary vein of the tegmina is generally wanting
13.—The scapular area of the tegmina is often expanded, and the venation is scalariform.
14.—Imperfect tegmina and wings are very common. Abortive and long-winged forms in the same species are not uncommon.
15.—The tegmina are plain or striped. If maculate, the spots are not arranged in bands.
16.—The wings are generally transparent, never bright colored, nor with a black band.

12.—The intercalary vein of the tegmina is commonly present.
13.—The scapular area of the tegmina is narrow, and the venation irregularly reticulate.
14.—Imperfect tegmina and wings are very rare. Abortive and long-winged forms in the same species do not occur.
15.—The tegmina are plain or maculate, scarcely ever striped. If maculate, there is a tendency for the spots to be arranged in bands.
16.—The wings are generally bright colored, and most generally have a black band.

BIBLIOGRAPHY.

Amoen. Acad.—*Centuria insectorum rariorum*, in Amoenitates Academicæ. (See C. von Linne.)

Ann. Del. Mus. Civ.—*Annali del Museo Civico Storia Naturale di Genova.* Geneva, Roy. 8vo. (See Brunner von Wattenwyl.)

Ann. Rept. Ent. Soc. Ont.—*Annual Report of the Entomological Society of Ontario.* Toronto. Roy. 8vo. (See S. H. Scudder, F. B. Caulfield.)

Bessey, C. E.—*A Preliminary List of the Orthoptera of Iowa.* In the 7th Bien. Rept. Iowa Agr. Col.

Beutenmüller, W.—*Descriptive Catalogue of the Orthoptera found within fifty miles of New York.* In Bul. Am. Mus. Nat. Hist., VI, art. xii, 253–316. Oct. 19, 1894. New York.

Bien. Rept. Iowa Agr. Col., 7.—*7th Biennial Report of the Iowa Agricultural College.* (See Bessey, C. E.)

Bijdr. Kenn. Orth.—*Bijdragen de Kennis der Orthoptera.* (See W. De Haan.)

Blatchley, W. S.—*Some Indiana Acrididæ*, I. In the Can. Ent. xxiii, 74–81, April, 98–100, May, 1891.

Blatchley, W. S.—*Some Indiana Acrididæ*, III. In the Can. Ent. xxvi, 217–223, and 242–248, 1894.

Bolivar, Ignacio.—*Synòpsie de los Orthòpteros de España y Portugal.* 1–333, pl. i–vii. Madrid, 1876. 8vo.

Bolivar, Ignacio.—*Énumèration des Orthoptères de l'Ile de Cuba.* Extrait des Mem. Soc. Zool. France, I, 1–49. 1888.

Brit. N. Am. Bound. Com.—*British North American Boundary Commission.* Report on the geology and resources of the region in the vicinity of the forty-ninth parallel, from the Lake of the Woods to the Rocky Mountains, with lists of plants and animals collected, and notes on the fossils, by George M. Dawson, Assoc. R. S. M., F. G. S., Geologist and Botanist to the Commission. Appendix D, Orthoptera, by S. H. Scudder. Montreal, 1873. 8vo.

Bruner, L.—*List of Orthoptera found in Nebraska.* In the Can. Ent. ix, 144, 145. August, 1877.

Bruner, L.—*Notes on other Locusts and on the Western Cricket.* Chap. iv, 53–64, 3rd Rept. U. S. Ent. Com. 1883.

Bruner, L.—*Report on the Abundance of the Rocky Mountain Locust in 1885.* 303–308, Rept. Com. Agr., 1885. Washington. 1885.

Bruner, L.—*First Contribution to a Knowledge of the Orthoptera of Kansas.* 125–139, I, no. 4. Oct., 1885. In Bul. Wash. Col. Lab. Nat. Hist.

Bruner, L.—*Second Contribution to a Knowledge of the Orthoptera of Kansas*, I, No. 7, 193–200. 1886. In Bul. Wash. Col. Lab. Nat. Hist.

Bruner, L.—*Locusts* (*Grasshoppers*). 167, 168. Rept. Com. Agr., 1887. Washington. 1888.

Bruner, L.—*New North American Acrididæ Found North of the Mexican Boundary.* From the Proc. U. S. Nat. Mus. XII, 1889, 47–82, pl. i, fig. 11. Feb. 5, 1890. Washington

Bruner, L.—*Nicaraguan Orthoptera.* In Bul. Lab. Nat. Hist. State Univ. Iowa, vol. III, no. 2, art. 6, 58–69, pl. ii. and iii. March, 1895.

Brunner von Wattenwyl, C.—*Prodromus der Europaischen Orthopteren.* 1–466, pl. i.–xi. One map. Leipzig, 1862. 8vo.

Brunner von Wattenwyl, C.—*On the Orthoptera of the Island, Grenada, West Indies.* 599–611. Pl. lii, Proc. Zool. Soc., 1893. N. XLI. London. 8vo.

Brunner von Wattenwyl, C.—*Révision du Système des Orthoptères et Description des Espèces Rapportées par M. Leonardo Fea de Birmanie.* 1–230. Pl. i–vi. Ann. Mus. Civ. Stor. Nat. di Gen. Serie. 2. a, XIII (XXXIII). 23 November, 1892, 21 Aprile, 1893. 8vo.

Bul. Am. Mus. Nat. Hist.—*Bulletin of the American Museum of Natural History.* New York. 8vo.

Bul. Div. Ent.—*Bulletin of the Division of Entomology U. S. Department of Agriculture.* Published by the Government. Washington. 8vo. (See J. B. Smith.)

Bul. Ill. Mus. Nat. Hist.—*Bulletin of the Illinois Museum of Natural History.* Bloomington, Ill. 8vo.

Bul. Lab. Nat. Hist. State Univ. Iowa.—*Bulletin from the Laboratories of the State University of Iowa.* Published by the authority of the Regents. Iowa City. 8vo. (See L. Bruner.)

Bul. Mus. Comp. Zool.—*Bulletin of the Museum of Comparative Zoology at Harvard College,* vol. xxv, no. 1. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California. In charge of Alexander Agassiz. Carried on by the U.S. Fish Commission Steamer "Albatross" during 1891. Lieut.-Commander Z. L. Tanner, U. S. A., commanding. (See S. H. Scudder.)

Bul. N. J. Agr. Col. Ex. Sta.—*Bulletin of the New Jersey Agricultural College Experiment Station.* New Brunswick, New Jersey. 8vo. (See J. B. Smith.)

Bul. U. S. Geol. Surv. Terr. II., 1876.—*Bulletin of the Geological and Geographical Survey of the Territories.* Vol. II. 1876. F. V. Hayden, U. S. Geologist in charge. Washington, 1876. 8vo.

Bul. U. S. Geol. and Geog. Surv. Terr. III.—*Bulletin of the United States Geological and Geographical Survey of the Territories.* F. V. Hayden, U. S. Geologist in charge. Vol. III. Washington, 1877. 8vo.

Bul. Wash. Col. Lab. Nat. Hist.—*Bulletin of the Washburn College Laboratory of Natural History.* Edited by Francis W. Cragin, Topeka, Kan. 8vo. (See L. Bruner.)

Burmeister, H.—*Handbuch der Entomology.* Band II., Abtheil ii. Gymnognatha: erste hälfte, Orthoptera. Berlin, 1838. 8vo.

Can. Ent.—*The Canadian Entomologist.* London, Ontario. 8vo.

Can. Nat.—*The Canadian Naturalist and Geologist.* Montreal. 8vo.

Cat. Ins. Mass.—*Catalogue of the Insects of Massachusetts.* (See Thad. W. Harris.)

Cat. Derm. Salt.—*Catalogue of the Specimens of Dermaptera Saltatoria in the Collection of the British Museum.* (See Francis Walker.)

Caulfield, B. F.—*Preliminary List of Canadian Orthoptera,* 69-72, in the Eighteenth Ann. Rept. Ent. Soc. Ont., 1887. Toronto, 1888.

Cent. Ins. Rar.—*Centuria Insectorum rariorum.* (See C. von Linne.)

Cent. Orth.—*Century of Orthoptera.* (See S. H. Scudder.)

Coquillet, D. W.—*Report of the Locusts of the San Joaquin Valley, California.* 289–303. Rept. Com. Agr., 1885.

Coquillet, D. W.—*Do. Rept.* Ex. Rept. Ent. U. S. Dept. Agr., 1885. 1–17. Washington, 1886.

Davis, W. T.—*List of Orthoptera found on Staten Island.* V, 78–81 Ent. Am., April, 1889.

De Geer, C.—*Mémoires pour servir à l'historire des Insectes.* 7 Tom. 4to. Stockholm, 1752–78. (Orthoptera, Tome III, 1773.)

De Haan, W.—*Bijdragen tot de kennis der Orthoptera,* in the Verhandelingen over de Natuurlijke Geschiedenis der Nederlandsche overzeesche Bezittingen door de leden der natuurkuundige Commissie in Indie en andere Schrijvers. Uitgegeven door C. J. Temminch. Fol. Leiden, 1839–44. (Orthoptera, 1842.)

Ent. Am.—*Entomologica Americana.* (See Wm. T. Davis.)

Ent. N. Am. Ed. Lec.—*The Complete Writings of Thomas Say on the Entomology of North America.* (See T. Say.)

Ent. Notes VI.—*Entomological Notes VI.* (See S. H. Scudder.)

Ex. App. JJ. Chief Eng. 1876.—*Extract (Appendix H 9) from Appendix JJ of the Annual Report of the Chief of Engineers for 1876.* (See S. H. Scudder.)

Fabricius, J. C.—*Systema entomologie sistens insectorum classes*, ordines, genera, species, adjectis synonymis, locis, descriptionibus, observationibus. Flensburgi et Lipsiae. 1775. 8vo.

Fernald, C. H.—*The Orthoptera of New England*, designed for the use of students in the Massachusetts Agricultural College, and the farmers of the State. 1–61, 24th Annual Report of the Massachusetts Agricultural College, Jan., 1887.

Faune Entom. Can.—*Faune Entomologique du Canada* et particulariement de la Province de Quebec. (See L'Abbe Provancher.)

Fin. Rept. U. S. Geol. Surv. Neb.—*Final Report of the United States Geological Survey of Nebraska and Portions of the Adjacent Territories*, made under the directions of the Commissioner of the General Land Office by F. V. Hayden, United States Geologist. Washington, 1872. 8vo. (See S. H. Scudder.)

Fischer, L. H.—*Orthoptera Europaea.* Lipsiae, 1853. 4to.

Garman, H.—*The Orthoptera of Kentucky.* From Sixth Ann. Rept. Ky. Agr. Ex. Sta., 1–10. Lexington, 1894.

Hand. Ent. II.—*Handbuch Entomology.* (See H. Burmeister.)

Harris, Thad. W.—*Catalogue of the Insects of Massachusetts.* (Extract from Catalogue of the Animals and Plants of Massachusetts.) By E. Hitchcock. Amherst, 1835.

Harris, Thad. W.—*A Treatise on Some of the Insects of New England Which are Injurious to Vegetation.* Second edition. Boston, 1852. 8vo. (First edition, 1841.)

Harris, Thad. W.—*A Treatise on Some of the Insects Injurious to Vegetation.* Third edition, Boston, 1862 (posthumous).

Hist. Nat. Orth.—*Histoire naturelle des insectes Orthoptères.* (See J. G. Audinet Serville.)

Ins. Afr. Amr.—*Insects recuillis en Afrique et en Amerique.* (See A. M. F. J. Palisot de Beauvois.)

Ins. Am. Mer.—*De Insectorum in America meridionali habitantium vitae genere.* (See M. Perty.)

Ins. Life.—*Insect Life.* Devoted to the economy and life-habits of insects, especially in their relation to agriculture. Published by the authority of the Secretary of Agriculture. Periodical bulletin. Division of Entomology, U. S. Department of Agriculture. Washington. 8vo.

Jour. Acad. Nat. Sci. Phila.—*Journal of the Academy of Natural Science of Philadelphia.* Philadelphia. 8vo. (See T. Say.)

Jour. Bost. Soc. Nat. Hist.—*Journal of the Boston Society of Natural History.* Boston. 8vo.

Linne, C. von.—*Systema Naturae par regna tria naturae.* secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio decim reformata. 2 Tom. Holmiae, 1858–9 (Orthoptera, Tom. I, 1758).

Linne, C. von.—*Ditto.* Editio duodecim reformata 3 Tom, 8vo. Holmiæ, 1766–7. (Orthoptera, Tom. II, 1767.)

Linne, C. von.—*Ditto.* Editio decima tertia ad editionem duodecimam reformatam Holmiensam. 3 Tom. in 4 vols., 8vo. Vindobonæ, 1767–70. (Orthoptera, Tom. I, 1767.)

Linne, C. von.—*Centuria Insectorum rariorum.* 4to. Upsaliae, 1763.

Linne, C. von.—*Ditto,* in the Amoenitates Academicæ seu dissertationes physicæ, medicæ, botanicæ antehac seorsim editæ nunc collectæ et auctæ cum tabulis æneis, Tom. VI. 8vo. Holmiæ, 1763.

Lintner, J. A.—*Chimarocephala viridifasciata, DeGeer.* The Green-striped Locust. 187–198. Second Rept. Ins. N. Y., 1885.

McNeill, Jerome.—*A List of the Orthoptera of Illinois.* III, Acrididæ (Œdipodini, Truxalini). Psyche, Vol. VI, 62–66. April, 1891.

Mem. Acad. St. Peter. V.—*Hemipterorum maxillosorum genera illustrata.* (See C. P. Thunberg.)

Mem. Ins.—*Mémoires pour servir l'histoire des insectes.* (See C. De Geer.)

Mem. Soc. Zool. France.—*Mémoires de la Société Zoologique de France.* Paris, 8vo. (See Ignacio Bolivar.)

Morse, Albert Pitts.—*A New Species of Stenobothrus from Connecticut*, with remarks on other New England species. Psyche, VI, 477–479. June, 1893.

Morse, Albert Pitts.—*Wing-length in Some New England Acrididæ.* VII, 13–55. Psyche, January, 1894.

Morse, Albert Pitts.—*A Preliminary List of the Acrididæ of New England.* VII, 102–108. Psyche, June–September, 1894.

Morse, S. P.—*Notes on the Orthoptera of Penikese and Cuttyhunk.* Psyche, VII, 179–80. Dec., 1894.

Morse, S. P.—*Notes on the Acrididæ of New England, II. Truxalinæ.* In Psyche, VII, 323–327, 342–344, 382–384, 402–403, 407–411, 419–422, 443–445, pl. vii. January–December, 1896.

N. Am. Fauna, 7.—*North American Fauna, No. 7.* The Death Valley Expedition, a biological survey of parts of California, Nevada, Arizona, and Utah. Part II, 1–393, pl. i–xiv, maps i–v. Washington, 1893.

Ninth Rep. Ins. Ill.—*The Ninth Report on the Noxious and Beneficial Insects of Illinois.* (See Cyrus Thomas.)

Nov. Act. Upsal. IX.—*Truxalis insecti genus illustratum.* (See C. P. Thunberg.)

Ofv. Vet. Akad. Forh.—*Ofversigt of konglingen vetenskap–akademiens förhandlingar.* (See C. Stal.)

Orth. Eur.—*Orthoptera Europaea.* (See L. H. Fischer.)

Orth. Nov. Am., Ser. II.—*Orthoptera nova americana, Series II.* (See H. de Saussure.)

Orth. N. E.—*The Orthoptera of New England.* (See C. H. Fernald.)

Osborn, Herbert.—*On the Orthopterous Fauna of Iowa.* In the Can. Ent., xxiv, 36. Feb., 1892. An abstract of a paper read before the Iowa Acad. of Sciences, Dec. 29, 1891.

Osborn, Herbert.—*On the Orthopterous Fauna of Iowa.* In the Proc. Iowa Acad. of Sci. for 1890–91. I, 2–6. Des Moines, 1892.

Palisot de Beauvois, A. M. F. J.—*Insectes recueillis en Afrique et en Amérique*, dans les royaumes d'Oware à Saint Domingue et dans les États-unis pendant les années 1786–97.. Fol. Paris, 1805–21.

Perty, M. de.—*Insectorum in America meridionali habitantium vitæ genere*, moribus ac distributione geographica observationes nonnullæ; in Delectus animalium articulatorum quæ in itinere per Brasilium annis 1817–20 jussu et auspiciis Maximiliani Joseph I, Bavariæ regis augustissime peracto collegerunt Dr. J. B. de Spix et Dr. C. F. Ph. de Martius. Degessit, descripsit, pingenda curavit Dr. Maximilianus Perty, praefatus est et edidit C. F. Ph. de Martius. Fol. Monachii, 1830–34.

Prelim. Rept. U. S. Geol. Surv. Mont.—*Preliminary Report of the United States Geological Survey of Montana and the Adjacent Territories*, being a fifth annual report of progress. By F. V. Hayden, United States Geologist. Washington, 1872. Pl. i–vi, pp. 1–538. 8vo. (See Cyrus Thomas.)

Prelim. Rept. U. S. Geol. Surv. Wyo.—*Preliminary Report of the United States Geological Survey of Wyoming and Portions of Contiguous Territories.* By F. V. Hayden, United States Geologist. Washington, 1871. 8vo.

Proc. Ac. Nat. Sci. Phila.—*Proceedings of the Academy of Natural Science of Philadelphia.* Published by the Society.

Proc. Am. Ent. Soc.—Proceedings of the American Entomological Society. Philadelphia. 8vo.

Proc. Bost. Soc. N. H.—*Proceedings of the Boston Society of Natural History.* Boston. Published by the Society.

Proc. Dav. Ac. N. S.—*Proceedings of the Davenport Academy of Natural Sciences.* Published by the Society.

Proc. Ent. Soc. Phila.—*Proceedings of the Entomological Society of Philadelphia.* Philadelphia. 8vo.

Proc. Iowa Ac. Sci.—*Proceedings of the Iowa Academy of Science.* Des Moines. 8vo.

Proc. Port. Soc. Nat. Hist.—*Proceedings of the Portland Society of Natural History.* Portland, Maine. (See Sidney I. Smith.)

Proc. U. S. Nat. Mus.—*Proceedings of the United States National Museum.* Washington. 8vo.

Prod. Eur. Orth.—*Prodromus der Europaischen Orthoptera.* (See Brunner von Wattenwyl.)

Provancher, Leon.—*Faune entomologique du Canada.* Vol. II. Fasc. i., Les Orthopteres et les Nevropteres (Orthoptera, p. i–v and 1–53, figs. 1–9). November, 1877. Quebec. 8vo.

Psyche.—*A Journal of Entomology.* (Established in 1874.) Published by the Cambridge Entomological Club. Cambridge, Mass., U. S. A.

Rathvon, S. S.—*Orthoptera.* 374–390, pl. iv, fig. 129. Rept. Com. Agr., 1862. Washington, 1863.

Recen. Orth., I.—*Recensio Orthopterorum*, part I. (See C. Stål.)

Rept. Com. Agr.—*Report of the Commissioner of Agriculture.* Washington. 8vo.

Rept. Conn. Sec. Agr.—*Annual Report of the Secretary of Agriculture for Connecticut.* Hartford. 8vo. (See S. I. Smith.)

Rept. Geol. New Hamp.—*Final Report upon the Geology of New Hampshire.* (See S. H. Scudder.)

Rept. Geol. Surv. W. 100 Mer. V. Zool.—*Report upon the Collections of Orthoptera* made in portions of Nevada, Utah, California, and Arizona during the years 1871, 1872, 1873 and 1874. (See Cyrus Thomas.)

Rept. Ins. N. Y.—*Report on the Injurious and other Insects of the State of New York.* Albany. 8vo. (See J. A. Lintner.)

Rept. U. S. Ent. Com. 2nd.—*Second Report of the United States Entomological Commission for the Years 1878 and 1879.* Relating to the Rocky Mountain Locust and the Western Cricket, and treating of the best means of subduing the locust in its permanent breeding grounds, with a view of preventing its migrations into other fertile portions of the trans-Mississippi country, in pursuance of appropriations made by Congress for this purpose, with map and illustrations. Pp. i–xviii, 1–322, (1)–(80), maps 1–6, 1–4, pl. i–xviii. Washington, 1880.

App. 11.—*List of the Orthoptera Collected by Dr. A. S. Packard in the Western United States in the Summer of 1877.* (23)–(28), pl. i.

Rept. U. S. Ent. Com. 3d.—*Third Report of the United States Entomological Commission*, relating to the Rocky Mountain Locust, the Army Worm, and the Hessian Fly, together with descriptions of larvæ of injurious forest insects, studies on the embryological development of the locust and on other insects, and on the systematic position of the *Orthoptera* in relation to other orders of insects. Pp. i–xiv, 1–347, (1)–(11), (1)–(92), pl. i–xliv, maps i–iii. Washington, 1883. 8vo.

Rept. U. S. Geol. Surv. Terr. 1873.—*Report of the United States Geological Survey of the Territories.* F. V. Hayden, United States Geologist, in charge. In five volumes. Washington, 1873. 4to. Volume V. Zoology and Botany. Part i. Synopsis of the Acrididæ of North America. By Cyrus Thomas, Ph.D.

Rev. Et. Mag. de Zool.—*Revue et Magazin de Zoologie, pure et applique.* Recueil mensuel destiné à faciliter aux savants de tous les pays les moyens de publier leur observations de zoologie pure et appliquee a l'industrie et a l'agriculture leur travaux de paleontologie d'anatomie et de physiologie comparées et a leur tenir au courrant des nouvelles decouvertes et de progress de la science. Paris. 8vo.

Rev. Sys. Orth.—*Révision du Système des Orthoptères.* (See Brunner von Wattenwyl.)

Riley, C. V.—*Report on a Small Collection of Insects made during the Death Valley Expedition.* 235–252, in N. Am. Fauna, 7. Washington, 1843.

Say, T.—*Description of New Hemipterous Insects* collected in the expedition to the Rocky Mountains, performed by order of Mr. Calhoun, Secretary of War, under the command of Major Long. In the Journal of the Academy of Natural Science of Philadelphia, Vol. IV. Philadelphia, 1825. 8vo.

Say, T.—*The Complete Writings of Thomas Say on the Entomology of North America*, edited by John L. Le Conte, M.D. 2 Vols. 8vo. New York, 1859. (Posthumous.) See also Uhler, P. R.

Saussure, H. de.—*Orthoptera nova Americana.* Diagnoses prælimináries (Series II) from the Rev. et Mag. de Zool., Mars, 1861. 126, 153, 313.

Schufeldt, R. W.—*Orthoptera*, in observations upon a collection of insects made in the vicinity of New Orleans, Louisiana, during the years 1882 and 1883. Pp. 331–336. Proc. U. S. Nat. Mus., VII, 1884.

Scudder, S. H.—*Materials for a Monograph of North American Orthoptera*, including a catalogue of the known New England species in the Bost. Jour. Nat. Hist., VII, no. 3, 409–480. Boston, 1862.

Scudder, S. H.—*List of Orthoptera Collected on a Trip from Assiniboia to Cumberland.* In Can. Nat., VII, art. xxix, 283–288, August, 1862.

Scudder, S. H.—*Songs of Grasshoppers.* II, 113, Am. Nat., 1868.

Scudder, S. H.—*Descriptions of New Species of Orthoptera in the Collection of the American Entomological Society.* In Trans. Am. Ent. Soc., II, 305–307. April, 1869.

Scudder, S. H.—*Notes on the Orthoptera Collected by F. V. Hayden in Nebraska.* 251–261, in Final Report U. S. Geol. Surv. Neb. 1872.

Scudder, S. H.—*The Distribution of Insects in New Hampshire.* A chapter from the first volume of the Fin. Rept. Geol. New Hamp., 331–384, maps 1, 2, figs. 46–59, pl. A. Concord, 1874.

Scudder, S. H.—*Notice of the Butterflies and Orthoptera* collected by Mr. George M. Dawson, as Naturalist of the B. N. A. Boundary Commission. Appendix D, 341–345, in Brit. N. Am. Bound. Com. Montreal, 1875.

Scudder, S. H.—*A Century of Orthoptera.* In Proc. Bost. Soc. N.H. Decade IV. *Acridii,* XVII, 510–517. Aug., 1875. Decade VII. *Acridii,* XIX, 27–35. April and May, 1877.

Scudder, S. H.—*Orth. Coll. A. S. Packard* in Colorado and neighboring territories during the summer of 1875. 261–267 in Bul. U. S. Geol. and Geog. Surv., II, 1876.

Scudder, S. H.—*Report upon the Orthoptera Collected by the Expedition for Geographical Surveys West of the 100th Meridian* during the field season of 1875. Lieut. George M. Wheeler, Corps of Engineers U. S. Army, in charge. Extract Appendix H 9 from Appendix JJ of the Annual Report of the Chief of Engineers for 1876, 498–515. 1876.

Scudder, S. H.—*List of Orthoptera Collected by A. S. Packard, Jr.,* in the Western United States in the summer of 1877. In Second Report U. S. Ent. Com. App. II, (32)–(28), pl. xvii.

Scudder, S. H.—*Entomological Notes VI.* Reprinted from the Proc. Bost. Soc. Nat. Hist., XIX, 1–55. 1877–78. Boston. 8vo.

Scudder, S. H.—*The Songs of our Grasshoppers and Crickets.* 62–78, 23d Ann. Rept. Ent. Soc. Ont., 1892. Toronto, 1893.

Serville, J. G. Audinet.—*Histoire naturelle des insectes Orthopteres.* Pp. iii–xviii, 1–776, 1–4, pl. i–xiv. Paris, 1839. 8vo.

Smith, John B.—*Locusts and Crickets.* 30–31 in report upon cranberry and hop insects. 9–50 in Bul. no. 4, U. S. Dept. of Agr., Div. of Ent. 1884.

Smith, John B.—*Grasshoppers, Locusts, Crickets.* Being Bul. 90 New Jersey Agricultural Experiment Station, Dec. 8, 1892. 1–34. 8vo. This article is reprinted in Report of the Entomological Department of the New Jersey Agricultural College Experiment Station for the year 1892. 408–439, pl. ii.

Smith, Sidney I.—*On the Orthoptera of the State of Maine.* From the Proc. Port. Soc. Nat. Hist., 143–151. February, 1868.

Smith, Sidney I.—*Grasshoppers and Their Allies.* In Report of the Entomologist to the Connecticut Board of Agriculture in the Rept. Conn. Secy. Agr., 350–383. Hartford, 1872.

Syn. Ort. Esp.—*Synópsis de les Ortópteros de España y Portugal.* (See Ignacio Bolivar.)

Sys. Ent.—*Systema Entomologiæ.* (See J. C. Fabricius.)

Sys. Nat. Orth. I.—*Systema naturæ per regna tria naturæ.* (See C. von Linnè.)

Stal, C.—*Öfversigt of konlingen vetenskaps akademiens förhandlingar.* Stockholm.

Thomas, Cyrus. *Orthoptera.* In Insects Injurious to Vegetation in Illinois. Vol. V, 439–454, 1861–4, in the Transactions of the Illinois State Agricultural Society, with report from County Agricultural Societies and Kindred Associations. Springfield, 1865. 8vo.

Thomas, Cyrus.—*Descriptions of Grasshoppers from Colorado.* In Proc. Acad. Nat. Sci., no. 2, 74–84. July, 1870.

Thomas, Cyrus.—*A List and Description of New Species of Orthoptera.* 265–284 in the Prelim. Rept. U. S. Geol. Surv. Wyoming. 1870.

Thomas, Cyrus.—*Contributions to Orthopterology.* In Proc. Acad. Nat. Sci. Phila., 149–153. July, 1871.

Thomas, Cyrus.—*Notes on the Saltatorial Orthoptera of the Rocky Mountain Regions.* 423–466 in the Prelim. Rept. U. S. Geol. Surv. Mont. Washington, 1872. 8vo.

Thomas, Cyrus.—*Syn. Acrid. N. Am.* 1–262, pl. i, figs. 1–17, pt. i, vol. V, Zoology and Botany in Rept. U. S. Geol. Surv. Terr., 1873.

Thomas, Cyrus.—*Description of some New Orthoptera*, and notes on some species but little known. 63–71 in Bul. 2 U. S. Geol. and Geog. Surv. of the Territories, 1874. Washington. 8vo.

Thomas, Cyrus.—*Report on the Collections of Orthoptera* made in portions of Nevada, Utah, California, Colorado, New Mexico, and Arizona during the years 1871, 1872, 1873, and 1874. Chapter xiii, 844–908, pl. xliii–xlv, in vol. V, Zoology of Rept. Geog. and Geol Ex. Surv. W. 100 Mer., 1875. Washington.

Thomas, Cyrus.—*A List of the Orthoptera of Illinois.* Article vii (59–69), in Bul. 1, Ill. Mus. Nat. Hist., Dec. 29, 1876.

Thomas, Cyrus.—*A List of Orthoptera* collected by J. Duncan Putnam, of Davenport, Iowa, during the summers of 1872, 1873, 1874, and 1875, chiefly in Colorado, Utah, and Wyoming Territories. In the Proc. Dav. Ac. N. S., I, 249–264. July, 1876. Pl. xxxvi.

Thomas, Cyrus.—*The Acrididæ of Illinois*, being pt. III of the Manual of Economic Entomology, 73–142 of the 9th Rept. Nox. and Ben. Ins. Ill. 1880.

Thunberg, C. P.—*Hemipterorum Maxillosorum Genera Illustrata.* In the Mémoires de l'Academe Impériale des Sciences de St. Pétersbourg. Tome V. St. Pétersbourg, 1815. 4to.

Thunberg, C. P.—*Truxalis Insecti Genus Illustratum.* In the Nova Acta Regiae Societatis Upsaliensis. Tome IX. Upsaliae, 1827.

Townsend, C. H. Tyler.—*Biologic Notes on New Mexico Insects.* Can. Ent., xxiv, 193–200. Aug., 1892.

Townsend, C. H. Tyler.—*On the Injurious and Other Locusts of New Mexico and Arizona.* VI, 29–32. Ins. Life, 1893.

Trans. Am. Ent. Soc.— *Transactions of the American Entomological Society.* Philadelphia. 8vo.

Trans. Ill. State Agr. Soc., V.—*Orthoptera* In Insects Injurious to Vegetation in Illinois. (See Cyrus Thomas.)

Treat. Ins. Inj. Veg.—*A Treatise on Some of the Insects Injurious to Vegetation.* (See Thad. W. Harris.)

Uhler, P. R.—*Orthopterological Contributions.* 543–555, vol. II of the Proc. Ent. Soc. Phila. March, 1864.

Uhler, P. R.—*Report upon the Insects Collected by P. R. Uhler* during the explorations of 1875, including monographs of the families *Cydnidæ* and *Saldæ* and the *Hemiptera* collected by A. S. Packard, Jr., M.D., being Art. XIV in Bul. U. S. Geol. and Geog. Surv. Terr., III. Washington, 1877 (Orthoptera, 357–361, and 791–796).

Walker, Francis.—*Catalogue of Specimens of Dermaptera Saltatoria in the Collection of the British Museum.* London. 8vo. Part III. 325–604. 1870. Part IV. 605–609. 1870. Part V. 811–850. 1871. Supplement to Blattariæ, 1–43, 1871. Supplement to the Catalogue of Dermaptera Saltatoria, 1–95, 1871. On the Geographical Distribution of Dermaptera, 96–116, 1871.

KEY TO TRUXALINÆ.

A.[1] Head distinctly longer than the pronotum, eyes very oblique, nearly horizontal; metasternal lobes contiguous. (Fig. 2b, 2c.)

B.[1] Tegmina very much shorter than the abdomen; spines of the posterior tibiæ minute and numerous, about 25 ..... 1.—*Radinotatum*, n. gen.

B.[2] Tegmina exceeding the abdomen; spines of the posterior tibiæ less numerous, about 16 ..... 2.—*Achurum*, Sauss.

A.[2] Head sometimes equaling, never exceeding, the pronotum in length.

B.[1] Mesosternal lobes separated by a space almost linear in its narrowest part (Fig. 3b); metasternal lobes approximate in both male and female ..... 3.—*Mermiria*, Stål.

B.[2] Mesosternal lobes separated by a space never much longer than broad (Fig. 4b), generally broader than long (Fig. 11b); metasternal lobes rarely approximate in the male, very rarely in the female.

C.[1] Antennæ triquetrous (Fig. 4a) or strongly depressed at the base and distinctly acuminate (Fig. 5a); pronotum with the lateral lobes vertical and straight and the lateral carinæ not at all sinuate (Fig. 5a); median carina of the pronotum generally cut much behind the middle (Fig. 3a); the disk plain and unstriped.

D.[1] Spines of the exterior margin of the posterior tibia 15 or more; posterior margin of the disk of the pronotum nearly straight, scarcely angled or rounded ..... 4.—*Pseudopomala*, Morse.

D.[2] Spines on the exterior margin of the posterior tibia less than 15; posterior margin of the disk of the pronotum obtusely angled or rounded.

E.[1] Tegmina exceeding the abdomen considerably in both sexes (in some large females but little); lateral carinæ of the pronotum quite as distinct as the median; spurs at the apex of the posterior tibiæ on the inner side about equal ..... 5.—*Truxalis*, Fabr.

E.² Tegmina not exceeding the abdomen, even in the male.

F.¹ Lateral foveolæ of the vertex linear and distinct (Fig. 6); tegmina quite unspotted; inner spurs of the posterior tibiæ equal. . . . . 6.—*Napaia*, n. gen.

F.² Lateral foveolæ less distinct and sub-triangular or obsolete; tegmina more or less distinctly spotted as well as the face and pronotum; inner tibial spurs very unequal, the longer but little shorter than the first tarsal joint. . . . . 7.—*Oreina*, n. gen.

C.² Antennæ never triquetrous (Fig. 4a), sometimes plainly depressed basally and acuminate (Fig. 5a), most commonly filiform (Fig. 10a), rarely clavate (Fig. 9a); pronotum with the lateral lobes less distinctly vertical, with the lateral carinæ very rarely quite straight, but gently (Fig. 12a) or strongly (Fig. 10a) sinuate near the middle, median carina of the pronotum generally cut in or not far behind the middle. (Figs. 9a, 10a.)

D.¹ Tempora either foveolate or plain, not visible from above. (Figs. 7a, 8a, 11a.)

E.¹ Scutellum of the vertex with a distinct median carina which is usually a coarse raised line stronger anteriorly. (Figs. 7a, 8a, 12a.)

F.¹ Spurs on the inner side of the posterior tibiæ very unequal, the apical spur being twice as long as the other (Figs. 8 and 9); antennæ very greatly exceeding the head and pronotum.

G.¹ Antennæ depressed basally and distinctly acuminate. No supplementary carinæ (compare Fig. 9a) present either upon the head or disk of the pronotum . . . . . 8.—*Pedeticum*, n. gen.

G.² Antennæ depressed apically and somewhat clavate. Supplementary carinæ accompanying the median carina upon either the head or the disk of the pronotum. (Fig. 9a). . . . . 9.—*Eritettix*, Bruner.

F.² Spines of the inner side of the posterior tibiæ about equal in length. (Fig. 11.)

G.¹ Spines on the exterior margin of the posterior tibiæ 19–21. . . . . 10.—*Syrbula*, Stål.

G.² Spines of the exterior margin of the posterior tibiæ not exceeding 15.

H.¹ Median carina of the pronotum cut in the middle by the principal sulcus.

I.¹ Color striped distinctly or obscurely. Scapular area of the tegmina broader than the mediastine area. (Fig. 11.)

J.¹ Lateral carinæ of the pronotum obsolete, median carina accompanied by a supplementary pair upon the disk. (Fig. 11a). . . . . 11.—*Amphitornus*, n. gen.

J.² Lateral carinæ of the pronotum present, median carina not accompanied by supplementary carinæ upon the disk. (Fig. 12a) ....12.—*Akentetus*, n. gen.

I.² Color plain; scapular area of the elytra not broader than the mediastine area. (Fig. 13.).....13.—*Amblytropidia*, Stål.

H.² Median carina of the pronotum cut much behind the middle by the principal sulcus.....14.—*Chloeältis*, Harr.

E.² Scutellum of the vertex with no distinct median carina. (Fig. 15a.)

F.¹ Median carina of the pronotum cut much behind the middle by the principal sulcus.

G.¹ Posterior margin of the metazone angulate. Tegmina usually much shorter than the abdomen, with the ulnar area not very much wider than the discoidal area. (Fig. 22, u.a., d.a.)..... .....15.—*Dichromorpha*, Morse.

G.² Posterior margin of the metazone rounded or not distinctly angulate. Tegmina not much shorter than the abdomen, with the ulnar area very wide and several times as broad as the discoidal area..... ....16.—*Clinocephalus*, Morse.

F.² Median carina cut near the middle by the principal sulcus.

G.¹ Hind tibiæ never red.....17.—*Orphula*, Stål.

G.² Hind tibiæ red.

H.¹ Antennæ depressed basally, long and acuminate; face strongly oblique.....18.—*Alpha*, Brunner.

H.² Antennæ filiform, face moderately oblique in the male, subperpendicular in the female.....19.—*Phlibostroma*, Scud.

D.² Tempora plain or foveolate, visible from above (in *Mecostethus* small or minute, triangular, and basal (Fig. 22a). In this case the intercalary vein is very strong (Fig. 22). In *Boötettix*, female, not very easily visible from above as they are almost vertical plain triangular spaces (Figs. 23a and 23b). In this case the antennæ are shorter than the head and pronotum and the lateral carinæ of the pronotum are wanting).

E.¹ The vertex is not bounded in front by a raised line and, viewed from the side, it does not form an angle with the face. (Figs 20 and 21; compare 22 and 23.) The tempora are very faintly impressed spaces which are very strongly declivent. Intercalary vein of the tegmina wanting. (Figs. 20, 21.)

F.¹ Tegmina plain; lateral carinæ of the pronotum very little sinuate. .....20.—*Boöpedon*, Thos.

F.² Tegmina distinctly spotted; lateral carinæ of the pronotum strongly sinuate.....21.—*Plectrophorus*, n. gen.

E.² The vertex bounded in front by a raised line, viewed from the side it forms a more or less distinct angle with the face or it is not at all angulate.

F.¹ Median carina of the pronotum high and sharp, cut by the principal sulcus in, or plainly in front of, the middle. Intercalary vein very strong. Apical spurs on the inner side of the posterior tibiæ subequal.....22.—*Mecostethus*, Fieb.

F.² Median carina of the pronotum rarely cut plainly in front of the middle, in this case it is not high and sharp, or the intercalary vein is not strong. (In *Stirapleura* and *Psolocssa* the intercalary vein is present but not very strong and the inner apical spurs of the posterior tibiæ are very unequal).

G.¹ Lateral carinæ of the pronotum entirely obsolete even on the metazone and the anterior of the prozone. Scapular area of the tegmina of the male forming a conspicuous musical organ.

H.¹ Vertex of the head forming an acute angle with the face; tempora nearly plain triangular spaces.....23.—*Boötettix*, Bruner.

H.² Vertex of the head forming an obtuse angle with the face. Tempora impressed, trapezoidal... .24.—*Ligurotettix*, n. gen.

G.² Lateral carinæ of the pronotum usually distinct, present at least upon the metazone and the anterior part of the prozone.

H.¹ Tempora elongate, narrow, from two to four times as long as broad. The apical spur on the inner side of the posterior tibiæ is much less than twice as long as the one beside it.

I.¹ Antennæ filiform.

J.¹ Median carina of the pronotum cut in the middle. Posterior margin of the pronotum plainly more angulate than the anterior. .....25.—*Stenobothrus*, Fisch.

J.² Median carina of the pronotum cut plainly behind the middle. Posterior margin of the pronotum not more angulate than the anterior.....26.—*Brunneria*, n. gen.

I.² Antennæ clavate.....27.—*Gomphocerus*, Thunb.

H.² Tempora short, little more than once as long as broad or, when twice as long, the apical spur on the inner side of the posterior tibiæ is twice as long as the one beside it.

I.¹ Posterior margin of the metazone straight or just perceptibly angulate. Pronotum shorter than the head, which is very large. .....28.—*Pnigodes*, n. gen.

I.² Posterior margin of the metazone distinctly or strongly angulate. Pronotum never shorter than the head, generally plainly longer (viewed from above).

J.¹ Median carina of the pronotum cut behind the middle of the pronotum. Vertex of the head destitute of a median carina. Posterior margin of the metazone very obtusely angulate..... ..... 29.—*Eremnus*, n. gen.

J.² Median carina of the pronotum cut more or less plainly in front of the middle, never behind. Summit of the head furnished with a more or less distinct median carina which sometimes extends nearly or quite to the tip of the vertex and is most distinct on the posterior part of the scutellum. Posterior margin of the metazone strongly angulate.

K.¹ Lateral lobes of the pronotum furnished with a single or double series of short irregular and sometimes indistinct carinæ which extend from about the middle of the anterior margin toward or to the upper posterior angle; also with a second more distinct, low, broad, light-colored carina which extends from the middle of each lobe toward the lower posterior angle. Sometimes this carina is distinct only at the anterior end. Face nearly perpendicular, rarely very moderately inclined. Frontal costa sulcate throughout, acuminate at the vertex and regularly divergent below..... ..... 30.—*Stirapleura*, Scud.

K.² Lateral lobes of the pronotum destitute of carinæ. Face distinctly and considerably oblique. Frontal costa not sharply acuminate above and scarcely sulcate at any point....31.—*Psoloëssa*, Scud.

I. RADINOTATUM,* n. gen. Fig. 1.

Sexes very unequal in size. Body very slender and considerably compressed. Head plainly longer than the pronotum, elongate pyramidal with the occiput and vertex in the same plane, ascending, the face extremely inclined and, viewed from the side, decidedly sinuate. The vertex in front of the eyes is about as long as the eyes, somewhat longer than broad with the lateral margins parallel, and suddenly and roundly acuminate in front where they form an angle a little greater than 90 degrees. The margins of the vertex are not raised, but are extended horizontally into lamellæ which are wider anteriorly where they equal the lesser diameter of the eye. The scutellum of the ver-

*Ραδίνότατον, a very slender thing.

tex is concave with a median carina which continues to the end of the body. The tempora are entirely wanting. The frontal costa is a high, narrow ridge just below the vertex, very quickly expanding to form a very narrow deeply sulcate costa with the walls elevated and nearly parallel except on the lower part of the face where they expand slightly. The antennæ are short, triquetrous, placed higher than the eyes. The eyes are elongate ovate and are placed nearly horizontally. The ocelli are above the eyes instead of in front of them. The pronotum has all of the carinæ distinct and parallel, the median only being cut by the principal transverse incision about one-fourth the distance from the posterior border which is straight. The lateral lobes are vertical, with the lower border straight, the lower angles sharp, the anterior obtuse, the posterior acute, the anterior border very oblique and straight and the posterior border with a reëntral angle. Mesosternal lobes approximate, at least behind, in both male and female, metasternal lobes approximate behind in the female, approximate throughout in the male. Tegmina very rudimentary. Supra-anal plate of the male very long and acute, much exceeding the last ventral segment. Posterior femora very slender, scarcely compressed, with the apical angles produced. Spines of the posterior tibia minute and very numerous. Inner apical spur of the posterior tibiæ much longer than the outer.

This genus is based upon the single species formerly known as *Achurum brevipenne*, Thos. The genus *Achurum* was founded upon the species *A. sumichrasti*, Sauss., and made by Stål to include the closely allied species *A. acridodes*, Stål, but these species are so radically different from *R. brevipenne*, Thos., in the structure of the posterior femora, and in the last ventral segment of the male, as well as in the tegmina, in the absence of the lateral foveolæ, and in other particulars, that it makes the erection of a new genus advisable.

In part, *Truxalis* (*Achurum*) Sauss., 1861. Orth. Nov. Am. Ser. II, 15.

In part, *Achurum*, Stål, 1873. Recen. Orth. I, 89.

In part, *Achurum*, Brunner, 1893. Rev. Sys. Orth. 118.

R. BREVIPENNE, Thos. Fig. 1a, 1b.

Length (male)	31	mm.	(female)	43	mm.
Tegmina "	4.5	mm.	"	5	mm.
Antennæ "	9	mm.	"	6.5	mm.
Post. Fem. "	14	mm.	"	19	mm.

The median carina of the head is faint upon the posterior part of the occiput. The transverse sulci of the pronotum are obsolete except the principal one, which is barely visible as cutting the median carina. The lateral carinæ are not cut by any incision. The tegmina are about as long as the pronotum, very narrow, bluntly pointed and separated by a space nearly twice as great as their width. The posterior femora are very much (male) or decidedly (female) shorter than abdomen, very little expanded at the base. The spines of the posterior tibiæ are minute and very numerous, being about 25 on the outside. The supra-anal plate of the male is five times as long as the last abdominal segment and projects far beyond the abdomen.

Truxalis brevipennis, Thos., 1873. Syn. Acrid. N. Am., 58, pl. fig. 12.
Achurum brevipennis, Scud, 1877. Ent. Notes, VI, 29.

Hab. This species has been reported only from Florida, where it is probably not uncommon in suitable situations. According to Scudder it is common about Fort Reed, Fla. I have specimens from Orange, Fla., and the National Museum contains a female, which seems to be Thomas' type, and a single male without a label.

II. **ACHURUM**, Sauss. Fig. 2.

Sexes not very unequal in size, very slender, with the head longer than the pronotum and the face approaching horizontal. The vertex is much longer than wide with the sides parallel and the front rounded, extending in front of the eyes a distance equal to their length. It is convex with a plain median carina. At the sides it is somewhat lamellate and horizontally extended. The frontal costa is a high, narrow ridge just below the vertex. A short distance below, it becomes sulcate and the sides are slightly divergent to the ocellus, below which they diverge with increasing rapidity and reach the clypeus. The face, seen from the side, is distinctly sinuate. The lateral foveolæ are distinctly linear and are separated from the face by a delicate carina. The eyes are long, elliptical, nearly horizontal and near the middle of the head. The antennæ are much flattened, triquetrous, regularly acuminate, and shorter than the head and pronotum. The pronotum is plain above with the three carinæ distinct and parallel; they are cut by the principal sulcus much behind the middle. The posterior margin of the metazone is roundly angulate. The lateral lobes of the pronotum are vertical and distinctly higher behind with the anterior and posterior borders much inclined, the latter sinuate and the lower

straight and in the same straight line with the lower margin of the cheeks. The prosternum has a very low pyramidal spine. The mesosternal lobes are separated by a space longer than broad in both sexes, and the metasternal lobes are contiguous behind. The tegmina and wings are very long and narrow; they exceed the abdomen much or little in length. The tegmina have the anal field forming a distinct angle with the discoidal field and they are acutely pointed. The ovipositor is small and moderately exerted. The posterior femora are unusually compressed and moderately wide on the basal portion. Their apical angles are produced into two blunt spines.

The posterior tibiæ are furnished on the outside with about 17 moderate spines and they have the apical spurs on the outside not very unequal to those on the inside. The supra-anal plate of the male is much shorter than the last ventral segment, which is acutely tapering and sharpest at the apex.

Achurum, Sauss., 1861. Orth. Nov. Am. II, 15.

Achurum, Stål., 1873. Recen. Orth., I, 89.

Achurum, Brunner, 1893. Rev. Sys. Orth., 118.

This is a North American genus represented by only two species.

KEY TO ACHURUM, Sauss.

A.[1] Tegmina much exceeding the abdomen; pronotum alutaceo-rugose.....1.—*Sumichrasti*, Sauss.

A.[2] Tegmina not exceeding the abdomen; pronotum not alutaceo-rugose, vertex of the head, disk of the pronotum, and anal area of the tegmina green.....2.—*Acridodes*, Stål.

1. ACHURUM SUMICHRASTI, Sauss. Fig. 2a, 2b, 2c.

Truxalis (*Achurum*) *sumichrasti*, Sauss., 1861. Orth. Nov. Am., II, 15.

Truxalis (*Achurum*) *sumichrasti*, Thos., 1873. Syn. Acrid. N. Am., 195.

Achurum sumichrasti, Walk., 1870. Cat. Derm. Salt., III, 518.

Achurum sumichrasti, Stål., 1873. Recen. Orth., I, 101.

Hab. This species is said by Saussure to belong to the temperate regions of Mexico. The National Museum contains specimens from Fort Grant, Arizona.

2. ACHURUM ACRIDODES, Stål.

Truxalis acridodes, Stål., 1873. Ofv. Vet. Akad. Förh., 30:4, p. 52.

Achurum acridodes, Stål, 1873. Recen. Orth., I, 101..

Achurum acridodes, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 M., V, Zool., 865.

Hab. Mexico. It is doubtful whether this species is distinct from *A. sumichrasti*. I have not seen it.

III. **MERMIRIA**, Stål. Fig. 3.

The head is long, sometimes equaling the pronotum, with the top slightly ascending, transversely moderately convex. Vertex horizontal, triangular or semi-elliptical, convex but more or less sulcate near the lateral carinæ, which are more or less distinct, never sharp and high, and which meet at an acute angle or are shortly or broadly rounded at the apex. The median carina of the vertex is either slight, but moderately distinct, or obsolete or entirely wanting. The lateral foveolæ are usually indistinct elongate triangular or sub-lunar spaces without distinct walls. The frontal costa is more or less completely sulcate (frequently very deeply sulcate between the antennæ) and strongly prominent, with the sides acuminate above and sub-parallel below, sometimes suddenly expanding and vanishing near the clypeus. The face, seen from the side, is straight or moderately or strongly sinuate and strongly (female) or very strongly (male) declivent. The antennæ are strongly triquetrous and acuminate and equaling (female) or exceeding considerably (male) the head and pronotum in length. The eyes are long ovate or elliptical and are placed very obliquely. The pronotum is long with the disk a little elevated toward the median carina which is distinct and cut once, more or less plainly, much behind the middle. The lateral carinæ are rarely distinct, usually indistinct or wanting, almost straight and parallel or very slightly divergent on the metazone. The latter has the posterior margin nearly straight or very obtusely angulate or gently rounded. The lateral lobes of the pronotum are vertical and parallel with both the anterior and posterior margins strongly oblique (the latter a little sinuate) and the lower margin straight and in the same line with the lower border of the cheeks. The prosternum has a low quadrate bent spine. The mesosternal lobes are separated by a space longer than broad (female) or are closed (male); the metesternal lobes are closed entirely (male) or behind (female). The tegmina and wings are well developed, usually equaling or exceeding the abdomen. The former have the scapular area a little widened and transparent and somewhat regularly scalariform. The

ovipositor is very short and small, scarcely exerted. Last ventral segment usually elongate and pointed, supra-anal plate acutely tapering. Posterior femora elongate and narrow. Posterior tibiæ with about 19 spines on the outer side. A distinctly post-ocular stripe of ferruginous or brown is usually present on the sides of the head and the lateral lobes of the pronotum and in the male, at least, a longitudinal median stripe of the same color extends from the vertex to the posterior edge of the pronotum.

Mermiria, Stål, 1873. Recen. Orth., I, 90.

Mermiria, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 866.

Mermiria, Brunner, 1893. Rev. Sys. Orth., 119.

In part, *Opsomala*, Serv., 1838. Hist. Nat. Orth,, 586.

In part, *Opsomala*, Burm., 1838. Handb. Ent., II, 610.

In part, *Opomala*, Thos., 1873. Syn. Acrid. N. Am., 62.

Xiphicera, Perty. Ins. Am. Mer.

This genus is represented by six closely allied species in North America. All the species known are natives of the Southern and Southwestern States though the extreme limits of the range of some of them extends as far north as Nebraska and Illinois.

Key to Mermiria, Stål.

A.[1] Face, seen from the side, straight, head distinctly shorter than the pronotum.

B.[1] Posterior femora not exceeding the tegmina, which are unspotted. Vertex rather shortly than broadly rounded in front.

C.[1] Vertex with some trace of a median carina. Posterior femora very long and slender, exceeding the abdomen in both sexes. Last ventral segment of male elongate, acutely tapering to a point..... 1.—*Bivittata*, Serv.

C.[2] Vertex entirely destitute of a median carina. Posterior femora comparatively short and heavy, not qnite reaching the end of the abdomen in the female. Last ventral segment short and not acutely tapering to a point..... 2.—*Texana*, Bruner.

B.[2] Posterior femora exceeding the tegmina in both sexes. Tegmina generally spotted. Vertex broadly rounded..... 3.—*Maculpennis*, Bruner.

A.[2] Face seen from the side plainly sinuate. Vertex as long as or longer than broad. Head as long as the pronotum.

B.¹ Vertex semi-elliptical rather than triangular with a faint median carina. Lateral carinæ of the pronotum present and moderately distinct. Posterior margin of the metazone hardly perceptibly rounded. . . . . 4.—*Neomexicana*, Thos.

B.² Vertex triangular rather than semi-elliptical. Lateral carinæ of the pronotum scarcely apparent. Posterior margin of the metazone plainly though very obtusely angulate or rounded.

C.¹ Vertex sub-triangular with the sides generally arcuate and the tip rounded, the median carina not entirely obsolete. The top of the head green with a ferruginous median stripe (at least in the male). Face green with a ferruginous stripe at each side. Median carina of the pronotum distinct, the sulci faint but visible. . . . . 5.—*Alacris*, Scud.

C.² Vertex acutely triangular with the sides straight and the tip hardly blunt even in the female, the median carina entirely wanting. The top of the head with a very broad fuscous stripe (at least in the male) which is separated from the post-ocular stripe by a green stripe no wider than the latter. Face purplish. Median carina of the pronotum less distinct. Sulci obsolete. . . . . 6.—*Rostrata* n. sp.

1. Mermiria bivittata, Serv.

Opsomala bivittata, Serv., 1839. Hist. Nat. Ins. Orth., 589.

Opsomala bivittata, Walk., 1870. Cat. Derm. Salt., III, 507.

Opomala bivittata, Thos., 1865. Trans. Ill. State Agr. Soc., V, 447.

Opomala bivittata, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 429.

Opomala bivittata, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 432.

Opomala bivittata, Scud., 1872. Final Rept. U.S.Geol. Surv. Neb., 250.

Opomala bivittata, Thos., 1873. Syn. Acrid. N.Am., 65, fig. 16.

Acridium bivittata, Bruner, 1877. Can. Ent., IX, 144.

Acridium bivitattum, de Haan, 1842. Bijdr. Kenn. Orth., 143.

Mermiria bivittata, Scud., 1877. Cent. Orth., 47.

Mermiria bivittata, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.

Mermiria bivittata, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, no. 4, 130.

Mermiria bivittata, Osborn, 1892. Proc. Iowa Acad. Sci., 1890–91, 4.

Mermiria bivittata, Townsend, 1893. Ins. Life, VI, 31.

Hab. United States east of the Rocky Mountains, extending as far north as Nebraska, Illinois, and Virginia.

This is the most widely distributed species of the genus.

2. Mermiria texana, Bruner.

Mermiria texana, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 53, pl. i, fig. 2.

Hab. Lerodo, Durango, Mex.; El Paso, Tex. (Bruner); Colorado Springs, Col.; Ft. Grant, Arizona. It is said by Bruner to be "met with only among the sisal producing plants growing upon the rocky hills back from the rivers."

3. Mermiria maculipennis, Bruner.

Mermiria maculipennis, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 54.

Hab. San Antonio, Carrizo Springs, Texas. (Bruner.)

The National Museum contains one of Bruner's types from Carrizo Springs and several other specimens from the same State, and in addition a male and female from Risville, Nevada, and a female from Kansas which have the tegmina unspotted, but in other respects seem to be very much like this species. It is possible that the species is not distinct from *M. bivittata*.

4. Mermiria neomexicana, Thos.

Opomala neomexicana, Thos., 1870. Proc. Acad. Nat. Sci. Phil., 77.

Opomala neomexicana, Thos., 1871. Prelim. Rept. U. S. Geol. Sur. Wyo., 269.

Opomala neomexicana, Thos., 1872. Prelim. Rept. U. S. Geol. Sur. Mont., 429 and 432.

Opomala neomexicana, Thos., 1873. Syn. Acrid. N. A., 65.

Opomala neomexicana, Bruner, 1877. Can. Ent., IX, 144.

Mermiria neomexicana, Scud., 1876. Bul. U. S. Geol. and Geog. Sur., II, 262.

Mermira neomexicana, Scud., 1877. Cent. Orth., 47.

Mermiria neomexicana, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.

Mermiria neomexicana, Bruner, 1885. Rept. Com. Agr., 307.

Mermiria neomexicana, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, no. 4, 130.

Mermiria neomexicana, Bruner, 1886. Bul. Wash. Col. Lab. Nat. Hist., I, No. 7, 196.

Mermiria belfragei, Stål, 1873. Recen. Orth., I, 102.

Mermiria belfragei, Thos., 1875. Rept. Geog. and Geol. Surv. W. 100 M., V. Zool., 856 and 901.

Mermiria belfragei, Scud., 1877. Cent. Orth., 47.

Hab. The eastern slopes of the Rocky Mountains from Wyoming to New Mexico and eastward to Georgia.

The National Museum contains a specimen which seems to be the type. Except *M. bivittata* it is the most widely distributed species of the genus. It seems to be partial to regions where vegetation is sparse.

5. MERMIRIA ALACRIS, Scud. Fig. 3a, 3b.

Mermiria alacris, Scud., 1877. Cent. Orth, 47.

Mermiria alacris, Bruner, 1883. 3d Rept. U. S. Ent Com., 55.

Hab. Georgia (Scudder), Dallas, Tex.

The National Museum contains a male and female from the last mentioned locality.

6. MERMIRIA ROSTRATA, n. sp. Fig. 3c.

Length (male)	36 mm	(female)	46 mm.
Antennæ	16 mm		
Tegmina	24 mm		33.5 mm.
Post. Fem	18 mm		

Vertex triangular, as long as (female) or longer than (male) wide with the sides straight and meeting at a very acute angle which is barely blunt at the tip. The median carina of the vertex is entirely wanting and the sides are somewhat expanded and a little ascending. The frontal costa is deeply sulcate throughout in the male and in the female above the ocellus; below it ends suddenly half-way between the ocellus and the clypeus. The face is very decidedly sinuate. The lateral foveolæ are quite distinct, elongate triangular and curved. The pronotum is scarcely (female) or not longer than the head. The median carina is less distinct than in *alacris* and the lateral carinæ are very faint. The transverse sulci are scarcely distinguishable and the metazone is scarcely perceptibly punctate. The lower margin of the lateral lobes of the pronotum is straight or perceptibly sinuate. The usual postocular band has at its lower border a very faint carina (in this respect it resembles *alacris* and *bivittata*). The colors are green and ferruginous or purplish-brown, the dark color being more decided in the male. In this sex the face is completely infuscated and the top of the head is occupied by a very broad band which is three times as

broad as the green stripe on either side. The lower half (female) or third (male) of the tegmina is green, the rest ferruginous. The last ventral segment is decidedly elongate as in *alacris*. The posterior femora do not exceed the abdomen.

Described from two males and one female from Mackay, I. T., where the species is said by the collector, Prof. S. E. Meek, to be common on the small prairies which are interspersed through the forests of that region.

This species is more closely related to *alacris* than to any other of the *Mermiria*, but it is readily distinguished by the very different vertex.

IV. **PSEUDOPOMALA**, Morse. Fig. 4.

Vertex horizontal, longer than broad, semi-elliptical, medianly convex with a very distinct carina, laterally sulcate (female) or extended into lamina (male), with the margins limited by lateral carinæ. The lateral foveolæ are wanting. The frontal costa is sulcate throughout with slightly divergent heavy lateral carinæ except at the immediate apex where it is much constricted. The face is very declivent and straight or a very little sinuate on account of the prominence of the frontal costa between the antennæ. These are very slightly triquetrous and very much flattened and expanding basally, equaling the short diameter of the eye nearly (male) or quite (female) and strongly acuminate. They equal the head and pronotum in length (female) or greatly exceed them (male). The pronotum is but little longer than the head. Its disk is nearly plain, slightly elevated toward the median carina which is distinct and cut only once much behind the middle by the principal sulcus which alone is apparent upon the disk. The lateral carinæ are distinct, parallel, cut by the principal sulcus only. The posterior margin of the metazone is straight. The lateral lobes of the pronotum are vertical, slightly convex above, with the anterior and posterior margins strongly oblique, the one straight, the other sinuate just above the posterior lower angle, which is sharp and sub-rectangular. The lower margin is nearly straight and horizontal. The mesosternal lobes are separated by a space longer than broad (female) or by a linear ridge with a deep pit on either side (male). The wings in both sexes and the tegmina (female) are abortive or they are well developed. In the male the scapular area is enlarged with prominent cross veins. The posterior femora are slender, not banded. The posterior tibiæ has the apical spurs on the inner side not very unequal.

The last ventral segment of the male is horizontal, elongate, conical and four times as long as the penultimate segment. The valves of the ovipositor are exerted, the lower ones furnished with a strong lateral tooth, the upper ones with two distinct basal teeth.

This genus is North American and is represented by two species.

Pseudomopala, Morse, 1896. Psyche, VII, 325 and 342, fig. 6, 6a, 6b.
Opomala, Scud., 1862. Journ. Bost. Soc. Nat. Hist., VII, 454.
In part, *Opomala*, Thos., 1873. Syn. Acrid. N. Am., 62.

KEY TO PSEUDOPOMALA, Morse.

A.[1] Wings wanting.....1.—*Aptera*, Scud.
A.[2] Wings present, usually small.....2.—*Brachyptera*, Scud.

1. PSEUDOPOMALA APTERA, Scud.

Opomala aptera, Scud., 1869. Proc. Am. Ent. Soc., II, 305.
Opomala aptera, Walk., 1870. Cat. Derm. Salt., V, 52.
Opomala aptera, Thos., 1873. Syn. Acrid. N. Am., 63.
Opomala aptera, Bruner, 1877. Can. Ent., IX, 144.
Opomala aptera, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.

Hab. Pennsylvania. It is very doubtful whether this species is distinct from *P. brachyptera*. Bruner apparently recognized it in Nebraska (in Can. Ent., IX, 144), but later he refers it to Pennsylvania alone, which was Scudder's original reference. It has never been reported there since its first mention and it is not found in any (not even Scudder's) collection with which I am acquainted. It seems altogether probable, therefore, that it is merely an apterous form of *brachyptera*. I think it best, however, not to place it in the list of synonyms until further collections are made in the place where it was found and its identity is thoroughly established.

2. PSEUDOPOMALA BRACHYPTERA, Scud. Fig. 4a, 4b.

Opomala brachyptera, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 454.
Opomala brachyptera, Thos., 1871. Proc. Acad. Nat. Sci. Phila., 151.
Opomala brachyptera, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 429, 432, 446.
Opomala brachyptera, Thos., 1873. Syn. Acrid. N. Am., 63.
Opomala brachyptera, Bruner, 1877. Can. Ent., IX, 144.
Opomala brachyptera, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.
Opomala brachyptera, Fernald, 1887. Orth. N. E., 35.

Opomala brachyptera, Bruner, 1885. Rept. Com. Agr., 307.
Opomala brachyptera, Morse, 1894. Psyche, VII, 13 and 106.
Opomalo brachyptera, Beutenmüller, 1894. Desc. Cat. Orth., 291.
Opsomala brachyptera, Walk., 1870. Cat. Derm. Salt., III, 507.
Pseudopomala brachyptera. Morse, 1896. Psyche, VII, 325 and 343, fig. 6, 6a, 6b.
Mermiria brachyptera, Osborn, 1892. Proc. Iowa Acad. Sci., 1890-1891, 4.

Hab. Northern United States east of the Sierra Nevada Mountains. This species has an extended range east and west, though its distribution throughout the territory it inhabits is comparatively irregular. There is a gap in this range extending from Illinois to New York and Pennsylvania (unless *P. aptera* is a synonym), but since it is found in New England and from Iowa to Utah there is little doubt but that its non-occurrence in the intermediate area is due to the fact of its extreme rarity.

V. **TRUXALIS**, Fabr.

Vertex horizontal, semi-elliptical, length in front of the eyes a little less (female) or a little more (male) than the distance between the eyes. Furnished with a delicate median carina. Lateral carinæ distinct though slight with shallow sulci behind them. Lateral foveolæ entirely wanting. Frontal costa narrow, deeply (male) or shallowly (female) sulcate except just below the vertex where it is suddenly contracted into a mere ridge. The face, seen from the side, is strongly oblique and straight. The antennæ are flattened strongly (female) or moderately (male) at the base and acuminate, about as long as (female) or a little longer than (male) the head and pronotum. The pronotum has the disk plain with the three carinæ parallel, about equally distinct, the median cut by the last sulcus only, the lateral by all the transverse incisions. The metazone is a little shorter than the prozone with its posterior border very obtusely angled. The lateral lobes of the pronotum are perpendicular and parallel, a little longer than high, with both the anterior and posterior margins decidedly oblique, the former straight, the latter sinuate with the lower border straight posteriorly and slightly oblique anteriorly. The lobes of the mesosternum are separated by a space broader than long (female) about as broad as long (male). The lobes of the metasternum are separated by a space about as broad as long (female) or they are contiguous (male). The tegmina are much longer than the abdomen, with the discoidal area

with no intercalary vein. The posterior femora are slender with the apex reaching (female) or exceeding by half their length (male) the abdomen. The valves of the ovipositor of the female are strongly exerted.

In part, *Gryllus* (*Acrida*), Linn.
In part, *Truxalis*, Fabr., 1875. Sys. Ent., 279.
In part, *Truxalis*, Burm., 1838. Handb. 606, Orth.
Truxalis, Stål, 1873. Recen. Orth., I, 92.
Truxalis, Morse, 1896. Psyche, VII, 325, fig. a, aa, ab.
Metaleptea, Brunner, 1893. Rev. Sys. Orth, 118.
Not *Truxallis*, Serv., 1839. Hist. Nat. Orth., 578.
Not *Truxalis*, Brunner, 1883. Proc. Eur. Orth., 87.
Not *Truxalis*, Brunner, 1893. Rev. Sys. Orth., 118.

In 1873 Stål, in Rec. Orth., I, saw fit to restore *Acrida*, Linn., restricting it to Linnean species, *Grillus* (*Acrida*) *nasuta* and *Acrida serrata*, Thunb. Both of these species had been included in *Truxalis*, Fabr., for more than one hundred years. The latter genus he restricted to the Linnean species *Grillus* (*Acrida*) *brevicornis* and other American species which have since been removed to other genera. There is no doubt but that Stål had a right to restore the name *Acrida*. Brunner refused to follow him in the restoration of *Acrida* and the restriction of *Truxalis*, but himself restored *Truxalis* in the Fabrician sense and then suggested the name *Metaleptea* for the American genus. For the present, *Truxalis*, Stål, must stand and *Metaleptea* will remain a synonym unless *Truxalis* is restricted to some of the old world species included in the genus by Fabricius; under which circumstances, as *T. brevicornis* is the only species left to which it could apply, *Metaleptea* would have to be restored.

1. TRUXALIS BREVICORNIS, Linn., 5a, 5b.

Gryllus (*Acrida*) *brevicornis*, Linn., 1758. Sys. Nat. Orth., I.
Gryllus (*Acrida*) *brevicornis*, Linn., 1763. Cent. Ins. Rar., 15.
Gryllus (*Acrida*) *brevicornis*, Linn., 1763. Amoen. Acad., VI, 398.
Truxalis brevicornis, Fabr., 1775. Ent. Sys., II, 27.
Truxalis brevicornis, Thunb., 1815. Mem. Acad. St. Peter., V, 264.
Truxalis brevicornis, Thunb., 1827. Nov. Act. Upsal., IX, 84.
Truxalis brevicornis, Stål, 1873. Recen. Orth., I, 104.
Truxalis brevicornis, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.
Truxalis brevicornis, McNeill, 1891. Psyche, VI, 66.
Truxalis brevicornis, Blatchley, 1891. Can. Ent., XXIII, 75.

Truxalis brevicornis, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 8.

Truxalis brevicornis, Blatchley, 1894. Can. Ent., XXVI, 221.

Truxalis brevicornis, Beutenmüller, 1894. Desc. Cat. Orth., 29, pl. viii, fig. 7.

Acridium ensicormum, De Geer, 1773. Mem. Ins., 449, pl. xlii, fig. 1, 2.

? *Truxalis notochlorus*, Pal. de Beauv., 1805. Ins. Afr. Amer., 80, pl. iii, fig. 3.

? *Truxalis viridulus*, Pal de Beauv., 1805. Ins. Afr. Amer., 81, pl. iii, fig. 4.

Tryxalis brevicornis, Burm., 1838. Handb. Ent., II, 607.

Tryxalis brevicornis, Morse, 1896. Psyche, VII, 325, fig. A, Aa, Ab.

Pyrgomorpha brevicornis, Thos., 1873 Syn. Acrid. N. Am., 67.

Pyrgomorpha brevicornis, Thos., 1874. Bul. 2, U.S. Geol. and Geog. Surv. 64

Pyrgomorpha brevicornis, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Pyrgomorpha punctipennis Thos., 1873. Syn. Acrid. N. Am., 68.

Pyrgomorpha punctipennis, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Pyrgomorpha punctipennis, Schufeldt, 1884. Proc. U. S. Nat. Mus., VII, 332.

Opsomala punctipennis, Serv., 1838. Hist. Nat. Ins. Orth., 590.

Opsomala punctipennis, Thos., 1865. Trans. Ill. State. Agr. Soc., 447.

Opsomala punctipennis, Walk., 1870. Cat. Derm. Salt., III, 507.

Opomala punctipennis, Thos., 1873. Syn. Acrid. N. Am., 197.

Hab. Eastern and Southern United States. Reported by Stål from Rio Janeiro, Brazil. By Walker, from Honduras. *T. notochlorus* and *viridulus* are reported by Pal. de Beauv. from St. Domingo.

VI. **NAPAIA**, n. gen. Fig. 6.

Vertex horizontal, equilaterally triangular, moderately sulcate, with distinct linear median and lateral carinæ. The lateral foveolæ are plainly visible from above, long rhomboidal. The frontal costa is prominent a little above the antennæ, not constricted just below the apex, slightly sulcate below the ocellus and moderately expanding below. The face seen from the side is strongly (female) or very (male) declivent. The antennæ are strongly depressed at the base and acu-

minate, a little longer than the head and pronotum (female) or as long as the hind femora (male). The pronotum has the disk plain, furnished with three carinæ, the median being a little more distinct, the lateral being very slightly sinuate, and all three are cut much behind the middle. The posterior margin of the metazone is very slightly angulate. The lateral lobes of the pronotum are nearly perpendicular, a little convex on the upper part with the anterior and the posterior margins straight and strongly oblique and with the lower margin posteriorly a little descending, anteriorly slightly ascending. The prosternum is armed with a low (female) or high (male) tubercle. The mesosternal lobes are separated by a space a little (female) or not (male) broader than long. The metasternal lobes are very nearly approximate behind. The tegmina are much (female) or a little (male) shorter than the abdomen, the scapular area is expanded and occupied by weak cross veins in the male, the discoidal area is narrow without an intercalary vein and is filled with a single series of cross veins. The posterior femora are moderately slender, extending beyond the abdomen. The posterior tibiæ have about 13 spines on the outer margin. The valves of the ovipositor are very moderately exerted.

This genus contains, so far as known, but a single species. It is most closely related to *Mermiria*, but is easily distinguished from that genus by the distinct lateral foveolæ visible from above, the different structure of the frontal costa just below the vertex, the abbreviated tegmina, and the fewer spines of the posterior tibiæ.

NAPAIA GRACILIS, n. sp. Fig. 6a, 6b, 6c, 6d.

Yellow or brown with a fuscous stripe extending backwards from the eyes limited above by the lateral carinæ of the pronotum, either covering the whole of the sides including the cheeks, lateral lobes of the pronotum, the lower edge of the tegmina, the sides of the abdomen, and the outer face of the posterior femora (male) or it is more or less restricted below, but it is always present. The upper surface of the body and head is distinctly lighter than the sides, plain, or sometimes with two faint curved stripes extending on the top of the head from the corners of the vertex to the lateral carinæ of the pronotum. The tegmina are plain except for the more or less infuscated lower edge. In the male they are four-fifths as long as the abdomen, broadly rounded at the tip. In the female they are half as long as the abdomen, lanceolate with the tip blunt. The posterior femora extend a little (female)

or one-third their length (male) beyond the abdomen. The posterior tibiæ are light (female) or very obscure (male) red infuscated at the apex.

Described from one female and one male, the latter collected by Mr. Coquillett at Los Angeles, the former bearing simply the lable "California." All the specimens are in the collection of the National Museum. The male bears a very different appearance from the female with its very dark, nearly black color, more sloping face, longer tegmina and antennæ and more slender form, but the structure of the head and pronotum is exactly the same and I think that there is scarcely any doubt but that they belong to the same species.

VII. **OPEIA**, n. gen. Fig. 7.

Vertex nearly horizontal shorter than the distance between the eyes, convex, a little sulcate behind the prominent lateral carinæ which meet at an angle of about 90 degrees. Median carina distinct. Lateral foveolæ not visible from above, they are small sulci which extend from the ocelli toward the vertex and are not clearly separated from the front. The frontal costa is sulcate except at the apex, and its margins are slightly and regularly expanded downward. Seen from the side, the face is straight and strongly declivent. The antennæ are considerably flattened basally and regularly acuminate, distinctly shorter than the head and pronotum. The pronotum has the disk nearly plain, being slightly elevated to the median carina. This and the lateral carinæ are unusually heavy and distinct and all three are cut by the principal sulcus only much behind the middle. The lateral carinæ are very slightly divergent from the middle of the pronotum to the posterior margin which is roundly angulate. The lateral lobes of the pronotum are not quite so high as long; they are nearly perpendicular, being very slightly convex above, and they have a nearly horizontal carina extending from the middle to the posterior margin. They have the anterior and posterior borders strongly oblique with the lower margin nearly straight. There is no prosternal tubercle. The mesosternal lobes are separated (female) by a space about as long as wide, the metasternal lobes by a space longer than wide (female) or nearly contiguous (male). The tegmina are little shorter than the abdomen (female). The discoidal area is occupied by a weak intercalary vein. The scapular area is decidedly expanded in the male, and filled with a single series of moderately strong curved cross veins. The posterior femora

are not slender, they extend somewhat beyond the end of the abdomen. The valves of the ovipositor are but little exerted.

This genus is represented in North America by a single species. It, with *Pedeticum*, is a connecting link between *Mermiria* and *Napaia* on the one side and *Amphitornus*, *Atkentetus*, and *Eritettix* upon the other.

Oxycoryphus, Thos., 1873. Syn. Acrid. N. Am., 72.

I. Opeia obscura, Thos. Fig. 7a, 7b, 7c.

Oxycoryphus obscurus, Thos., 1871. Pre. Rept. Surv. Mont., 446.
Oxycoryphus obscurus, Thos., 1873. Syn. Acrid. N. Am., 73.
Oxycoryphus obscurus, Bruner, 1883. 3rd Rept. U.S. Ent. Com., 55.
Oxycoryphus obscurus, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 130.
Oxycoryphus obscurus, Bruner, 1885. Rept. Com. Agr., 307.

This is an extremely variable species in every way. The coloration in particular is so variable that it is difficult to describe. In typical specimens the dorsum is brown or green, nearly plain with sometimes a streak of fuscous along the median carina. The sides are marked by a stripe which extends backward from the eye, widening and generally becoming more obscure. When most distinct, this stripe consists of five parts, as follows: an upper streak of brown or fuscous below the lateral carinæ, below this a lighter streak followed by a white line, and still below this the light and dark streak repeated. Apparently these five elements of the lateral stripe may be varied in intensity of coloration in any way so that the great dissimilarity in appearance is produced. Nearly always, however, all these parts can be distinctly or faintly seen, and in all cases the lower fifth of the pronotum at least is brown. The tegmina have the discoidal area occupied by a row of large usually distinct quadrate fuscous spots and the scapular area contains a whitish streak.

Hab. West of Missouri and Arkansas and east of the Rocky Mountains. This seems to be a species peculiar to the great plains. Its range is unusually great north and south, as it extends from the northern to the southern boundaries of the United States and probably much farther in each direction, while it is somewhat restricted east and west. Bruner says it "occurs where the grasses are short and the climate is arid," and reports it as common in the Yellowstone Valley. The National Museum contains two females and one male which seem

to be Thomas' type as they bear his label. His description of the species, however, was based upon the female. In addition to these are numerous specimens from Nebraska, Texas, and Wyoming. Two females from Texas are of larger size than the others, the lateral stripe is distinct and occupies the upper half of the lateral lobe of the pronotum, and the vertex is a little wider and more rounded.

VIII. **PEDETICUM**, n. gen. Fig. 8.

This genus is very closely related to *Opeia*, and does not differ materially in the structure of the head except in the possession of supplementary lateral carinæ more or less distinct. In the following particulars it seems to be too different to be united with that genus. The pronotum has the lateral carinæ strongly sinuate a little in advance of the middle. None of the carinæ are cut by any of the sulci, and these are almost entirely obsolete. The anterior and posterior borders of the disk of the pronotum are straight. The mesosternal lobes are separated by a space decidedly (female) or a little broader than long, and the metasternal lobes are contiguous behind and inclose two very deep pits. The tegmina are abbreviated, less than one-half (female) or nearly three-fourths (male) as long as the abdomen. The valves of the ovipositor are moderately exerted.

This genus contains but one species which, in spite of its very different appearance, is really closely related to *Opeia obscurus*, Thos. I should have hesitated to erect this genus but that if it is not done Scudder's species would become a synonym and I should be compelled to give it a new specific name; and in case these species should afterwards be considered generically distinct (and this seems extremely probable as the tendency undoubtedly is to restrict more and more generic groups) there would be a useless synonym.

1. PEDETICUM OBSCURUM, Scud. Fig. 8a, 8b.

Chrysochraon obscurus, Scud., 1877. Ent. Notes, VI, 29.
Chrysochraon obscurus, Bruner, 1883. 3rd Rept. Ent. Com., 55.

Hab. Fort Reed, Florida.

As this specimen has not been reported in any other collection than that in which Dr. Scudder first found it there is little doubt but it is a local and very rare species. I have examined a specimen from Scudder's collection.

IX. **ERITETTIX**, Bruner. Fig. 9.

Head conical, occiput not elevated, furnished with three carinæ, one median and two supplementary; the former extends from the pronotum to the tip of the vertex where it is enlarged, the latter from the pronotum to a point opposite the anterior margin of the eyes where each suddenly bends to join the lateral carinæ of the vertex. The vertex is convex and equilaterally triangular. Its lateral carinæ are generally distinct, sometimes heavy, raised lines. The lateral foveolæ are present below the vertex, sub-triangular, not deeply impressed, sometimes not very apparent because of the slightness of the lower carinæ and because of their small size. The frontal costa has its sides somewhat regularly divergent from the vertex to the clypeus, generally a little constricted about the ocellus and slightly sulcate for a greater or less distance above this point but never sulcate to the vertex. The antennæ are thick, generally somewhat flattened at the base and clavate at the apex (except *variabilis*) which is bluntly acuminate and scarcely longer than the head and pronotum. The pronotum has the lateral and median carinæ distinct and cut once only by the principal sulcus decidedly behind the middle. In addition to these usual carinæ are two supplementary carinæ on either side about midway between the median and lateral carinæ. The posterior margin of the pronotum is very obtusely angulate. The lateral lobes of the pronotum are about as high as they are long, with the anterior border decidedly or little more oblique than the posterior. They have a more or less distinct carina which runs obliquely from the first sulcus to or toward the posterior margin. The anterior lower angle is obtuse, the posterior is rectangular. The lower margin is straight and horizontal on the posterior half, straight and slightly ascending on the anterior half. The mesosternal lobes are separated by a space much wider than long, and the metasternal lobes by a space longer than wide, in both sexes. The tegmina and wings are usually well developed (except *abortiva*). The former have the mediastine vein well developed, extending much beyond the middle of the wing and the scapular area in the male widened and filled with a series of rather weak and not very regular oblique veins. There is no intercalary vein and the dividing soon unites with the plicate vein. The ovipositor of the female is nearly included. The posterior femora are more than usually heavy, with the apex extending beyond the abdomen, and they are never banded. The posterior tibiæ are obscure or reddish, never blue, and the apical inner spur is about twice as long as the one behind it.

In part, *Stenobothrus*, Thos., 1873. Syn. Acrid. N. Am., 80.
In part, *Gomphocerus*, Thos., 1873. Syn. Acrid. N. Am., 96.
Eritettix, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

This genus does not seem to have been known to Brunner, as there is nothing in his key to fit it. It falls near his South American genus *Toxopterus*, but is very distinct from that. It appears to be a purely North American genus, therefore, and the species that belong to it are widely distributed.

KEY TO ERITETTIX, Bruner.

A.[1] Lateral carinæ of the pronotum straight or very gently arcuate. Oblique carina of the lateral lobes very slender or nearly obsolete. Disk of the pronotum furnished with two narrow or broad, black, velvety stripes just inside of the lateral carinæ.

B.[1] Supplementary carinæ of the pronotum about as strong as the median. Space between the supplementary carinæ carneous or brown, and the space between the supplementary carinæ and eyes and lateral carinæ velvety black.

C.[1] Antennæ clavate.

D.[1] Wings hyaline..... 1.—*Virgatus*, Scud.

D.[2] Wings fuliginous..... 2.—*Carinatus*, Scud.

C.[2] Antennæ acuminate, not clavate..... 3.—*Variabilis*, Brun.

B.[2] Supplementary carinæ of the pronotum much weaker than the median or obsolete. Space between the supplementary carinæ little if any darker than the median space.

C.[1] Tegmina with the posterior half green or brown with a light yellow or green stripe in the scapular area extending from the base to the middle..... 4.—*Tricarinatus*, Thos.

C.[2] Tegmina testaceous..... 5.—*Simplex*, Scud.

A.[2] Lateral carinæ of the pronotum moderately arcuate before the middle. Oblique carina of the lateral lobes very heavy and generally white or light colored, at least on the apical half.

B.[1] Tegmina as long as or longer than the abdomen..... 6.—*Naviculus*, Scud.

B.[2] Tegmina abortive, a little (male) or not (female) more than half as long as the abdomen..... 7.—*Abortivus*, Bruner.

2. ERITETTIX VIRGATUS, Scud. Fig. 9a, 9b.

Gomphocerus virgatus, Scud., 1875. Cent. Orth., 23.
Gomphocerus virgatus, Bruner, 1883. 3rd Rept. Ent. Com., 56.

Eritettex virgatus, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

Hab. Apparently a rare species, it has heretofore been reported only from Texas. It occurs also in Arkansas.

2. ERITETTIX CARINATUS, Scud.

Gomphocerus carinatus, Scud., 1875. Cent. Orth., 23.
Gomphocerus carinatus, Bruner, 1889. Proc. U. S. Nat. Mus , XII, 56.

Hab. Middle States (Scud.).

I think there is little doubt but that this species is a variety of *E. virgatus* with fuliginous wings. I am unacquainted with it, however, and prefer to retain the name.

3. ERITETTIX VARIABILIS, Bruner.

Eritettix variabilis, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

Hab. Silver City, New Mexico (Bruner).

This species is distinguishable from all others of the genus in having the antennæ acuminate instead of clavate at the tip.

4. ERITETTIX TRICARINATUS, Thos.

Stenobothrus tricarinatus, Thos., 1873. Syn. Acrid. N. Am., 84.
Stenobothrus tricarinatus, Bruner, 1883. 3rd Rept. Ent. Com., 55.
Stenobothrus tricarinatus, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.
Stenobothrus tricarinatus, Osborn, 1892. Proc. Iowa Acad. Sci., 1890–91, 4.

Hab. This species has been reported but once outside of Wyoming. Herbert Osborn gives it as not common in Iowa. The United States Museum contains numerous specimens from the first mentioned locality.

5. ERITETTIX SIMPLEX, Scud.

Gomphocerus simplex, Scud., 1869. Proc. Am. Ent. Soc., II, 305.
Gomphocerus simplex, Thos., 1873. Syn. Acrid. N. Am., 97.
Gomphocerus simplex, Bruner, 1877. Can. Ent., IX., 144.
Gomphocerus simplex, Bruner, 1883. 3rd. Rept. Ent. Com., 56.

Hab. Said by Scudder to occur in Delaware. It does not seem to have been recognized there since. It was reported by Bruner in 1877 in the Can. Ent., IX, 144, to occur in Nebraska. Since he gives Delaware as the only locality for this species in the 3rd Rept. Ent. Com., 56, in 1883, it is probable that he was mistaken in the first

reference. I am unacquainted with the species, but I think that it is probable that it is synonomous with *virgatus*.

6. ERITETTIX NAVICULUS, Scud.

Gomphocerus navicula, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ., 506.

Gomphocerus navicula, Bruner, 1883. 3rd. Rept. Ent. Com., 56.

Hab. Southern Colorado, Northern New Mexico, Montana. The National Museum contains Scudder's type from Southern Colorado, and another specimen from Montana. The latter does not agree closely with the type, but the divergence is no greater than should be expected in species so variable as the *Eritettix*.

7. ERITETTIX ABORTIVUS, Bruner.

Eritettix abortivus, Bruner, 1889. Proc. U. S. Nat. Mus., 56, pl. i, figs. 8 and 9.

Hab. Central Texas (Schaupp), Washington Co., Tex. (Bruner). This species is most nearly related to *naviculus*, but it is easily distinguished from that by its abortive tegmina and wings, its smaller size and very heavy and short antennæ.

X. **SYRBULA**, Stål. Fig. 10.

Head not much shorter than the pronotum with the occiput moderately rounded transversely, and slightly or considerably ascending. Vertex convex and more or less sulcate, horizontal and semi-elliptical or sub-triangular in shape with a distinct median carina not less apparent than the lateral carinæ, which are suddenly curved inward a short distance back of the anterior margin of the eye, and from that point together with the median carina are more or less distinctly continued to the pronotum. The lateral feveolæ, generally indistinct and small, are triangular in shape and invisible from above. The frontal costa is plain, a little convex or more or less sulcate, continued to or even upon the clypeus, decidedly constricted at the apex and very slightly at the ocellus. The antennæ are flattened decidedly at the base and distinctly acuminate (female) or are flattened moderately at the base and decidedly or strongly expanded apically and acuminate (male). The pronotum has the disk plain with the three carinæ distinct, the lateral being gently or strongly sinuate and very slightly or moderately divergent posteriorly. All are severed by a single sulcus

in or behind the middle. The metazone is sub-truncate or decidedly angulate. The lateral lobes of the pronotum are about as high as long with both the anterior and posterior margins moderately oblique, the latter generally sinuate and the lower margin nearly horizontal and scarcely perceptibly or very moderately angulate in the middle. Behind the principal sulcus the lateral lobes are generally deeply and thickly pitted. The mesosternal lobes are separated by a space not (male) or a little (female) broader than long, the metasternal lobes by a space longer than broad (female) or they are closed behind (male). The tegmina and wings are well developed, exceeding the abdomen. The former have a very different structure in the two sexes. In the male they are regularly reticulate everywhere except in the anal field and at the base of the scapular area which is opaque. This and the ulnar area being widened and furnished with a single series of conspicuous veins. In the female, they are irregularly reticulate throughout and not expanded in the ulnar or scapular areas. The legs are moderately or quite slender, their posterior femora much exceeding the abdomen even in the female, and the posterior tibiæ are furnished with 17 to 20 rather small spines. The ovipositor is moderately exerted and the last ventral segment of the male is acutely conical.

Syrbula, Stål, 1873. Recen. Orth., I, 90.

Syrbula, Bruner, 1893. Rev. Sys. Orth., 119.

Oxycoryphus, Sauss., 1861. Orth. Nov. Am., II, 16.

In part, *Stenobothrus*, Thos., 1873. Syn. Acrid. N. Am., 80.

This distinct North American genus contains four species as now determined, all of them being southern, though *S. admirabilis* extends as far north as northern Illinois.

KEY TO SYRBULA, Stål.

A.[1] Median carina cut by two sulci . . . . 1. —*Montezuma*, Sauss.

A.[2] Median carina cut by the last sulcus only.

B.[1] Lateral lobes of the pronotum either plainly punctate or furnished with elongate rugæ behind the principal sulcus.

C.[1] Lateral carinæ of the pronotum generally sinuate. Posterior femora and tibiæ unusually long and slender, the latter with 19 (female) to 21 (male) spines on the outer edge . . . . . 2.—*Admirabilis*, Uhler.

C.[2] Lateral carinæ of the pronotum strongly sinuate. Posterior femora and tibiæ moderately slender, but not longer than usual, the latter with 17 (male) spines on the outer edge . 3.—*Acuticornis*, Bruner.

B.[2] Lateral lobes of the pronotum smooth behind the principal sulcus.....4.—*Fuscovittata*, Thos.

1. Syrbula montezuma, Sauss.

Oxycoryphus montezuma, Sauss., 1861. Orth. Nov. Am., Ser. II, 18.
Oxycoryphus montezuma, Walk., 1870. Cat. Derm. Salt., IV, 787.
Oxycoryphus montezuma, Thos., 1873. Syn. Acrid. N. Am., 204.
Syrbula montezuma, Stål, 1873. Rec. Orth., I, 102.

Hab. Mexico (Saussure).

This species is included in this genus on the authority of Stål as it is unknown to me. I am not inclined to think it is synonymous with *Admirabilis*, as has been suggested by Thomas and Bruner, because Stål probably knew the species and considered it distinct, and because there is at least one character given by Saussure which can not apply to *Admirabilis*. It is true that there is evidently a misconstruction in the text at the point referred to (pronoti carinæ tres sulci 2 sejunctis), but whether the figure 2 be translated by a cardinal as sulci would require, or by an ordinal as Thomas has assumed, the difficulty remains that in *Admirabilis* the median carina is cut but once and that very distinctly by the third sulcus.

2. Syrbula admirabilis, Uhler.

Stenobothrus admirabilis, Uhler, 1864. Proc. Ent. Soc. Phil., II, 553.
Stenobothrus admirabilis, Thos., 1873. Syn. Acrid. N. Am., 84.
Stenobothrus admirabilis, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., Art. VII, 61.
Stenobothrus admirabilis, Bruner, 1883. 3rd Rept. U.S. Ent. Com., 55.
Syrbula admirabilis, Bruner, 1877. Can. Ent., IX, 144.
Syrbula admirabilis, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., Vol. I, No. 4, 131.
Syrbula admirabilis, McNeill, 1891. Psyche, VI, 65.
Syrbula admirabilis, Blatchley, 1891. Can. Ent., XXIII, 76.
Syrbula admirabilis, Garman, 1894. 6th Ann. Rept. Ky. Ag. Ex. Sta., 9.
Syrbula admirabilis, Beutenmüller, 1894. Desc. Cat. Orth., 292.
Syrbula leucocera, Stål, 1873. Rec. Orth., I, 102.
Syrbula leucocera, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V Zool, 1869.
Syrbula leucocera, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., Vol. I, No. 4, 131.

? *Syrbula montezuma*, Townsend, 1893. Ins. Life, VI, 31.

Hab. United States east of the Rocky Mountains, extending as far north as Nebraska and Northern Illinois and on the Atlantic coast to Maryland. If the species determined by Bruner and reported by Townsend is *admirabilis*, it is also found between the Rocky and the Sierra Nevada Mountains. The United States Museum contains numerous specimens from Illinois, Missouri, Arkansas, Texas, and Georgia.

3. SYRBULA ACUTICORNIS, Bruner. Fig. 10, 10b.

Syrbula acuticornis, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 55.

Hab. Southwestern Texas (Bruner); Fort Grant, Arizona. The National Museum contains several specimens (males) from the last-mentioned locality which have been doubtfully referred to *S. fusca-vittata*, Thos. They do not fit Thomas' description of that species, however, in having the lateral lobes of the pronotum not smooth behind the principal sulcus, but punctate. I think there is little doubt but the specimens in question belong to Bruner's species. The National Museum also contains two of Bruner's types (females).

4. SYRBULA FUSCA-VITTATA, Thos.

Syrbula fusca-vittata, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 870, pl. xlv, fig. 7.

Hab. Lower Arizona (Thomas).

I am not acquainted with this species; it may be that it is identical with Bruner's *acuticornis*.

XI. **AMPHITORNUS**, n. gen. Fig. 11.

Vertex a little declivent, advanced in front of the eyes less than half the distance between the eyes, convex, with slight sulci on either side of the median carina. Lateral carinæ are scarcely at all perceptible. Tempora rather broad, not at all foveolate, and no more clearly separated from the vertex than from the front. Frontal costa rather broad, not sulcate, barely depressed at the ocellus with the margins very moderately divergent below. The antennæ are distinctly shorter (female) or not longer (male) than the head and pronotum, flattened in both sexes, more or less acuminate in the female, linear in the male. Pronotum with the disk well rounded and the lateral carinæ, if present at all, extremely faint and not interfering at all with

rounded outline of the humeral angles. The median carina is distinct and accompanied by more or less distinct supplementary carinæ on the disk. All of these are cut by the last principal sulcus only, a little or considerably behind the middle. The posterior angle of the disk is moderately rounded. The lateral lobes of the pronotum are a little higher than long with the anterior margin strongly oblique, the posterior margin perpendicular and the lower margin slightly angulate. The mesosternal lobes are separated by a space broader than (female) or as broad as long (male), and the metasternal lobes by a space longer than broad (female) or very nearly approximate (male). The tegmina are well developed, with the scapular area of the male expanded, hyaline and filled with rather prominent cross veins. The discoidal area has no intercalary vein, and the dividing is soon united with the plicate vein. The posterior femora are banded with fuscus on the upper and inner faces. The upper valves of the ovipositor are included, the lower valves slightly exerted. The posterior tibiæ are bluish, with the apical inner spur sub-equal to the one behind it, much less than twice as long.

This genus includes two western species, it is closely related to the following genus and less intimately to *Eritettix*. From the last-mentioned genus it is easily distinguished by the absence of lateral carinæ upon the top of the head, and the median carina except at the vertex, by the absence of the club to the antennæ, by the rounded disk of the pronotum and the obsolete lateral carinæ, by the banded hind femora, the blue hind tibiæ with sub-equal inner apical spurs, and by the unspotted tegmina.

KEY TO AMPHITORNUS, n. gen.

A.[1] Median carina cut very little behind the middle.....
.....1.— *Bicolor*, Thos.

A.[2] Median carina cut decidedly behind the middle. 2.— *Ornatus*, n. sp.

1. AMPHITORNUS BICOLOR, Thos. Fig. 11a, 11b.

Stenobothrus bicolor, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 465.

Stenobothrus bicolor, var. a., Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 465.

Stenobothrus coloradus, Thos., 1873. Syn. Acrid. N. A., 82.

Stenobothrus coloradus unicolor, Thos., 1873. Syn. Acrid. N. Am., 83.

Stenobothrus coloradus, Thos., 1876. Proc. Dav. Acad. Nat. Sci., I, 251.

Stenobothrus coloradus, Bruner, 1883. 3rd. Rept. U. S. Ent. Com., 55.

Stenobothrus coloradus, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 131.

Stenobothrus coloradus, Bruner, 1885. Rept. Com. Agr., 307.

Hab. Montana, Wyoming, and Colorado, east of the Rocky Mountains, Kansas and Nebraska.

This, like *Opeia obscurus*, Thos., is a species of the great plains. It is reported by Bruner as very common in the Yellowstone Valley. The National Museum contains Thomas' types and specimens from Nebraska, Wyoming, Colorado, and Montana.

2. AMPHITORNUS ORNATUS, n. sp.

Stenobothrus coloradus, Koebele, 1890. Bul. 22, Div. Ent., 94.

This species is closely allied to the preceding, but the following differences appear: The head and pronotum in this species are longer, and the face is distinctly more oblique in both sexes. The antennæ of the female are more depressed and distinctly acuminate. The median carina is cut decidedly behind the middle. The colors are brighter and more strongly contrasted. The posterior tibiæ are bright blue.

Described from several specimens from Los Angeles, California, which now belong to the United States National Museum.

XII. **AKENTETUS**, n. gen. Fig. 12.

This genus is closely related to *Amphitornus*. It differs in the somewhat longer and considerably deeper sculpturing of the head, but especially in the structure of the pronotum which is nearly plain above with the lateral carinæ faint except upon the anterior part of the prozone and the metazone and considerably divergent from the middle sulcus to the posterior margin. These are cut by all three transverse sulci. The median carina is faint and cut near the middle by the principal sulcus only. There are no traces of supplementary carinæ. The color is nearly uniform brown.

This genus contains a single species found in Colorado.

AKENTETUS UNICOLOR, n. sp. Fig. 12a, 12b.

Length (male)	18.5 mm.
Tegmina	16 mm.
Post. Fem.	12.5 mm.

Color dark, dull brown with a narrow stripe of fuscous, which is not at all conspicuous on account of the dark ground color, extending from the upper margin of the eye along the lateral lobes of the pronotum just outside of the lateral carinæ. The posterior femora have the outer face marked with three distinct black bands and the knee is black. All these black marks are extended across the upper face and upon the inside. The posterior tibiæ are bluish.

Described from a single male from Colorado.

XIII. **AMBLYTROPIDIA**, Stål. Fig. 13.

Vertex extended considerably in front of the eyes, plainly declivent and roundly united with the front from which it is separated by lateral carinæ which are almost obsolete or moderately distinct. It is convex and shallowly or scarcely sulcate with a plain median carina. The lateral foveolæ are wanting. The frontal costa is plain or sulcate with elevated lateral carinæ. The face seen from the side is nearly straight. The antennæ are filiform or slightly enlarged apically and heavy, scarcely as long as the head and pronotum. The pronotum has the disk plain with the carinæ, more especially the median, distinct and parallel or the lateral slightly divergent. The median carina is cut near or distinctly behind the middle and the metazone is sharply but very obtusely angulate. The lateral lobes of the pronotum are at least as high as broad with the anterior border moderately oblique, the posterior sub-vertical and the lower a little descending posteriorly, more decidedly ascending anteriorly. The lobes of the mesosternum are separated by a space about as broad as long (male and female) and the metasternal lobes are contiguous behind. The tegmina and wings are well developed with the scapular area of the former not expanded nor hyaline nor regularly veined. The posterior femora are decidedly heavy with the base unusually convex on the outer face. The valves of the ovipositor are exerted.

Amblytropidia, Stål, 1873. Recen. Orth., I, 93.

Amblytropidia, Bruner, 1893. Rev. Syst. Orth., 120.

This American genus contains three species, *A ferruginea*, Stål, from Brazil and the two enumerated below from North America.

Key to Amblytropidia, Stål.

A.[1] Median carina of the pronotum cut in the middle. Dorsum of the abdomen brownish.....1.— *Occidentalis*, Sauss.

A.[2] Median carina of the pronotum cut much behind the middle. Dorsum of the abdomen reddish orange..2.—*Auriventris*, Bruner.

1. AMBLYTROPIDIA OCCIDENTALIS, Sauss. Fig. 13a, 13b.

Stenobothrus occidentalis, Sauss., 1861. Orth. Nov. Am., Ser. II, 19.
Stenobothrus occidentalis, Walk., 1870. Cat. Derm. Salt., IV, 755.
Amblytropidia subhyalina, Scud., 1875. Cent. Orth., 23.
Amblytropidia subhyalina, Scud., 1877. Ent. Notes, VI, 29.
Amblytropidia subhyalina, Bruner, 1883. 3rd Rept. Ent. Com., 58.
Amblytropidia subhyalina, Schufeldt, 1884. Proc. U. S. Nat. Mus., VII, 332.
Chlocaltis (*Amblytropidia*) *subhyalina*, Provancher, 1877. Faune Entom. du Can., 44.

Hab. The Gulf States of the United States north of Tennessee and Georgia and west to Colorado and Arizona. Abbé Provancher implies that a specimen of this species in his collection was found in Canada. Its occurrence there seems improbable.

2. AMBLYTROPIDIA AURIVENTRIS, Bruner.

Amblytropidia auriventris, Bruner.

Hab. Orizaba, Mexico.

XIV. CHLOËALTIS, Harr. Fig. 14.

Vertex triangular, a little declivent, not extending in front of the eyes as much as the distance between the eyes, convex, more or less sulcate, with the lateral carinæ little elevated and the median carina slight but never entirely wanting. The lateral foveolæ are wanting. The frontal costa is more or less rounded above the ocellus, plain or very faintly sulcate below with the sides sub-parallel. The antennæ are decidedly flattened at the base and much longer than the head and pronotum together, in the male as long as the hind femora. The face seen from the side is nearly straight. The pronotum has the disk plain with the three carinæ equally distinct and cut much behind the middle with the last transverse sulcus. The lateral carinæ are plainly (male) or strongly (female) curved. The posterior margin of the metazone is straight or gently curved, not angulate. The lateral lobes of pronotum are longer than high, with the anterior and posterior margins straight and strongly and equally oblique, and with the lower margins horizontal or slightly descending posteriorly, more decidedly

ascending anteriorly. Mesosternal lobes separated by a space much broader than long, the metasternal lobes by a space broader than long (female) or about as broad as long (male). The tegmina are generally abortive (female) or well developed (male). The scapular area is unusually expanded, especially near and beyond the middle in the male (and in the female to a less extent when the tegmina are not abortive), and is filled with a series of strong oblique cross-veins. The discoidal is as broad as the ulnar area, and the intercalary vein is present. The posterior femora are rather slender or moderately robust and more or less distinctly banded above. The posterior tibiæ have the apical spurs on the inside about equal.

This North American genus contains two species, one from the north-eastern and one from the north-western United States.

In part, *Locusta* (*Chločaltis*), Harr., 1852. Treat. Ins. Inj. to Veg., 160.

In part, *Locusta* (*Chločaltis*), Harr., 1862. Treat. Ins. Inj. to Veg., 184.

In part, *Chločaltis*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

In part, *Chločaltis*, Thos., 1880. 9th Rept. Ins. Ill., 84.

In part, *Chločaltis*, Brunner, 1893. Rev. Sys. Orth, 119.

Chločaltis, Morse, 1896. Psyche, VII, 327, fig. 11, 11a, and 419.

In part, *Chrysochraon*, Thos., 1873. Syn. Acrid. N. Am., 74.

In part, *Stenobothrus*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

In part, *Truxalis*, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.

KEY TO CHLOËALTIS, Harr.

A.[1] Posterior margin of the disk of the pronotum straight, lateral lobes of the pronotum of the male black. . . . 1.— *Conspersa*, Harr.

A.[2] Posterior margin of the disk of the pronotum obtusely rounded, lateral lobes of the pronotum of the male not black. . . . . 2. —*Abdominalis*, Thos.

1. CHLOËALTIS CONSPERSA, Harr. Fig. 14a, 14b.

Locusta (*Chločaltis*) *conspersa*, Harr, 1852. Treat. Ins. Inj. Veg., 160.

Locusta (*Chločaltis*) *conspersa*, Harr., 1862. Treat. Ins. Inj. Veg., 184.

Chločaltis conspersa, Scud., 1862. Can. Nat., VII, 286.

Chločaltis conspersa; Scud., 1862. Journ. Bost. Soc. Nat. Hist., VII, 455.

Chločaltis conspersa, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 145.

Chločaltis conspersa, S. I. Smith, 1872. Rept. Sec. Agr. Conn., 375.

Chločaltis conspersa, Scud., 1874. Fin. Rept. Geol. N. H., I., 570, fig. 55–56.

Chločaltis conspersa, Scud., 1875. Brit. N. Am. Bound. Com., 286.

Chločaltis conspersa, Fernald, 1887. Orth. N. E., 36.

Chločaltis conspersa, Caulfield, 1887. 18th Rept. Ent. Soc. Ont., 70.

Chločaltis conspersa, Davis, 1889. Ent. Am., V, 78 and 81.

Chločaltis conspersa, McNeill, Psyche, VI, 65.

Chločaltis conspersa, Scud., 1893. 23rd Ann. Rept. Ent. Soc. Ont., 75, fig. 50 and 51.

Chločaltis conspersa, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 8.

Chločaltis conspersa, Morse, 1894. Psyche, 13 and 104.

Chločaltis conspersa, Blatchley, 1894. Can. Ent., XXVI, 222.

Chločaltis conspersa, Morse, 1896. Psyche VII, 327, fig. 11, 11a, and 419.

Stenobothrus conspersus, Walk., 1870. Cat. Derm. Salt., IV, 755.

Chrysochraon conspersum, Thos., 1873. Syn. Acrid. N. Am., 76.

Chrysochraon conspersum, Bruner, 1877. Can. Ent., IX, 144.

Chrysochraon conspersum, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Chrysochraon conspersum, Blatchley, 1891. Can. Ent., XXIII, 75.

Chrysochraon conspersum, Osborn, 1892. Proc. Iowa Acad. Sci., 1890–91, 4.

Truxalis conspersa, Thos., 1876. I, Bul. Ill. Mus. Nat. Hist., 61.

Locusta (*Chloealtis*) *abortiva*, Harr., 1852. Treat. Ins. Inj. Veg., 160.

Locusta (*Chloealtis*) *abortiva*, Harr., 1862. Treat. Ins. Inj. Veg., 184.

Stenobothros melanopleurus, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

Stenobothros melanopleurus, Walk., 1870. Cat. Derm. Salt., IV, 754.

Hab. Canada as far north as the shores of Lake Winnipeg; United States, Nebraska to New England and south to Ohio, Indiana, and Illinois.

This species has only been reported once as far west as Nebraska (Bruner, 1877), and it is not unlikely that this reference was mistaken.

2. CHLOËALTIS ABDOMINALIS, Thos.

Chrysochraon abdominalis, Thos., 1873. Syn. Acrid. N. Am., 74.

Chrysochraon abdominalis, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Hab. Montana.

The types are in the National Museum. The species has not been reported since it was named by Thomas.

XV. **DICHROMORPHA**, Morse. Fig. 15.

Vertex much shorter than broad, somewhat declivent, convex, but more or less sulcate behind the distinct elevated lateral carinæ. These are straight or gently curved and meet at an angle of 90 degrees or more in a blunt point. The median carina is entirely wanting, as are the lateral foveolæ. The frontal costa is sulcate above and below the ocellus with the sides gently divergent downward, more or less constricted just below the ocellus and near the vertex. The face seen from the side is nearly straight. The antennæ are a little longer (male) or scarcely so long as (female) the head and pronotum. The disk of the pronotum is plain with the three carinæ very nearly straight and parallel. All are cut distinctly behind the middle by the very faint principal sulcus. The first and second transverse sulci are not visible upon the disk. The lateral lobes of the pronotum are perpendicular, longer than high, with the anterior and posterior margins strongly oblique, the latter plainly sinuate and the lower margin a little descending posteriorly, more strongly ascending and sinuate anteriorly. The lobes of the mesosternum are separated by a space broader than long (female) or as broad as long (male). The lobes of the metasternum are separated in the female by a space as long as broad, in the male they are contiguous. The tegmina are generally abortive, sometimes well developed, in which case the scapular area is not expanded. The anal field of the tegmina meets the discoidal field at an angle. The posterior femora are stout and not banded. The posterior tibiæ are obscurely colored with the apical spurs on the inner side not very unequal. The valves of the ovipositor are moderately exerted.

Dichromorpha, Morse, 1896. Psyche, VII, 326, fig. 1, 7, 7a, 7b.

In part, *Chloëaltis*, Scud., 1862. Journ. Bost. Soc. Nat. Hist., VII, 445.

In part, *Chloëaltis*, Bruner, 1893. Rev. Syst. Orth., 119.

In part, *Opsomala*, Thos., 1865. Trans. Ill. Agr. Soc., 451.

In part, *Chrysochraon*, Thos., 1873. Syn. Acrid. N. Am., 75.

In part, *Truxalis*, Stål, 1873. Recen. Orth., I, 92.

In part, *Truxalis*, Thos., 1876. Bul. Ill. Mus. Nat. Hist., I, 61.

KEY TO DICHROMORPHA, Morse.

A.[1] Lateral carinæ of the pronotum perceptibly sinuate about the middle and a little less distant at this point than on the metazone. .....1.—*Viridis*, Scud.

A.[2] Lateral carinæ of the pronotum perceptibly arcuate about the middle and more distant at this point than on the metazone ... .2.—*Brunnea*, Scud.

1. DICHROMORPHA VIRIDIS, Scud.

Chlocaltis viridis, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 455.

Chlocaltis viridis, S. I. Smith, 1872. Rept. Sec. Agr. Conn., 374.

Chlocaltis viridis, Scud., 1877. Ent. Notes, VI, 29.

Chlocaltis viridis, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

Chlocaltis viridis, Fernald, 1887. Orth. New Eng., 36.

Chlocaltis viridis, Davis, 1889. Ent. Am., V, 81.

Chlocaltis viridis, McNeill, 1891. Psyche, VI, 64.

Chlocaltis viridis, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 8.

Chlocaltis viridis, Morse, 1894. Psyche, VII, 14.

Chlocaltis viridis, Beutenmüller, 1894. Desc. Cat. Orth., 292, pl. vii, fig. 10.

Chlocaltis viridis punctulata, Beutenmüller, 1894. Desc. Cat. Orth., 292.

Stenobothrus viridis, Walk., 1870. Cat. Derm. Salt., IV, 755.

Chrysochraon viridis, Thos., 1873. Syn. Acrid. N. Am., 75.

Chrysochraon viridis, Scud., 1874. Fin. Rept. Geol. N. H., 372.

Chrysochraon viridis, Bruner, 1877. Can. Ent., IX, 144.

Chrysochraon viridis, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 131.

Chrysochraon viridis, Blatchley, 1891. Can. Ent., XXIII, 75.

Chrysochraon viridis, J. B. Smith, 1892. Bul. 90, N. J. Agr. Exp. Sta., 31, pl. i, fig. 5.

Chrysochraon viridis, Osborn, 1892. Proc. Iowa Acad. Sci., 1890, 914.

Chrysochraon viridis, Blatchley, 1894. Can. Ent., XXVI, 221.

Truxalis viridis, Thos., 1876. Bul. Ill. Mus. Nat. Hist., I, 61.

Dichromorpha viridis, Morse, 1896. Psyche, VII, 326, fig. 7, 7a, 7b.

Chlocaltis punctulata, Scud., 1862. Journ. Bos. Soc. Nat. Hist., VII, 455.

Chlocaltis punctulata, Fernald, 1887. Orth. New Eng., 36.
Chlocaltis punctulata, Bruner, 1885. Rept. Com. Agr., 307.
Chlocaltis punctulata, Morse, 1894. Psyche, VII, 14, 104.
Stenobothrus punctulata, Walk., 1870. Cat. Derm. Salt., IV, 755.
Chrysochraon punctulatum, Thos., 1873. Syn. Acrid. N. Am., 76.
Chrysochraon punctulatum, Bruner, 1877. Can. Ent., IX, 144.
Chrysochraon punctulatum, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.
Opsomala brevipennis, Thos., 1865. Trans. Ill. Agr. Soc., V, 451.
Truxalis angusticornis, Stål, 1873. Recen. Orth., I, 105.
Truxalis angusticornis, Thos., 1875. Rept. Geog. and Geol. Surv. W. 100 Mer., V, Zool., 871.

Hab. The United States east of the Rocky Mountains except Texas and the extreme Southwest.

This is one of the commonest and most widely spread species in North America.

2. DICHROMORPHA BRUNNEA, Scud. Fig. 15a, 15b.

Chloealtis brunnea, Scud., 1875. Cent. of Orth., 22.
Chloealtis brunnea, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

Hab. Florida (Scudder).

I have seen a typical specimen from Scudder's collection.

XVI. CLINOCEPHALUS, Morse. Fig. 16.

Vertex horizontal, triangular, sulcate, without a median carina, much shorter than the distance between the eyes, with strongly elevated lateral carinæ. Lateral foveolæ wanting. Frontal costa acuminate above, sulcate throughout, with the heavy lateral carinæ regularly divergent below. Face a very little arcuate. The antennæ a little longer than the head and pronotum (male), sub-filiform, with the seventh to eleventh joints expanded laterally on the inner side so as to make them obscurely serrate at that point. The pronotum has the disk nearly plain with the three carinæ heavy and distinct and plainly cut much behind the middle by the principal sulcus only. The lateral carinæ are parallel on the prozone, very slightly divergent on the metazone. The posterior margin of the metazone is very gently arcuate. The lateral lobes of the pronotum are slightly convex above with the anterior margin straight and strongly oblique, the posterior margin oblique and decidedly sinuate above the lower angle and the lower

margin decidedly angulate in the middle. The lobes of the mesosternum are separated by a space longer than broad (male). The metasternal lobes are contiguous. The tegmina and wings are well developed and not longer than the abdomen. In both the ulnar area is very greatly expanded in the middle and the discoidal area is narrow. The posterior femora are not banded. The posterior tibiæ have the apical spurs on the inner side not very unequal. The anterior and middle femora are somewhat inflated.

Clinocephalus, Morse, 1896. Psyche, VII, 326, fig. B, Ba.

1. CLINOCEPHALUS ELEGANS, Morse. Fig. 16a.

Clinocephalus elegans, Morse, 1896. Psyche, VII, 326, fig. B. Ba.

Hab. Long Island, New Jersey, Maryland, Georgia, (Morse).

XVII. **ORPHULA**, Stål. Fig. 17a, 17b, 17c, 17d.

Vertex nearly horizontal, never extending in front of the eyes a distance greater than its own width, always more or less sulcate, with or without a faint median carina. The lateral foveolæ are obsolete or distinct, elongate triangular, or linear, not visible from above. The frontal costa is plain or sulcate with the sides nearly straight and very moderately divergent. The face is nearly straight or a little arcuate, never at all sinuate. The antennæ are filiform, sometimes depressed and acuminate at the apex. The pronotum has the disk nearly plain, with the median carina cut in or behind the middle. The lateral carinæ are generally decidedly or strongly sinuate, rarely nearly straight and divergent from the front border, or from the first and second sulcus. Very rarely they are nearly parallel. The lateral lobes of the pronotum have the anterior border decidedly oblique and straight or a little arcuate, the posterior border is less oblique and more or less sinuate and the lower border is decidedly angulate in the middle. The mesosternal lobes are separated by a space broader than long (female) or about as broad as long (male) and the metasternal lobes by a space not broader than long (female) or they are contiguous (male). The tegmina and wings are well developed, a little shorter or much longer than the abdomen. The former are very narrow with the scapular area not more expanded in the male than in the female. The discoidal area is destitute of the intercalary vein and the ulnar area in the male is sometimes much widened and regularly reticulate. The posterior femora are moderately slender or rather heavy. The

apical spurs on the inner side of the posterior femora are never very unequal. The valves of the ovipositor are moderately exerted.

Truxalis (*Orphula*), Stål, 1873. Recen. Orth., I, 105.

In part, *Stenobothrus*, Scud., 1861. Jour. Bost. Soc. Nat. Hist., VII, 456.

In part, *Stenobothrus*, Thos., 1873. Syn. Acrid. N. Am., 80.

Orphula, Boliv., 1888. Ex. Mem. Soc. Zool. France, 27.

Orphula, Brunner. Rev. Sys. Orth., 119.

Orphula, Morse, 1896. Psyche, VII, 326, fig. 8, 10a.

This genus is given by Stål as a sub-genus of Truxalis. It was founded upon *T. pagana*, Stål, *T. plebeia*, Stål, *T. intricata*, Stål, and *Acridium punctatum*, De G. The first and third mentioned are South American species; the second is from Honolulu; and the fourth from Surinam, Rio Janeiro and Columbia. It is represented in North America and the West Indies by seven species.

KEY TO ORPHULA, Stål.

A.[1] Discoidal field of the tegmina (female) scarcely narrowing distally where it is occupied nearly always by more than one row of cells and is little if any narrower than the ulnar area at its widest part. The ulnar area in the male is either divided into two series of cells by a more or less distinct false vein or it is irregularly reticulate, never occupied throughout with a single series of perpendicular or oblique cross-veins. The tegmina extend beyond the tips of the posterior femora always.

B.[1] Antennæ very slender, very slightly depressed and not somewhat suddenly constricted near the tip and acuminate, as long as the head and pronotum even in the female. Lateral carinæ of the pronotum most nearly approximate at the second transverse sulcus.....1.—*Pelidna*, Burm.

B.[2] Antennæ not very slender, strongly depressed, somewhat suddenly constricted near the apex and acuminate, shorter than the head and pronotum (female) or but little longer (male). Lateral carinæ of the pronotum most nearly approximate at the transverse sulcus.....2.—*Olivacea*, Morse.

A.[2] Discoidal area of the tegmina of the female generally plainly narrowed distally where it is nearly always occupied by a single row of cells, and is plainly narrower than the ulnar area at its widest part. The ulnar area in the male is occupied by a single series of transverse veins. The tegmina rarely exceeding the abdomen (female) or the tip of the posterior femora (male).

B.[1] Lateral carinæ sub-straight and parallel.....3.—*Decora*, n. sp.

B.[2] Lateral carinæ either strongly constricted, or if not they are strongly divergent on the metazone.

C.[1] Lateral carinæ more nearly approximate at the second sulcus than at the anterior margin of the pronotum. Posterior margin of the metazone gently angulate or obscurely rounded. Median carina cut decidedly behind the middle.

D.[1] Lateral foveolæ of the vertex generally very obscure, always triangular and basal. Head not very much shorter than the pronotum. Antennæ as long as (female) or longer than the head and pronotum and not acuminate at the apex. 4.—*Speciosa*, Scud.

D.[2] Lateral feveolæ of the vertex distinct and sub-linear. Head much shorter than the pronotum. Antennæ scarcely as long as (male) or much shorter than (female) the pronotum, and distinctly acuminate at the tip.....5.—*Tepanica*, Sauss.

C.[2] Lateral carinæ not more nearly approximate at any part of the pronotum than at the anterior margin.

D.[1] Median carina of the pronotum cut in the middle. Lateral carinæ of the pronotum gently divergent on the prozone, decidedly on the metazone. Posterior margin of the metazone strongly angulate.....6.—*Orizabæ*, n. sp.

D.[2] Median carina of the pronotum cut behind the middle. Lateral carinæ parallel on the prozone.....7.—*Scudderi*, Boliv.
.....8.—*Punctata*, De Geer.

1. Orphula pelidna, Burm.

Length (male).....	16	–19 mm.	(female)....	20	–24 mm.
Tegmina (male).....	14	–17.5 mm.	(female)....	18	–20 mm.
Antennæ (male).....	7	–10 mm.	(female)....	8.5	–10 mm.
Post. Fem. (male).....	9.5	–11 mm.	(female)....	12	–14 mm.

The scutellum does not extend in front of the eyes a distance equal to the width between the eyes, its sides meet in an angle a little greater (female) less (male) than a right angle, a sub-crescent shaped transverse sulcus extends from eye to eye, which is not interrupted by any trace of a longitudinal median carina. The lateral fovoelæ are generally quite distinct and deep, elongate triangular in shape. The frontal costa is shallowly sulcate with the walls more divergent than in *speciosa*. The eyes are from one and one-half (female) to nearly twice (male) as long as the groove below the eye. The antennæ are little or not at all depressed, longer than the head and pronotnm, decidedly

(male) or a little (female), with the segments near the middle from three to four times as long as wide. The pronotum has the three carinæ quite distinct, the two lateral carinæ being strongly divergent on the metazone and more nearly approximate upon the prozone than in *speciosa*. They are most nearly approximate at the second sulcus. All the carinæ are cut very near the middle by the principal transverse sulcus.

The tegmina surpass the femora slightly (female) or considerably (male). The ulnar area of the tegmina is usually little or no broader than the intercalary and the latter is occupied even distally by two or more rows of cells. The former is never, as in *speciosa*, occupied in the male by a single row of cells.

This species is extremely variable in color, but brown and fuscous are the predominant tints. In some specimens brown is replaced by various shades of green on the face, cheeks, occiput, disk and lower part of the lateral lobes of the pronotum, anal and costal fields of the tegmina. In these and other light colored specimens the fuscous stripe behind the eye is quite broad especially in the male; in many dark specimens, especially in the male, the fuscous stripe expands so as to cover nearly the whole of the lateral lobes of the pronotum; generally, however, there is to be seen more or less of lighter sometimes strongly contrasting color along the anterior and lower margins. The lateral carinæ are nearly always sharply outlined with yellowish brown or green which cuts the fuscous band on the metazone. The disk of the pronotum is sometimes dark except for a broad median light stripe. The tegmina are commonly brown and the whole radial field is usually mottled with lighter and darker brown or fuscous. The posterior femora are brown with the outer face more or less infuscated, sometimes with traces of transverse brown bands. The posterior tibiæ are greenish yellow or obscure brown or plumbeous with the darker basal half interrupted by a somewhat conspicuous light annulus a short distance below the knee.

When compared with *speciosas*, the color is more mottled, especially on the sides and in the radial field of the elytra and green specimens are much less common.

This species can be distinguished from *speciosas* by the length of the tegmina, by the fact that the antennæ are longer than the head and pronotum and little or not at all depressed, by the narrower ulnar area of the tegmina never (in the male) occupied by a single row of cells, by the more compressed prozone and by the absence of the faint

median carina present on the scutellum of *speciosa*. It is readily distinguished from *olivacea*, Morse by the antennæ which are not short and plainly depressed, with the apex acuminate, as in that species, by the lateral carinæ which are convergent only to the first sulcus in *olivacea* instead of to the second as in this.

Gomphocerus pelidnus, Burm., 1838. Handb. Ent., II, 650.

Gomphocerus pelidnus, Walk., 1870. Cat. Derm. Salt., IV, 784.

Gomphocerus pelidnus, Thos., 1873. Syn. Acrid. N. Am., 95.

Gomphocerus pelidnus, Bruner, 1883. 3rd Rep. Ent. Com., 56.

Gomphocerus pelidnus, Morse, 1894. Psyche, VII, 104.

In part, *Gomphocerus maculipennis*, Scud., 1862. Bost. Jour. Nat. Hist., VII, 458.

Gomphocerus maculipennis, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

Gomphocerus maculipennis, Walk., 1870. Cat. Derm. Salt., IV, 754.

Gomphocerus maculipennis, Thos., 1872. Syn. Acrid. N. Am., 86.

Gomphocerus maculipennis, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

Gomphocerus maculipennis, S. I. Smith, 1872. Rept. Sec Agr. Conn., 376.

Gomphocerus maculipennis, Scud., 1874. Fin. Rept. Geol. N. H., I, 373.

In part, *Gomphocerus maculipennis*, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.

Gomphocerus maculipennis, Bruner, 1877. Can. Ent., IX, 144.

In part, *Gomphocerus maculipennis*, Thos., 1880. Rept. Nox. and Ben. Ins. Ill., 102.

In part, *Gomphocerus maculipennis*, Fernald, 1887. Orth. N. Eng., 37, fig. 7.

Gomphocerus maculipennis, Bruner, 1884. 3rd Rept. U. S. Ent. Com., 55.

Gomphocerus maculipennis, Schufeldt, 1884. Proc. U. S. Nat. Mus., VII, 332 and 335.

Gomphocerus maculipennis, J. B. Smith, 1884. Bul. 4, Div. Ent., 30.

Gomphocerus maculipennis, Bruner, 1885. Rept. Com. Agr., 307.

Stenobothrus maculipennis, Lintner, 1885. 2nd Rept. Ins. N. Y., 196.

Stenobothrus maculipennis, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., Vol. I, No. 4, 131.

Stenobothrus maculipennis, Davis, 1889. Ent. Am., V, 81.

Stenobothrus maculipennis, J. B. Smith, 1892. Bul. 90, N. J. Agr. Col. Ex. Sta., 31, pl. i, fig. 19.

Stenobothrus maculipennis, Morse, 1893. Psyche, VI, 479, fig. 4.

Stenobothrus maculipennis, Morse, 1894. Psyche, VII, 14 and 104.

Stenobothrus maculipennis, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 9.

Stenobothrus propinquans, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 461.

Stenobothrus propinquans, Walk., 1870. Cat. Derm. Salt., IV, 754.

Stenobothrus propinquans, Thos., 1873. Syn. Acrid. N. Am., 90.

Stenobothrus propinquans, Bruner, 1877. Can. Ent., IX, 144.

Stenobothrus propinquans, Provancher, 1877. Faune Ent. du Can., 43.

Stenobothrus propinquans, Scud., 1880. Second Rept. U. S. Ent. Com., 25.

Stenobothrus, sp., Uhler, 1877. Bul. U. S. Geol. and Geog. Surv. Terr., I, 792.

Orphula maculipennis, Bolivar, 1888. Ex. Mem. Soc. Zool. Fr., 27.

Orphula maculipennis, Morse, 1896. Psyche, VII, fig. 8–8 e.

Not *Stenobothrus maculipennis*, McNeill, 1891. Psyche, 65.

Hab. United States east of the Rocky Mountains. It is possible that the range of this species is greater than I have given it, but there has been so much uncertainty about the identity of this and allied species that it is impossible to know in all cases to what species the reference was made. I am inclined to think that the species generally referred to *propinquans* was generally a long-winged *æqualis* as the range of this species is much farther north than *maculipennis* which is a southern form. I think there is little doubt but that the synonomy given above is correct. Mr. Scudder compared his *propinquans* with Burmeister's type of *pelidna* and decided that the former was a synonym. I have a typical specimen of *propinquans* from Mr. Scudder's cabinet which he has labeled as equal to *pelidna*. A careful study of this specimen has convinced me that it is *maculipennis* and really much more typical than some of the southern forms. Furthermore, Scudder's description of *propinquans* applies about equally well to varieties of *maculipennis* and *æqualis* except in one particular. He says "Hind tibiæ plumbeus with a broad pale annulation at the base." This applies to most varieties of *maculipennis*, but I have never seen a specimen of *æqualis* in the hundreds I have in my collection which contains specimens from Iowa, Illinois, Missouri, Arkansas, Louisiana, Texas, Indiana, New York, Massachusetts, Connecticut, New Hamp-

shire, New Jersey, Maryland, Georgia, or in any collection to which I have had access, which had this mark.

2. ORPHULA OLIVACEA, Morse. Fig. 17 b.

Stenobothrus olivaceus, Morse, 1893. Psyche, VI, 479, fig. 182.
Stenobothrus olivaceus, Morse, 1894. Psyche, VII, 105.
Stenobothrus olivaceus, Morse, 1896. Psyche, VII, 327, fig. 10–10a.

Hab. Greenwich and Stanford, Connecticut, salt marshes (Morse).

3. ORPHULA DECORA, n. sp. Fig. 17 d.

Length (female).....24 mm.
Tegmina.....16 mm.
Head..... 3 mm.
Pronotum..... 4½ mm

Vertex broad but little advanced in front of the eyes, with a very low lateral carina, close to which is a shallow narrow sulcus and no median carina. The frontal costa is not at all sulcate, with the sides straight and very moderately divergent. The lateral foveolæ are elongate triangular and obscure. The face is arcuate. The antennæ are filiform, scarcely at all depressed. The pronotum has the median carina cut distinctly behind the middle. The lateral carinæ are nearly straight and parallel to the median carina, being quite parallel to the second sulcus and from that point barely divergent to the posterior margin of the metazone which is moderately angulate. The lobes of the mesosternum are separated by a space much broader than long. The lobes of the metasternum by a space much longer than broad. The tegmina are a little longer than the abdomen. The general color is testaceous, with the sides of the abdomen and an obscure stripe behind the eye a little darker, and the whole upper surface, including the anal and the costal fields of the tegmina green. The testaceous discoidal field is scarcely perceptibly maculate with very small spots.

Described from a single female which has lost its posterior femora and all of one and part of the other antenna.

This species is more closely related to *speciosa* than to any other of the Orphulæ. It is, however, readily distinguished by its much greater size approaching as it does very nearly *Dichromorpha viridis*, the female being a little less robust than in that species. It is also distinct in the structure of the pronotum in which the lateral carinæ are very nearly parallel and straight. The vertex is shorter and more rounded than in *speciosa* and there is no median carina. The metas-

ternal lobes are separated by a space about twice as long as broad in this species, in *speciosa* by a space about as long as broad. In some respects *decora* approaches *O. orizabæ*, but it is readily distinguished from that species by the very much shorter vertex and the parallel lateral carinæ of the pronotum.

Hab. Fayetteville, Arkansas.

4. ORPHULA SPECIOSA, Scud. Fig. 17 c.

Length (male)	14–15 mm.	(female)	20–21 mm.
Tegmina	12–13 mm.		12–16 mm.
Antennæ	5– 6 mm.		6 mm.
Post. Fem	9 mm.		11 mm.

Scutellum of the vertex extending in front of the eyes much less than the distance between the eyes, with the sides meeting at an angle scarcely so little as a right angle even in the male. A somewhat crescent-shaped sulcus extends across the scutellum and this is interrupted by a faint median carina which extends backward more or less distinctly to the middle of the occiput. The lateral foveolæ are usually indistinct and triangular. The frontal costa has the sides slightly and somewhat regularly diverging from the vertex to the clypeus; it is furnished with coarse lateral walls which are moderately high or scarcely elevated. The eyes are distinctly less than twice as long as the groove below the eye. The antennæ are about as long as the head and pronotum; they are plainly depressed with the segments near the middle from one and one-half to twice as long as broad. The three carinæ of the pronotum are distinct raised lines, cut slightly behind the middle by the principal sulcus. The lateral carinæ are gently sinuate and convergent to the second sulcus on the prozone and only slightly divergent on the metazone.

The tegmina are rarely longer than the abdomen in the female and they very rarely surpass the knees in the male. The ulnar area is usually twice as wide as the intercalary area in the middle of the elytra and is furnished with one (male) or two (female) rows of cells. The intercalary area has but a single row of cells at the distal end.

The color is extremely variable. Some specimens are a nearly uniform dark brown; lighter colored specimens have the ground color any shade of brown or green, sometimes varied with rose, with a rather broad fuscous stripe extending from the eye across the upper margin of the lateral lobes of the pronotum, on the metazone crossing the lateral carinæ and edging the disk. In many specimens the lateral carinæ

are outlined with a lighter color. The elytra may be (*a*) nearly uniform brown; (*b*) nearly uniform green, except the radial field, which is more or less completely brown or fuscous with a single row of darker spots extending through the discoidal area to or beyond the middle of the tegmina; (*c*) the anal field concolorous with the occiput and disk of the pronotum, and the costal field green or some shade of brown different from that of the anal field.

The posterior femora are greenish or brown, with the outer face more or less infuscated but never plainly banded.

The posterior tibiæ are dull brown, yellowish without any pale annulation near the base.

This is a common or abundant species from the Yellowstone Valley to Maine. In Northern Illinois it is confined to the tops and sides of the hills. In suitable situations (somewhat dry pasture lands) it is not uncommon as far south as Kansas and North-west Arkansas, and I have found it common on the hills about Shreveport, La.

I have examined Mr. Scudder's type of *S. speciosus* and *S. gracilis* and I think there is no doubt of their specific identity with *S. æqualis*. I have also a specimen of *S. bilineatus* (Scud.) from Dr. Scudder's cabinet, and I think there is no reasonable doubt of its identity with the above-named species.

Stenobothrus speciosus, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 458.

Stenobothrus speciosus, Walk., 1870. Cat. Derm. Salt., IV, 754.

Stenobothrus speciosus, Thos., 1873. Syn. Acrid. N. Am., 86.

Stenobothrus speciosus, Bruner, 1883. 3rd Rept. U.S. Ent. Com., 55.

Stenobothrus æqualis, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 459.

Stenobothrus æqualis, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

Stenobothrus æqualis, Walk., 1860. Cat. Derm. Salt., IV, 754.

Stenobothrus æqualis, Scud., 1874. Fin. Rept. Geol. N. H., 373.

Stenobothrus æqualis, Bruner, 1877. Can. Ent., IX, 144.

Stenobothrus æqualis, Bruner. 3rd Rept. Ent. Com., 55.

Stenobothrus æqualis, Lintner, 1885. 2nd Rept. Ins. N. Y., 196.

Stenobothrus æqualis, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., 131, Vol. I, No. 4.

Stenobothrus æqualis, Bruner, 1885. Rept. Com. Agr., 307.

Stenobothrus æqualis, Bruner, 1887. Rept. Com. Agr., 167.

Stenobothrus æqualis, J. B. Smith, 1892. Bul. 90, N. J. Agr. Col. Ex. Sta., 31.

Stenobothrus æqualis, Osborn, 1892. Proc. Iowa Acad. Sci. 1890–91, 4.

Stenobothrus æqualis, Morse, 1893. Psyche, VI, 476, figs. 5 and 6.

Stenobothrus æqualis, Morse, 1894. Psyche, VII, 14 and 104.

Stenobothrus bilineatus, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 460.

Stenobothrus bilineatus, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

Stenobothrus bilineatus, Walk., 1870. Cat. Derm. Salt., IV, 754.

Stenobothrus bilineatus, Thos., 1873. Syn. Acrid. N. Am., 90.

Stenobothrus bilineatus, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Stenobothrus bilineatus, Morse, 1894. Psyche, VII, 104.

Stenobothrus gracilis, Scud., 1872. Fin. Rept. U. S. Geol. Surv. Neb., 250.

Stenobothrus gracilis, Thos., 1872, Pelim. Rept. U. S. Geol. Surv. Mont., 430.

Stenobothrus gracilis, Thos., 1873. Syn. Acrid. N. Am., 94.

Stenobothrus gracilis, Bruner, 1877. Can. Ent., IX, 144.

Stenobothrus gracilis, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Stenobothrus gracilis, Bruner, 1885. Rept. Com. Agr., 307.

Stenobothrus maculipennis, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

Stenobothrus maculipennis, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.

Stenobothrus maculipennis, McNeill, 1891. Psyche, VI, 65.

Orphula æqualis, Bolivar, 1888. Ex. Mem. Soc. Zool. France, 27.

Orphula æqualis, Morse, 1896. Psyche, VII, 326, figs. 9, 9c.

5. Orphula tepanica (?), Sauss. Fig. 17 a.

Length (male)	16 mm.	(female)	20 mm.
Tegminæ	12 mm.		14 mm.
Antennæ	5 mm.		5 mm.
Post. Fem.	9 mm.		12 mm.

Vertex with a distinct but shallow crescent-shaped foveola with the lateral carinæ sharp and elevated and meeting in a nearly sharp angle equal to (female) or less than (male) a right angle. Lateral foveolæ nearly linear and distinct. Frontal costa very slightly (female) or moderately (male) sulcate with the sides regularly divergent below.

The antennæ are much (female) or little (male) shorter than the head and pronotum and they are acuminate at the tip. Pronotum much longer than the head with the median carina cut decidedly behind the middle, and the lateral carinæ slightly convergent to the second sulcus, more strongly divergent from that point to the posterior margin which is very obtusely angulate. The tegmina are about as long as (female) or a little longer than (male) the abdomen. The ulnar area of the tegmina is much narrower than in *speciosa*, and is occupied by very weak cross-veins. The color is greenish or testaceous, very similar to light colored specimens of *speciosa*.

This species is described from one male and four females from Siskiyou county and Los Angeles, California. They were collected by Mr. Coquillett and are now in the National Museum. It is impossible to be certain that the species just described is that named *tepanicus* by Saussure, as he gives a very imperfect description of the pronotum. As his description fits these specimens very well as far as it goes, and as the locality is not far removed, I have thought it best not to risk another synonym.

? *Stenobothrus tepanicus*, Sauss., 1861. Orth. Nov. Am., Ser. II, 21.
? *Stenobothrus tepanicus*, Thos., 1873. Syn. Acrid. N. Am., 206.

Hab. Mexico (Saussure); Los Angeles, Siskiyou county, California.

6. Orphula orizabæ, n. sp. Fig. 17.

Length (male)	13.5–14.5 mm.	(female) 21 mm.
Tegmina	11–12.5 mm.	14 mm.
Antennæ	5 mm.	
Post. Fem.	9 mm.	11 mm.

The vertex is much produced in front of the eyes, being about as long as wide. It is very shallowly but broadly sulcate with the lateral carinæ very slight and scarcely elevated. The lateral foveolæ are triangular and obscure. The frontal costa is narrow and scarcely sulcate. The face is very slightly arcuate. The antennæ are very short, not equaling the head and pronotum even in the male. The pronotum is much longer than the head. The median carina is cut in the middle by the principal sulcus. The lateral carinæ are quite as distinct and sharp as the median, and they are divergent from almost the anterior margin to the posterior margin, which is strongly angulate. The tegmina exceed (male) or fall a little short (female) of the posterior femora. In some females the discoidal area has the distal portion a

little irregularly reticulate instead of the single series of cells usual in the division of the genus to which this species belongs. In the female, the ulnar area of the tegmina is less than twice as broad as the discoidal area and is occupied by a single series of weak and widely separated veins. The general color of the female is green with the under parts, the sides of the abdomen, and the inner and lower faces of the posterior femora and the posterior tibiæ brown; with the lateral carinæ of the pronotum whitish, accompanied by a very narrow black line, external on the prozone, internal on the metazone. The tegmina are grass-green and quite immaculate. The male is wholly testaceous, varying to dark brown except the upper surface of the head, the disk of the pronotum, and the anal field of the tegmina. The discoidal field is obsoletely maculate, with a few irregularly scattered small spots.

Described from two females from Mexico City, Mexico, and San Antonio, Texas, and four females from Mexico City and Tlalpam, Mexico. All of these specimens are in my collection except the specimen from San Antonio which is in the National Museum. The last mentioned specimen differs a little from the other male, especially in having the frontal costa plainly sulcate with heavy lateral carinæ and the ulnar area of the tegmina has more numerous cross-veins. I think, however, that it belongs to the species here described.

Hab. Mexico City, Tlalpam, Mexico, San Antonio, Texas.

7. Orphula scudderi, Bolivar.

Orphula scudderi, Bol., 1888. Ex. Mem. Soc. Zool. France, 27.

Hab. Cuba (Bolivar).

8. Orphula punctata, De Geer.

Acridium punctatum, De Geer, 1773. Mem. Ins., III, 503, pl. XLII, fig. 12.

Truxalis (*orphula*) *punctata*, Stål, 1873. Recen. Orth., I, 106.

Orphula punctata, Brunner, 1893. Proc. Zool. Soc., Lond., XLI, 606.

Hab. Surinam (De Geer); Rio Janeiro, Columbia (Stål), Grenada, St. Vincent, and other islands of the West Indies (Brunner).

I am unacquainted with this species and the descriptions are too meagre to determine its position, but I include it here for the sake of completeness.

SPECIES OF UNCERTAIN VALUE AND POSITION.

Stenobothrus mexicanus, Walk., 1870. Cat. Derm. Salt., IV, 756 (Oajaca).

Stenobothrus decisus, Walk., 1870. Cat. Derm. Salt., IV, 757 (San Domingo).

Stenobothrus arctatus, Walk., 1870. Cat. Derm. Salt., IV, 761 (Honduras).

Stenobothrus viridissimus, Walk., 1870. Cat. Derm. Salt., IV, 761 (Honduras).

These species apparently belong to *Orphula*, but the descriptions are not good enough to enable one to certainly recognize such variable and closely-allied forms. It is not unlikely that *mexicanus arctatus*, and *viridissimus* are synonyms of *O. tepanicus*, Sauss., while *decisus* is possibly *O speciosus*.

XVIII. **ALPHA**, Brunner. Fig. 18.

Head about as long as the pronotum. Vertex almost horizontal, slightly declivent, sulcate with rather heavy lateral carinæ which meet in a blunt point and with no trace of a median carina. The lateral foveolæ are present but often not clearly separated from the front on account of the obsolescence of the lower carinæ. The frontal costa is narrow above the ocellus, sulcate and slightly acuminate below; its sides are more or less strongly divergent, while its lateral carinæ are heavy and distinct. The face seen from the side is strongly oblique and straight. The antennæ are somewhat (female) or much (male) longer than the head and pronotum. They are flattened basally and plainly acuminate. The disk of the pronotum is somewhat convex, with the median carina rather slight and cut by the distinct principal sulcus behind the middle. The lateral carinæ are scarcely distinguishable, even on the metazone, but they are replaced on the sides of the disk by distinct light-colored stripes which are strongly or very strongly sinuate, and divergent on the metazone. The metazone has its posterior margin gently rounded. The lateral lobes of the pronotum are small, a little longer than high, with the anterior margin moderately oblique, the posterior sub-perpendicular and the lower nearly straight and horizontal. The lobes of the mesosternum are separated by a space much broader than long, snd the metasternal lobes by a space about square (female) or longer than broad (male). The tegmina and

wings are well developed. The former has the mediastine vein very short in the male, with the scapular area expanded so as to make the anterior margin of the tegmina plainly arcuate near the middle. The discoidal and ulnar areas are imperfectly or not at all closed. The posterior femora are slender, with more or less distinct bands on the upper face. The posterior tibiæ have the apical spines on the inner side much stronger than those on the outside. The valves of the ovipositor are strongly exerted, the lower ones being furnished with an unusually strong lateral tooth.

Of the new genera given by Brunner in his *Révision du système des Orthoptères*, this is one of the few that can be clearly determined. He says in a foot-note that it is represented by four species in the United States; with *Stenobothrus occipitalis*, Thos., as the type. In other cases he simply states that the genus is founded upon one or more species from a certain locality without either naming or describing the species and with no description of the genus other than the very brief one given in the key. It is impossible to determine from these brief characterizations just what the genus is and to guess at these would only make confusion in synonomy so that I have determined to treat such genera as though they never had been made. I know of but three species in the United States or North America that will be included in this genus as I have limited it.

Alpha, Brunner, 1893. Rev. Sys. Orth., 121.

In part, *Stenobothrus*, Thos. Syn. Acrid., N. Am., 81.

Ochrilidea? Bruner, 1889. Proc. U. S. Nat. Mus., XII, 52.

KEY TO ALPHA, Bruner.

A.[1] Median carina of the pronotum cut much behind the middle. Lateral carinæ twice as widely separated at the posterior margin of the metazone as near the middle of the disk.

B.[1] Posterior tibiæ red ..... 1.— *Occipitalis*, Thos.

B.[2] Posterior tibiæ testaceous ..... 2.— *Cinerea*, Bruner.

A.[2] Median carina of the pronotum cut very little behind the middle. Lateral carinæ about twice as widely separated at the posterior margin of the metazone as at the middle of the disk. ..... 3.— *Crenulata*, Bruner.

1. ALPHA OCCIPITALIS, Thos. Figs. 18a, 18b.

Stenobothrus occipitalis, Thos., 1873. Syn. Acrid. N. Am., 81.

Stenobothrus occipitalis, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Stenobothrus occipitalis, Bruner, 1884. Bul. 4 Div. Ent., 58.

Oxycoryphus occipitalis, Thos., 1876. Proc. Dav. Acad. Nat. Sci., I, 251.

Orchrilidea occipitalis, Bruner, 1889. Pro. U. S. Nat. Mus , XII, 52.

Orchrilidea occipitalis, Townsend, 1893. Insect Life, VI, 31.

Orchrilidea occidentalis, Bruner, 1893. XII, Proc. U. S. Nat. Mus., 51.

Stenobothrus occidentalis, Bruner, 1893. XII, Proc. U. S. Nat. Mus., 51.

Hab. Both slopes of the Rocky Mountains, extending from New Mexico and Arizona to Idaho and Montana and as far east as western Nebraska and Dakota. According to Bruner this and the following species are "frequenters of the mountain slopes and foot-hills and especially so when these localities are somewhat sandy. Like *crenulata* they are partial to the bare surfaces, and are very active in their movements." The National Museum contains what appears to be Thomas' type as well as other specimens from Colorado, Wyoming, Montana, and Nebraska.

2. ALPHA CINEREA, Bruner.

Orchrilidea cinerea, Bruner. Proc. U. S. Nat. Mus., XII, 51.

Hab. Wyoming, Idaho, Western Dakota, and Nebraska.

3. ALPHA CRENULATA, Bruner.

Orchrilidea crenulata, Bruner. Proc. U. S. Nat. Nat. Mus., XII, 51.

Hab. Both slopes of the Rocky Mountains, from the southern to the northern boundaries of the United States, as far east as western Dakota and Nebraska.

XIX. **PHLIBOSTROMA**, Scud. Fig. 19.

Body robust, with the head unusually large. The occiput is strongly convex. The vertex convex, declivent, and not sulcate, advanced in front of the eyes only half as far as the distance between them, with distinct lateral carinæ which are nearly straight and meet in a rounded angle. There is sometimes a trace of a median carina. The lateral foveolæ are scarcely separated from the front by a carina which is always weak, sometimes wanting. The frontal costa is nearly plain or sulcate with heavy lateral carinæ which are very moderately divergent downward. The face is gently arcuate and very moderately oblique. The antennæ are filiform, longer (female) or considerably longer (male)

than the head and pronotum. The pronotum has the disk nearly plain, with all the carinæ, but especially the median, distinct. This is cut by the transverse sulcus very little behind the middle. The lateral carinæ are very strongly sinuate and upon the metazone divergent. They are cut plainly by the principal sulcus. The metazone has its posterior margin roundly angulate. The lateral lobes of the pronotum are higher than long with the anterior margin slightly oblique, the posterior perpendicular and the lower arcuate. The anterior corner of the lateral lobes is evenly rounded, the posterior angulate with a rounded apex. There is on the anterior part of the lateral lobes a heavy carina which extends from the middle sulcus forward and a little downward to near the middle of the anterior margin. The mesosternal lobes are separated by a narrow space several times as broad as long, and the metasternal lobes by a narrow space not more than twice (male) or three or four times (female) as long as broad. The tegmina are a little shorter (female) or a little longer (male) than the abdomen. They have the scapular area much expanded in the male so as to make the anterior margin strongly arcuate. The discoidal and ulnar areas are frequently imperfectly closed, and the former has an irregular intercalary vein. The posterior femora are banded above and on the outer face. The posterior tibiæ are reddish with the apical spurs on the inner side not very unequal in length. The valves of the ovipositor are very moderately exerted.

Phlibostroma, Scud., 1875. Cent. Orth., 28.

In part, *Stenobothrus*, Thos., 1873. Syn. N. Am. Acrid., 93.

Beta, Brunner, 1893. Rev. Sys. Orth , 121.

The genus is represented by a single variable species.

1. PHLIBOSTROMA QUADRIMACULATA, Thos. Figs. 19a, 19b.

Stenobothrus quadrimacalatus, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 280.

Stenobothrus quadrimaculatus, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

Stenobothrus quadrimaculatus, Thos., 1873. Syn. N. Am. Acrid., 93.

Stenobothrus quadrimaculatus, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

Stenobothrus quadrimaculatus, Bruner, 1885. Rept. Com. Agr., 1885, 307.

Phlibostroma quadrimaculata, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 135.

Phlibostroma picta, Scud., 1875. Cent. Orth., 29.

Phlibostroma picta, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 57.

Phlibostroma picta, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., No. 7, 199.

Phlibostroma parva, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 510.

Phlibostroma parva, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 57.

Phlibostroma parva, Bruner, 1885. Rept. Com. Agr., 307.

Phlibostroma parva, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., No. 7, 199.

Stenobothrus laetus, Uhler, 1877. Bul. U. S. Geol. and Geog. Surv. Terr., III, 792.

Not *Philobostroma parva*, McNeill. Psyche, VI, 64.

Hab. The eastern slopes of the Rocky Mountains from Texas to British America and eastward to Kansas and Nebraska.

The study of a considerable number of specimens from numerous localities and an examination of Scudder's type of *Phli. pictum* and of what appears to be Thomas' types of *St. quadrimaculatus* in the National Museum has led me to the conclusion that there is but a single variable species of this genus in the United States. The United States National Museum contains specimens from Colorado, Nebraska, Wyoming, British America, and Texas.

XX. **BOÖPEDON**, Thos. Fig. 20.

Vertex declivent, convex and not separated from the front by distinct carinæ and not forming an angle with the front, but united with it in a curve. The foveolæ of the vertex and of the tempora are indicated by punctures or sometimes by very shallow sulcations. The latter are dorsal. The front is nearly perpendicular. The frontal costa is very broad, about equal to half the width of the vertex between the eyes, convex with the sides very little parallel, only a little constricted at the vertex, vanishing before reaching the clypeus. The antennæ are filiform, much (male) or somewhat (female) longer than the head and pronotum. The disk of the pronotum is more or less elevated toward the median carina. This is unusually prominent and is cut near the middle by the principal sulcus only. The lateral carinæ are nearly parallel or very moderately sinuate and on the metazone divergent. They are most distinct on the anterior margin of the prozone, obsolete on the metazone. The posterior margin of the

metazone is obtusely but sharply angulate. The lateral lobes of the pronotum are higher than long with the anterior and posterior margins straight, decidedly and equally oblique, and with the lower margin strongly arcuate and somewhat angulate in the middle. The lobes of the mesosternum are separated by a space much wider than long, the metasternal lobes by a linear ridge with an elongate deep pit on either side. The wings and tegmina are well developed but do not exceed the abdomen. The former in the male have the scapular area considerably expanded and filled with strong oblique cross-veins. The discoidal area is filled with irregularly reticulating veins. The posterior femora are banded on the inner and outer surfaces. The posterior tibiæ have the apical spurs on the inner side very long and stout, being twice as long as those on the outer side, and the anterior one of the inner spurs is nearly twice as long as the other. The valves of the ovipositor are only moderately exerted.

This genus is North American and is represented by two species only, both western forms.

Boöpedon, Thos., 1870. Proc. Acad. Nat. Sci. Phila., 83.
Boöpedon, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 272.
Boöpedon, Thos., 1873. Syn. Acrid. N. Am., 140.
Boöpedon, Brunner, 1893. Rev. Sys. Orth., 123.

KEY TO BOÖPEDON, Thos.

A.[1] Elytra brown, plain or most obscurely spotted. General color varying from shining black to yellow, posterior femora stout and more than commonly expanded at the base with black bands extending across the outer, upper and inner faces. . . . . 1.—*Nubilum*, Say.

A.[2] Elytra brown with a yellow stripe near both the anterior and posterior edges and three oblong yellow spots in the discoidal field. General color greenish-yellow varied with brown. Posterior femora slender with a longitudinal fuscous stripe on the outer, and fuscous bands or markings on the inner but not on the upper face . . . . . 2.—*Flavofasciatum*, Thos.

1. BOÖPEDON NUBILUM, Say. Figs. 20a, 20b.

Gryllus nubilus, Say, 1825. Jour. Acad. Nat. Sci. Phila., IV, 308.
Gryllus nubilus, Say, 1825. Ent. N. Am. Ed. Lec., II, 237.
Boöpedon nubilum, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 265 and 272.

Boöpedon nubilum, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

Boöpedon nubilum, Thos., 1873. Syn. Acrid. N. Am., 141, pl. fig. 11.

Boöpedon nubilum, Bruner, 1877. Can. Ent., IX, 144.

Boöpedon nubilum, Bruner, 1885. Rept. Com. Agr., 303.

Boöpedon nubilum, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

Boöpedon nubilum, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 135.

Boöpedon nubilum, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 7, 198.

Boöpedon nigrum, Thos., 1870. Proc. Acad. Nat. Sci. Phila., 83.

Hab. Eastern slopes of the Rocky Mountains, extending to eastern Nebraska, Kansas, and Texas.

The National Museum contains Thomas' type of *B. nigrum*.

2. BOÖPEDON FLAVOFASCIATUM, Thos.

Boöpedon flavofasciatum, Thos., 1870. Proc. Acad. Nat. Sci. Phila., 84.

Boöpedon flavofasciatum, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 265 and 273.

Boöpedon flavofasciatum, Thos., 1873. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

Boöpedon flavofasciatum, Thos., 1873. Syn. Acrid. N. Am., 141.

Boöpedon flavofasciatum, Bruner, 1877. Can. Ent., IX, 144.

Boöpedon flavofasciatum, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

Hab. Montana, Wyoming, Colorado, Nebraska, New Mexico, Texas, and eastern slopes of the Rocky Mountains.

The National Museum contains Thomas' types, two females. It also contains a male from Dallas, Texas, which also probably belongs to this species. In this specimen the tegmina are less than half as long as the abdomen and rounded at the tip. The femora are decidedly longer than in *B. nubilum*, and the lateral carinæ of the pronotum are more distinct and the disk is less rounded.

XXI. **PLECTROPHORUS**, n. gen. Fig. 21.

Head much shorter than the pronotum. Vertex horizontal, sulcate, with slight lateral and obsolete median carina, but little advanced in front of the eyes. (The frontal costa is indistinctly separated from the vertex and it is unusually prominent, seen from above, and

much advanced.) The top of the head is furnished with three slight carinæ. The lateral foveolæ are scarcely discernible as a group of punctations, but the tempora are plainly visible from above. The frontal costa is prominent, not at all sulcate but plainly convex, broad, with the sides sub-parallel. The face seen from the side is strongly arcuate and moderately declivent. The antennæ are sub-filiform, as long as the head and pronotum. The pronotum has the disk slightly elevated toward the median carina, which is very distinct and is cut once plainly in front of the middle. The lateral carinæ are distinct, except between the first and third sulci where they are broken and interrupted. They are gently arcuate and convergent to the second sulcus, beyond which they are slightly arcuate and strongly divergent. The metazone is strongly angulate. The lateral lobes of the pronotum are much higher than long, with the anterior and posterior margins straight and very little inclined and the lower margin horizontal behind, ascending before the middle. The mesosternal lobes are separated by a space about as long as broad. The metasternal lobes are nearly (female) or quite (male) contiguous behind and inclose two deep pits. The tegmina and wings are very large. The former has the discoidal area densely and irregularly reticulate. The posterior femora are unusually heavy at the base, with the apical half slender. The posterior tibiæ have the apical spurs on the inner side very large, the anterior one being straight, twice as long as the one behind it and scarcely shorter than the first tarsal joint. The valves of the ovipositor are moderately exerted. The disk of the pronotum is velvety black with a broad median longitudinal light stripe, and the tegmina are distinctly maculate with large spots, as in *Hippiscus*.

The genus is tropical American. It includes two species. The type is *Stenobothrus viatorius*, Sauss. This species, with *Scyllina peragrans*, Stål, from South America was made by Stål the type of the genus *Scyllina*. But it is generically distinct from *S. peragrans*, and does not fall into *Scyllina* as it is given in his key. I have therefore separated it.

In part, *Scyllina*, Stål, 1873. Recen. Orth, I, 94.

Key to Plectrophorus, n. gen.

A.[1] Foveolæ of the vertex semi-elliptical. Posterior femora orange, with the apex blue ..... 1.—*Viatorius*, Sauss.

A.[2] Foveolæ of the vertex triangular. Posterior femora red, with the apex blue ..... 2.—*Gregarius*, Sauss.

1. PLECTROPHORUS VIATORIUS, Sauss. Figs. 21a, 21b, 21c.

Stenobothrus viatorius, Sauss., 1861. Orth. Nov. Am., II, 20.
Stenobothrus viatorius, Thos., 1873. Syn. Acrid. N. Am., 206.
Scyllina viatoria, Stål, 1873. Recen. Orth., I, 112.

Hab. All of Mexico, where it is common and injurious (Sauss.). I have specimens from Orizaba and Tlalpam.

2. PLECTROPHORUS GREGARIUS, Sauss.

Stenobothrus gregarius, Sauss., 1861. Orth. Nov. Am., II, 20.
Stenobothrus gregarius, Thos., 1873. Syn. Acrid. N. Am., 206.

Hab. Islands of St. Thomas and Hayti (Sauss.).

I am unacquainted with the species, but it probably belongs to this genus.

XXII. **MECOSTETHUS**, Fieb. Fig. 22.

Vertex horizontally produced with a median carina more or less distinct and with lateral carinæ distinct, straight, meeting in a sharp or rounded point in front to form an angle a little greater or a little less than 90 degrees. The lateral foveolæ are very small, triangular, basal (distant from the vertex) visible from above, sometimes almost obsolete. The frontal costa is continued distinctly almost to the clypeus, it is sulcate at least below the ocellus. The antennæ are filiform, much longer (male) or about as long (female) as the head and pronotum together. The pronotum is plain above with all the carinæ distinct, the median cut in or a little in advance of the middle, the lateral cut by the principal sulcus only or by either or both of the other sulci as well. The metazone is very obtusely angled. The lateral lobes of the pronotum are at least as high as long with the anterior and posterior margins sub-perpendicular, and with the lower margins only moderately obtuse and but little rounded at the apex. The tegmina are well developed in both sexes, the mediastine vein is well developed, extending beyond the middle and the costal field is expanded at the base and furnished with an adventitious vein. The scapular area is but little expanded in the male and is about equal in both sexes. The discoidal area is furnished with a very prominent intercalary vein which is nearer the ulnar than the radial vein. This area is occupied by a double series of strong cross-veins and forms the musical organ in the male. The posterior femora are somewhat longer than usual, extending beyond the end of the abdomen in the male. The last

ventral plate of the male is acutely produced, being at least twice as long as its greatest depth. The valves of the ovipositor are strongly exerted, with the upper pair finely crenulate above.

Mecostethus, Fieber, 1853. Syn., 10.
Mecostethus, Bruner, 1882. Pro. Eur. Orth., 94, fig. 24.
Mecostethus, Bruner, 1893. Rev. Sys. Orth., 123.
Mecostethus, Morse, 1896. Psyche, VII, 327, figs. 13–15b.
Stetheophyma, Fisch., 1853. Orth. Eur., 357, XVIII, fig. 3.
Stetheophyma, Stål, 1873. Recen. Orth., I, 93.
Stetheophyma, Thos., 1873. Syn. Acrid. N. Am., 98.
Stetheophyma, Boliv., 1876. Syn. Acrid. Esp., 139.
Stetheophyma, Thos., 1880. Nox. and Ben. Ins. Ill., IX, 84.

This European genus is represented in North America by three species.

KEY TO MECOSTETHUS, Fieb.

A.[1] Prozone shorter than the metazone. Lateral carinæ plainly sinuate and strongly divergent from the first sulcus to the posterior margin. Posterior femora slender.

B.[1] Scapular area of the tegmina with a pale streak. Intercalary vein of the male with very obscure low dull teeth . . 1.—*Lineatus*, Scud.

B.[2] Scapular area without a pale streak. Intercalary vein of the male with sharp, elevated, minute, closely-set teeth. . 2 —*Gracilis*, Scud.

A.[2] Prozone as long as the metazone. Lateral carinæ very nearly straight and very gently divergent. Posterior femora not unusually slender. . . . . 3.—*Platyptera*, Scud.

1. MECOSTETHUS LINEATUS, Scud. Figs. 22a, 22b.

Arcyptera lineata, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 462.
Arcyptera lineata, Scud., 1874. Fin. Rept. Geol. Surv. N. H., I, 373.
Arcyptera lineata, Provancher, 1877. Faune Ent. du Can., 44.
Arcyptera lineata, McNeill, 1891. Psyche, VI, 66.
Stetheophyma lineata, Thos., 1873. Syn. Acrid. N. Am., 98.
Stetheophyma lineata, Thos., 1880. Nox. and Ben. Ins. Ill., 105.
Stetheophyma lineata, Fernald, 1887. Orth. N. E., 38.
Stetheophyma lineata, Bruner. 3rd Rept. U. S. Ent. Com., 56.
Stetheophyma lineata, Morse, 1894. Psyche, VII, 105.
Mecostethus lineatus, Morse, 1896. Psyche, VII, 327, figs. 13, 13b.
? *Mecostethus variegatus*, Walk., 1870. Cat. Derm. Salt., IV, 781.
? *Mecostethus variegatus*, Thos., 1873. Syn. Acrid. N. Am., 210.

Hab. New England to Northern Illinois and Iowa.

This is a rare species which has been reported but a few times. Walker refers certain specimens from North America to *S. variegatus*, Sulz. It is possible that this determination was correct, but it is very improbable, and I have referred his name to this species with great doubt. It is possible that his specimen is *Boöpedon nigrum*, Thos.

2. MECOSTETHUS GRACILIS, Scud.

Arcyptera gracilis, Scud., 1862. Can. Nat., VII, 286.

Arcyptera gracilis, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 463.

Arcyptera gracilis, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

Arcyptera gracilis, Scud., 1874. Fin. Rept. Geol. Surv. N. H., I, 373.

Arcyptera gracilis, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

Arcyptera gracilis, Scud., 1893. 23rd Ann. Rept. Ent. Soc. Ont., 76, fig. 53.

Arcyptera gracilis, Morse, 1894. Psyche, VII, 105.

Mecostethus gracilis, Morse, 1896. Psyche, VII, 327, fig. 14.

Hab. Maine, Red River (British America), Nebraska, and Black Hills (Dakota). The National Museum contains specimens from the last mentioned locality collected by Mr. Bruner.

3. MECOSTETHUS PLATYPTERUS, Scud.

Arcyptera platyptera, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 463.

Stenobothrus platyptera, Bruner, 1883. 3rd Rept. Ent. Com., 56.

Stenobothrus platyptera, Morse, 1894. Psyche, VII, 105.

Mecostethus platyptera, Morse, 1896. Psyche, VII, 327, figs. 15, 15b.

Hab. New England.

This species has never been reported outside of New England.

XXIII. BOÖTETTIX, Bruner. Fig. 23.

Scutellum of the vertex nearly horizontal, very shallowly sulcate, with a delicate median carina, and slight though distinct raised walls which meet at an acute angle in a very sharp point at the vertex. The tempora are triangular, nearly vertical, and scarcely visible from above, with the lower wall obsolete. The frontal costa is contracted for a short distance below the vertex into a very narrow ridge scarcely wider than the median carina of the pronotum This rapidly expands until

when opposite the antennæ it is as wide as at any point; from this point it is sub-parallel and sulcate with raised walls. The antennæ are shorter than (female) or about equal to (male) the head and pronotum. They are coarse, somewhat flattened, especially on the apical portion where they are somewhat clavate and more (male) or less (female) acuminate. The eye is rather long, not especially prominent. The occiput is much (male) or little (female) elevated. The pronotum has the disk of the prozone strongly convex, that of the metazone more nearly flat, with its sides rapidly divergent and the posterior margin strongly rounded. The median carina is quite distinct on the metazone, very faint on the prozone except in front of the anterior sulcus. It is cut by all three sulci. The lateral carinæ are entirely obsolete. The lateral lobes of the pronotum are about as long as high, with the anterior and posterior margins sub-perpendicular and both lower angles strongly rounded. The prosternum is furnished with a very low, rounded process. The lobes of the mesosternum and the metasternum are transverse in the female, square in the male. The tegmina are furnished with a distinct (female) or irregular and incomplete (male) intercalary vein, and the plicate is soon united with the dividing vein. The mediastine vein exceeds half the length of the wing in the female, in the male it is much abbreviated and the scapular area is much expanded, hyaline, and filled with a series of strong curved veins. The valves of the ovipositor of the female are exerted, the lower furnished with a large blunt tooth. The posterior femora are slender, equaling (female) or surpassing (male) the abdomen in length.

Boötettix, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 58.

This genus contains but one known species.

BOÖTETTIX ARGENTATUS, Bruner. Figs. 23a, 23b.

Boötettix argentatus, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 59, pl. i, fig. 4 (female), 5 (male).

Boötettix argentatus, Townsend, 1892. Can. Ent., XXIV, 198.

Boötettix argentatus, Townsend, 1893. Ins. Life, VI, 30.

Boötettix argentatus, Scudder, 1893. 23rd Ann. Rept. Ent. Soc. Ont., 76.

This is an arboreal species, said by Mr. Bruner to be found only on an evergreen species of *Ceanothus*. Since reported by Mr. Townsend to be found on *Larrea mexicana*. The latter is an evergreen, and as no evergreen *Ceanothus* is given by either Gray or Coulter it is probable that this species is confined to the single food-plant last mentioned.

XXIV. **LIGUROTETTIX**, n. gen. Fig. 24.

Scutellum of the vertex considerably declined, narrower than the short diameter of the eye, elliptical and sulcate throughout, with the boundary walls high raised lines which are continued backward to a point opposite the middle of the eyes. The lateral foveolæ are visible from above, deeply impressed, and trapezoidal in shape. The frontal costa is not sulcate even at the ocellus. The antennæ are short, filiform, and slender. The eyes are prominent, and the occiput is much (male) or somewhat (female) higher than the disk of the pronotum. The disk of the pronotum is moderately rounded, more decidedly on the prozone. The median carina is slight but distinct, cut near the middle by the last transverse sulcus. The lateral carinæ are wanting, even on the metazone. The lateral lobes of the pronotum are a little higher than long, with the anterior and posterior borders both subperpendicular, and both of the lower angles obtuse and rounded. The prosternum is furnished with a large pyramidal spine. The mesosternal lobes are wider than long in the female; about equally as wide as long in the male. The metasternal lobes are separated by a narrow space in the female, united behind in the male. The tegmina exceed the abdomen in length, the intercalary vein is distinct, and the plicate is soon united with the dividing vein. The mediastine vein is well developed in the female, and extends to a point beyond the middle of the wing. In this sex also the scapular area is filled with a single series of oblique cross-veins, but is not hyaline. In the male the mediastine vein is very much abbreviated and the scapular area greatly expanded so that it occupies one-third of the width of the tegmina and causes the anterior margin of the wing to be much expanded in the second and third fourths. It is hyaline and filled with a series of strong, curved, oblique veins forming a very efficient musical organ. Behind this musical organ the anterior radial vein is greatly thickened. In both sexes the longitudinal veins are distinct, and the cross veins are few and weak comparatively. The wings are more than twice as long as wide, hyaline, with a slight infuscation at the tip, and the veins black. The hind femora are moderately slender with distinct fuscous bands on the upper surface. The valves of the ovipositor of the female are moderately exerted, and the lower pair are furnished with a strong lateral tooth.

This genus is a curious composite form with affinities with *Œdipodinæ* and *Acridinæ*, as well as *Truxalinæ*. It is not closely related to

any other genus of this sub-family with which I am acquainted, but it is nearest *Boötettix*.

LIGUROTETTIX COQUILLETTI, n. sp. Figs. 24a, 24b, 24c.

Length (male)	14–16 mm.	(female)	18 mm.
Tegmina	14–16 mm.		17 mm.
Antennæ	5 mm.		5 mm.
Post. Fem	8– 9 mm.		9.5 mm.

The scutellum of the vertex is somewhat elliptical in shape, with the posterior end open and the anterior margin somewhat encroached upon in some specimens, especially in the female by the lateral foveolæ. These are about as wide as long with the narrow end forward, the two being separated at the apex by the width of the frontal costa, which is at this point only a little more than half its width between the antennæ where it is very slightly expanded. The antennæ are scarcely equal to the head and pronotum in length. The pronotum has all of the sulci about equally distinct, and the posterior margin of the disk is much rounded rather than angulate. The whole surface of the pronotum, but more especially the metazone, is finely tuberculate. The wings are more than twice as long as wide. The posterior femora do not surpass the abdomen.

In color there seems to be a constant difference between the males and the females, the former being very obscurely maculate so that the appearance is nearly uniform dull brown, with the tegmina rather faintly flecked with somewhat evenly distributed small spots of fuscous and the posterior femora plainly banded upon the upper surface. The female has the head and face, disk of the pronotum, and the posterior femora with the body-color light yellow or reddish brown, maculate everywhere, except on the posterior femora, more or less distinctly with numerous thickly scattered small brown or fuscous spots. The lateral lobes of the pronotum are, in the light colored females, generally much darkened upon the prozone. The tegmina are distinctly spotted with thickly scattered and evenly distributed quadrate fuscous spots. The posterior tibiæ are dull yellow.

Described from three males and two females which were collected by Mr. Coquillett (in whose honor the species is named), in Los Angeles county, California. These specimens now belong to the United States National Museum.

This species is of peculiar interest in possessing the most highly developed musical organ known in the family *Acrididæ*. According

to Mr. Coquillett its stridulation is as loud and sustained as that of some of the *Cicada*.

XXV. STENOBOTHRUS, Fisch. Fig. 25.

"Vertex triangular, obtuse,* with the foveolæ, which are visible from above, narrow, oblong, rhomboidal. Antennæ filiform. Frontal costa convex. Pronotum with the disk almost plain, the median carina distinct and cut by the principal sulcus only, and the lateral carinæ straight or more or less arcuate or sinuate. The lateral lobes are higher than long,† with the lower angles somewhat obtuse. Tegmina fully developed, rarely abortive, with the mediastine area more or less extended, either narrow throughout or widened at the base, and sometimes including an adventitious vein. The scapular area is filled with oblique transverse veins and in the male is dilated. The radial vein is composed of three principal branches; there is no intercalary vein. The ulnar vein is composed of two branches which sometimes unite again before the middle, the dividing vein is straight, and the plicate vein is free or united with the dividing. The wings are fully developed or rarely abortive, not fenestrated, rarely wanting. The posterior femora are frequently mottled, very rarely distinctly spotted. The posterior tibiæ are frequently dull testaceous, rarely red. The sternum is rather broad, with the mesosternal lobes widely separated and the metasternal lobes distant. The first abdominal segment is furnished with a closed tympanum. The anal segment is longitudinally sulcate with the supra-anal plate of the male obtusely triangular. The subgenital plate of the male is recurved with the apex obtuse or acuminate. The valves of the ovipositor are short but exerted, and sometimes furnished with a lateral basal tooth."

Stenobothrus, Fisch., 1843. Orth. Europ., 313.
Stenobothrus, Bruner, 1882. Pro. Europ. Orth., 100.
Stenobothrus, Bruner, 1893. Rev. Sys. Orth., 122.
Stenobothrus, Morse, 1896. Psyche, VII, 327, fig. 12.
In part, *Gomphocerus*, Stål, 1873. Recen. Orth., 193.
Gomphocerus, Bolivar, 1876. Orth. de Esp., 107.
Chorthippus, Fieb.

This large European genus is very meagerly represented in this country by only four species, though formerly it served the same use-

* In *St curtipennis*, Harr., the vertex of the male is acute.

† In *St. curtipennis*, Harr., the lateral lobes of the pronotum are about equally high and long.

ful purpose in *Truxalinæ* that *Œdipoda* did in *Œdipodinæ*, and was employed as a convenient appellation for species that did not fall in any other genus.

KEY TO STENOBOTHRUS, Fisch.

A.1 Tegmina unspotted. Posterior tibiæ never red.

B.1 Median carina of the vertex obsolete. Lateral carinæ of the pronotum divergent from the first sulcus. Posterior margin of the metazone angulate. Disk much broader at the posterior than at the anterior margin . . . . . 1.—*Curtipennis*, Harr.

B.2 Median carina of the vertex slight but distinct. Lateral carinæ of the pronotum divergent from the second sulcus. Posterior margin of the metazone rounded. Disk not much broader at the posterior than at the anterior margin . . . . 2.—*Coloradensis*, n. sp.

A.2 Tegmina spotted more or less distinctly. Posterior tibiæ red.

B.1 Lateral lobes of the pronotum not much narrower at the lower margin than at the lateral carinæ. Median carina of the pronotum cut a little in front of the middle. Tegmina about as long as (female) or longer than (male) the abdomen, distinctly spotted . . . . . 3.—*Brunneus*, Thos.

B.2 Lateral lobes of the pronotum much narrower at the lower margin than at the lateral carinæ. Median carina of the pronotum cut a little behind the middle. Tegmina about half (male) or less than half (female) the length of the abdomen . . 4.—*Sordidus*, n. sp.

1. STENOBOTHRUS CURTIPENNIS, Harr.

Locusta curtipennis, Harr., 1835. Cat. Ins. Mass., 56.

Locusta (*Chlocaltis*) *curtipennis*, Harr., 1862. Treat. Ins. Inj. Veg., 184, pl. iii, fig. 1.

Locusta (*Chlocaltis*) *curtipennis*, Rathvon, 1862. Rept. Com. Agr., 368, fig. 28.

Stenobothrus curtipennis, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

Stenobothrus curtipennis, Scud., 1862. Can. Nat., VII, 286.

Stenobothrus curtipennis, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

Stenobothrus curtipennis, Walk., 1870. Cat. Derm. Salt., IV, 754.

Stenobothrus curtipennis, S. I. Smith, 1872. Rept. Sec. Agr. Conn., 376.

In part, *Stenobothrus curtipennis*, Thos., 1873. Syn. Acrid. N. Am., 91.

Stenobothrus curtipennis, Scud., 1874. Fin. Rept. Geol. Surv. N. H., I, 373, fig. 37.

Stenobothrus curtipennis, Thos., 1876. Bul. I, Ill. State Lab. Nat. Hist., 61.

Stenobothrus curtipennis, Provancher, 1877. Faune Ent. du Can., 43.

Stenobothrus curtipennis, Lintner, 1885. 2nd Rept. Ins. N. Y., 196.

Stenobothrus curtipennis, Fernald, 1887. Orth. N. E., 37.

Stenobothrus curtipennis, Davis, 1889. Am. Ent., V, 81.

Stenobothrus curtipennis, McNeill, 1891. Psyche, VI, 65.

Stenobothrus curtipennis, J. B. Smith, 1892. Bul. 90, N. J. Agr. Exp. Sta., 31.

Stenobothrus curtipennis, Osborn, 1892. Proc. Iowa Acad. Sci. 1890–1891, 4.

Stenobothrus curtipennis, Scud., 1893. 23rd Ann. Rept. Ent. Soc. Ont., 76, fig. 52.

Stenobothrus curtipennis, Morse, 1894. Psyche, VII, 14 and 104.

Stenobothrus curtipennis, Blatchley, 1894. Can. Ent., XXVI, 222.

Stenobothrus curtipennis, Blatchley, 1896. Can Ent., VII, 327, fig. 12.

Stenobothrus longipennis, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

Stenobothrus longipennis, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

Stenobothrus longipennis, Walk., 1870. Cat. Derm. Salt., 754.

Stenobothrus longipennis, Thos., 1873. Syn. Acrid. N. Am., 91.

Stenobothrus longipennis, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 872.

Stenobothrus longipennis, Thos., 1876. Bul. I, Ill. State Lab. Nat. Hist., 61.

Stenobothrus longipennis, Provancher, 1877. Faune Ent. du Can., 43.

Stenobothrus longipennis, Morse, 1894. Psyche, VII, 14 and 104.

Not *Stenobothrus curtipennis*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

Not *Stenobothrus curtipennis*, Bruner, 1877. Can. Ent., IX, 144.

Not *Stenobothrus longipennis*, Scud., 1880. 2nd Rept. U. S. Ent. Com., App. II, 25.

Not *Stenobothrus curtipennis*, Bruner, 1885. Rept. Com. Agr., 307.

Hab. The North Atlantic and North Central States and Canada west to the Red River. The references to this species from the Northwest are, I think, mistaken, and should be made to the closely allied

species, *S. coloradensis*, n. sp. Mr. Bruner's thorough report on the Kansas *Orthoptera* does not give *S. curtipennis* as occurring in that State, so that Iowa seems to be the western limit of the eastern species and Nebraska (probably north-western) the eastern limit of the western species.

2. STENOBOTHRUS COLORADENSIS, n. sp. Figs. 25a, 25b.

Stenobothrus curtipennis, Thos., 1870. Prelim. Rept. U. S. Surv. Mont., 430.

Stenobothrus curtipennis, Bruner, 1877. Can. Ent., IX, 144.

Stenobothrus curtipennis, Scud.; 1880. 2nd Rept. U. S. Ent. Com., App. II, 25.

Stenobothrus curtipennis, Bruner, 1885. Rept. Com. Agr., 307.

Stenobothrus, sp., Uhler, 1877. Bul. U. S. Geol. and Geog. Surv. Terr., III, 793.

Length (female)	21	mm.
Tegmina	18	mm.
Antennæ	7	mm.
Femora	12.5	mm.

The vertex is narrow, about equal to the short diameter of the eye. The scutellum has a distinct arcuate sulcus divided by a very plain carina running close to its anterior margin. The walls of the scutellum consist of a distinct raised line which is curved rather than angulate. The lateral foveolæ are linear. The frontal costa is rounded, narrow, and punctate above the ocellus, with its sides sub-parallel; below it is shallowly sulcate with the sides somewhat rapidly divergent. The antennæ are filiform, flattened, and barely as long as the head and pronotum. The pronotum has the median carina very distinct, cut very slightly behind the middle by the principal sulcus. The first sulcus is about half-way between the anterior margin of the disk and the principal sulcus. The lateral carinæ are gently curved, being most nearly approximate about the first sulcus. The posterior margin is rather gently arcuate with the disk at that point very little wider than the anterior margin. The lateral lobes of the pronotum are a little higher than long. The tegmina are yellowish-brown, plain, and about half as long as the abdomen. The posterior femora and tibiæ are reddish-yellow and immaculate except for the black spots at the knee. The color is olivaceous brown deepening to a reddish brown on the abdomen, with the top of the head and the disk of the pronotum

lighter and a very much broken blackish stripe behind the eye. The surface is everywhere shining, but least so on the top of the head and pronotum.

Very closely related to *Stenobothrus curtipennis*, but sufficiently distinct to be easily recognized. When compared with that species, *coloradensis* has the vertex narrower between the eyes with the median carina distinct instead of very faint. The antennæ of the female are scarcely as long as the head and pronotum instead of being distinctly longer. The pronotum is much shorter proportionally and decidedly less expanded posteriorly, the disk being scarcely wider at the posterior margin than at the anterior margin instead of being 1½ times as wide. The lateral carinæ are gently instead of strongly curved, and the posterior margin of the disk is rounded instead of angulate. Finally, the posterior femora are more robust.

Described from a single female received from Prof. C. P. Gillette, Fort Collins, Colorado. The specimen was labeled "Colo. 1936."

Hab. The eastern slopes of the Rocky Mountains, south to Utah and Colorado, and west to the Sierra Nevada Mountains.

3. Stenobothrus brunneus, Thos.

Stenobothrus brunneus, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 266.

Stenobothrus brunneus, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

Stenobothrus brunneus, Thos., 1873. Syn. Acrid. N. Am., 91.

Stenobothrus brunneus, Bruner, 1877. Can. Ent., IX, 144.

Stenobothrus brunneus, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

This is apparently a somewhat uncommon species since it has been reported in but two or three collections. It is found from Nebraska to the Sierra Nevada Mountains and south to Colorado. The National Museum contains specimens labeled *Gomphocerus brunneus* from Fort McLeod, Henry county, Idaho; Henry Lake, Idaho, and Fort McKinney, Wyoming.

4. Stenobothrus sordidus, n. sp. Fig. 25c.

Length (male)	17 mm.	(female)	24 mm.
Antennæ	10 mm.		10 mm.
Tegmina	7 mm.		5.5 mm.
Post. Fem.	10 mm.		12 mm.

Most nearly related to *S. brunneus*, but it is easily distinguished

from that species in the short tegmina and the very different pronotum which has the median carina cut a little behind instead of a little in front of the middle, and the lateral lobes not higher than wide and much narrower below than at the lateral carinæ. This species also lacks the longitudinal median stripe generally present on the head and pronotum and tegmina of *S. brunneus*, and there is scarcely a trace of a median carina on the vertex.

Described from numerous specimens in the United States National Museum which are labeled *Gomphocerus shastanus*, Scudd.

Hab. Salmon City, Idaho.

XXVI. **BRUNNERIA**, n. gen. Fig. 26.

Vertex broad, the distance between the eyes being equal to the width of one of the tegmina at the base, very nearly horizontal, convex, not at all sulcate, with the boundary walls in front straight raised lines which meet in an angle a little greater than 90 degrees (male). The lateral foveolæ are deeply impressed, plainly visible from above, rhomboidal, four or more times as long as wide, and with heavy walls which are approximate at the tip of the vertex. The frontal costa viewed from the side is generally arcuate and moderately oblique. It is plain throughout or very slightly hollowed below the ocellus with a single row of distinct punctures on either side. It is rather abruptly acuminate at the apex, suddenly and considerably expanded opposite the antennæ, decidedly contracted again at the ocellus, and below rather rapidly expanding. The antennæ are slightly depressed, filiform, and considerably longer than the head and pronotum combined. The pronotum has the disk very gently rounded from side to side, a little longer than the top of the head. The anterior margin of the disk is very slightly angulate, the posterior margin is straight or very slightly angulate. The median carina is a moderately heavy raised line, equally distinct throughout, cut once a little behind the middle by the principal sulcus. The lateral carinæ are slight, moderately sinuate, and cut by the principal sulcus only. The lateral lobes are about as high as long, with the anterior margin nearly perpendicular and the posterior margin considerably inclined and the posterior lower angle angulate. The tegmina are abortive and the posterior femora slender.

This genus is closely related to *Stenobothrus*, but is distinguishable in having the posterior margin of the pronotum straight, the lateral lobes not higher than broad, and the elytra abortive.

1. BRUNNERIA SHASTANA, Scud. Figs. 26a, 26b.

This species is reported by Mr. Scudder as occurring on Mount Shasta among the firs. It has not been reported elsewhere. The United States National Museum contains a male and a female which seem to be typical specimens. I have examined a male from Mr. Scudder's collection.

Gomphocerus shastanus, Scud., 1880. 2nd Rept. U. S. Ent. Com., App. II, 25, pl. xvii; fig. 15 (male), 18 (female).

XXVII. GOMPHOCERUS, Thunb. Fig. 27.

Similar to *Stenobothrus* except that the antennæ are furnished with a short depressed club at the apex, and (according to Brunner) the tympanum is partially open.

Gomphocerus, Thunb., 1815. Mem. Ac. Petersb., V, 221.
Gomphocerus, Serv., 1839. Hist. Nat., 745.
In part, *Gomphocerus*, Stål, 1873. Recen. Orth., 93.
In part, *Gomphocerus*, Bol., 1876. Syn. Orth. Esp., 100 and 107.
Gomphocerus, Brunner, 1882. Pro. Eur. Orth., 128.
Gryllus, *Acridium*, Brunner.

KEY TO GOMPHOCERUS, Thunb.

A.[1] Size small (male about 14 mm.), anterior tibiæ clavate with a distinct groove on the outer face. . . . . 1.—*Clavatus*, Thos.
A.[2] Size medium (male about 18 mm.), anterior tibiæ only very moderately and regularly expanded apically in the male. . . . . 2.—*Clepsydra*, Scud.

1. GOMPHOCERUS CLAVATUS, Thos.

Gomphocerus clavatus, Thos., 1873. Syn. Acrid. N. Am., 96.
Gomphocerus clavatus, Bruner, 1877. Can. Ent., IX, 144.
Gomphocerus clavatus, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.
Gomphocerus carpenterii, Thos., 1874. Bul. 2, U. S. Geol. and Geog. Surv. Terr.
Gomphocerus carpenterii, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 871.
Stenobothrus carpenterii, Thos., 1876. Proc. Dav. Acad. Nat. Sci., I, 251.

I have united these species after much hesitation. The United States National Museum contains Thomas' types of both *clavatus* and

carpenterii, in each case a single male. These apparently differ only in that the tibiæ of the latter are much more decidedly clavate. But this, as well as the gibbosity of the pronotum of the male and the size of the club of the antennæ, is a variable character, as I have ascertained from the examination of many specimens.

Hab. The great plains east of the Rocky Mountains, from Dakota to New Mexico, and eastward to Western Kansas and Nebraska.

2. GOMPHOCERUS CLEPSYDRA, Scud. Figs. 27a, 27b.

Gomphocerus clepsydra, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. II, 506.

Gomphocerus clepsydra, Bruner. 3rd Rept. U. S. Ent. Com., 56.

Gomphocerus clepsydra, Bruner. Rept. Com. Agr., 1885.

This species is, not improbably, a form of the preceding very variable species, but I have not sufficient material in this species to settle the point to my satisfaction. The United States National Museum contains one of Scudder's types (a male from New Mexico). In the same collection there is also a type of Scudder's *Gomphocerus antennaria*, which is identical with the species just described. I have not included *G. antennaria* in the synonymy of *G. clepsydra* as I do not know where it was described, if it has been described at all. My recollection is that Dr. Scudder has at some time informed me that no description of it was ever published.

Hab. The great plains east of the Rocky Mountains, from British America to Northern New Mexico, and as far east as Kansas and Nebraska. The species is said by Bruner to be common in the Yellowstone Valley.

XXVIII. **PNIGODES**, n. gen. Fig. 28.

Head disproportionally large for the pronotum, it as well as the rest of the body being decidedly wider than the latter at its posterior margin. It exceeds the pronotum in length by about the length of the vertex in front of the eye. The scutellum of the vertex is nearly horizontal, deeply excavate and bounded anteriorly with distinct straight walls which meet at an angle of 90 degrees (female) or less (male).

The frontal costa is regularly acuminate and sulcate above to the tip of the vertex, regularly divergent (male) or slightly and abruptly expanded below the ocellus (female). The lateral foveolæ, plainly visible from above, are sub-rhomboidal, very slightly narrowed anteriorly.

They are twice as long as wide with a heavy boundary wall. The antennæ are filiform, little (female) or somewhat (male) exceeding the combined length of the head and pronotum.

The pronotum have the anterior and posterior margins of the disk slightly and about equally rounded. The median carina is a moderately high raised line equally distinct throughout and cut by the principal sulcus only, decidedly behind the middle. The lateral carinæ are very slight and are clearly outlined with white. They are cut by all three sulci. The lateral lobes have the posterior margin nearly vertical, the anterior moderately inclined, and the posterior lower angle broadly rounded. The valves of the ovipositor of the female are included.

The posterior femora are strong and marked above as in *Psolocssa* with three triangular dark-brown spots. The posterior tibiæ have the apical spur on the inner side about twice as long as the one beside it.

1. PNIGODES MEGOCEPHALA, n. sp. Figs. 28a, 28b.

Length (male)	15	mm.	(female)	19	mm.
Tegmina	4.5–5.5	mm.		7	mm.
Antennæ	6	mm.		6.5	mm.
Post. Fem	9	mm.		10.5	mm.

Yellowish-brown varying to dark-brown without distinct marks except the three triangular spots on the upper face of the posterior femora and the light-colored lateral carinæ of the pronotum bordered below with black and within on the disk of the metazone by a black triangular spot. In some specimens, however, the top of the head, the disk of the pronotum, and the anal field of the tegmina are light yellowish-brown and the black stripe of the pronotum is expanded backward across the lateral field of the tegmina. The latter have the longitudinal veins unusually prominent and, except in the variety just described, they are faintly flecked with numerous small spots of darker than the ground color. The posterior tibiæ are reddish.

This species seems to be confined to the Pacific Coast. The United States National Museum contains numerous specimens from Yuba county and Butte county, California.

XXIX. **EREMNUS**, n. gen. Fig. 29.

Vertex somewhat declivent, broader than the frontal costa at the clypeus, sulcate, without a median carina, bounded by straight, sharp

but slight carinæ which meet at the front at an angle greater or less than a right angle. The lateral foveolæ are sub-quadrate, about twice as long as broad, very distinct and very apparent from above. The frontal costa is about half as wide at the vertex as at the clypeus, slightly sulcate with low broad carinæ along the sides. Seen from the side the face is moderately arcuate and moderately oblique. The antennæ are filiform, a little (female) or considerably (male) longer than the head and pronotum. The median carina of the pronotum is quite distinct and cut once behind the middle by the principal sulcus. The lateral carinæ are very strongly sinuate and the posterior margin of the metazone is roundly and very obtusely angulate. The lateral lobes of the pronotum are higher than long with the anterior and the posterior margins nearly straight and vertical. The mesosternal lobes are separated by a space several times as wide as long in both sexes. The metasternal lobes are separated by a space a little longer than wide in male and female. The tegmina and wings are well developed, not quite equaling or somewhat longer than the abdomen. The former have the scapular area transparent and filled with a single series of oblique cross-veins. The discoidal and ulnar areas have each a false vein with a single row of cells on either side. The posterior femora have three usually well marked sub-triangular or irregular brown spots on the upper face. The posterior tibiæ are red or yellowish with the spurs on the inner side much elongated and very unequal. The ovipositor is very slightly exerted, only the extreme tip being visible.

This genus is North American and so far as known is represented by two species which are apparently confined to the northern and western states. All the species seem to be partial to sandy and rather barren soil.

KEY TO EREMNUS, n. gen.

A.[1] Tegmina very obscurely spotted or quite plain. 1.— *Deorum*, Scud.
A.[2] Tegmina usually distinctly and thickly spotted, never plain . . . . . 2.—*Scudderi*, Bruner.

1. EREMNUS DEORUM, Scud. Figs. 29a, 29b.

Chrysochraon deorum, Scud., 1876. Bul. II, U. S. Geol. Surv. in Col., etc., 263.

Chrysochraon deorum, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

Hab. Garden of the Gods, Colo. (Scudder). The National Museum contains several specimens, one of them immature, which were

collected in the same locality. It does not seem to have been reported elsewhere unless it proves to be identical with the following species which is, I think, very probable. I have, however, too few specimens of this species to determine the matter positively.

2. EREMNUS SCUDDERI, Bruner.

Aulocara scudderi, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 63.
Aulocara scudderi, Townsend, 1893. Ins. Life, VI, 30.
Aulocara scudderi, Blatchley, 1894. Can. Ent., XXVI, 217.
Philobostroma parva, McNeill, 1891. Psyche, VI, 64.

As noted above, this species is likely to prove a synonym of *E. de orum*. One variety of this species has the vertex usually broad between the eyes with the anterior margins bounded by carinæ which meet at an angle much greater than a right angle even in the male. Ordinarily a structural difference of this character would indicate specific distinctness, but as this species seems to exhibit considerable variations in this respect, I think it not advisable to name it. I have received this variety from Prof. G. P. Gillette under the name of *Aulocara scudderi*, Bruner, and the form with the narrower vertex under the name *Dociostaurus coloradensis*. Both forms being named by comparison with specimens determined by Mr. Bruner.

Hab. Montana to Illinois, extending northward into British America and southward to New Mexico. It is said by Mr. Bruner to be a very common species west of the Mississippi. It is probably very rare eastward. I have found it in a few localities near Moline, Ill., where it seems to be confined to a few sandy hilltops along the Mississippi river.

XXX. **STIRAPLEURA**, Scud. Figs. 30a, 30b, 30c.

Vertex narrow, not exceeding half the short diameter of the eye, horizontal or slightly declivent, deeply sulcate with high lateral walls which meet at an acute angle in front and form a sub-ellipse or a sub-hexagon open behind where there is always some trace of a median carina. The lateral foveolæ are rhomboidal once or twice as long as broad. The frontal costa is acuminate above, regularly divergent downward and sulcate throughout. Viewed from the side, the face is slightly convex and nearly perpendicular or moderately oblique. The antennæ are filiform short, scarcely exceeding the head and pronotum in length

even in the male. The disk of the pronotum is flat with all the carinæ distinct, the median being cut by the principal sulcus only in front of the middle. The lateral carinæ are very strongly sinuate in front of the middle. The posterior margin of the metazone is strongly angulate. The lateral lobes of the pronotum are higher than wide with the anterior and posterior margins nearly straight and vertical. A single or double series of somewhat irregular and broken carinæ extends more or less distinctly from the middle of the anterior border to or toward the upper posterior angle. The carinæ occupy the middle of a light stripe which is usually distinct and never entirely wanting. A usually more distinct but low broad carinæ extends from about the middle of the lateral lobes toward the lower posterior angle. This is also outlined by generally lighter and strongly contrasting color. The episternum of the mesosternum has a distinct high carina which extends from the hind coxæ toward the base of the tegmina. The mesosternal lobes are separated by a space much broader than long in both sexes and the metasternal lobes by a space as long as (female) or longer than (male) broad. The tegmina and wings are well developed, equaling or exceeding considerably the abdomen. The former have the scapular field transparent, and filled by a single series of oblique cross-veins. The discoidal area has a somewhat prominent intercalary vein and the ulnar area a weak longitudinal vein. The posterior femora have three distinct triangular brown spots on the upper surface. The posterior tibiæ are red or yellowish with the apical spurs on the inner side more or less unequal in length. The ovipositor is barely or moderately exerted.

Stirapleura, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 510.

In part, *Psoločssa*, Scud., 1875. Cent. Orth., 25.

This genus is North American and Western, none of the five species known being found east of the Mississippi River.

KEY TO STIRAPLEURA, Scud.

A.[1] Posterior tibiæ with the spurs on the inner side not very unequal. ..... 1.— *Ornata*, Scud.

A.[2] Posterior tibiæ with spurs on the inner side very unequal, the apical one being at least one and one-half times as long as the one behind it.

B.[1] General color brownish or yellowish, varied with darker brown and black spots and stripes.

C.[1] Lateral foveolæ about twice as long as broad.

D.[1] Face but little oblique (male) or vertical (female). Scutellum of the vertex pentagonal with the posterior side of the pentagon missing. Median carina not distinct upon the summit of the head. Tegmina (female) scarcely exceeding the abdomen..... .....2.—*Decussata*, Scud.

D.[2] Face even in the female strongly oblique. Scutellum of the vertex elliptical with the posterior side of the ellipse open. Median carina distinct upon the summit of the head and accompanied by two supplementary carinæ. Tegmina far surpassing the abdomen in both sexes.....3.— *Texana*, Scud.

C.[2] Lateral foveolæ scarcely longer than broad..4— *Delicatula*, Scud.

B.[2] General color creamy white with a greenish tinge. Antennal sulci black.....5.— *Eurotiæ*, Bruner.

1. STIRAPLEURA ORNATA, Scud.

Dociostaurus ornatus, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 507.

Dociostaurus ornatus, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

Hab. Northern New Mexico (Scudder).

This species has been reported but once. I have examined the type which is in Mr. Scudder's collection. The species to which it belongs undoubtedly belongs to this genus and it is distinct as shown by the sub equal inner apical spurs of the hind tibiæ, by the thick and somewhat clavate antennæ and by the structure of the vertex.

2. STIRAPLEURA DECUSSATA, Scud. Figs. 30a, 30b.

Stirapleura decussata, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 510.

Stirapleura decussata, Scud., 1880. 2nd Rept. U. S. Ent. Com., App. II, 26.

Stirapleura decussata, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 57.

Psoloëssa coloradensis, Thos., 1876. Proc. Dav. Acad. Nat. Sci., I, 252, pl. xxxvi, fig. 34.

Hab. Colorado (Scudder, Thomas); Colorado, Wyoming, New Mexico, Arizona, Montana (U. S. Nat. Mus.).

I have not seen the type of *S. decussata*, but it undoubtedly belongs to the genus which I have called *Stirapleura* and it agrees well in size and other particulars with *S. coloradensis*. It is very possible that

Thomas' name has priority as it was published in June. I have preferred Scudder's name, however, because it was the type of the genus.

3. STIRAPLEURA TEXANA, Scud. Fig. 30c.

Psoloëssa texana, Scud., 1875. Cent. Orth., 24.
Psoloëssa texana, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.
Pso'oëssa texana, Coquillett, 1886. Rept. Com. Agr., 1885, 11.
Psoloëssa texana, Riley, 1893. N. Am. Fauna, 7, II, 252.

Hab. Texas (Scudder); San Joaquin Valley, California (Coquillett); Coso Valley, Southern California (Riley).

The United States National Museum contains several specimens from San Antonio, Texas, which I have referred to this species.

4. STIRAPLEURA DELICATULA, Scud.

Scyllina delicatula, Scud., 1876. Bul. II, U. S. Geol. and Geog. Surv. in Col., etc., 1875, 263.
Scyllina delicatula, Bruner, 1883. 3rd. Rept. U. S. Ent. Com., 58.
Scyllina delicatula, Riley, 1893. N. Am. Fauna, No. 7, pl. 2, 252.

Hab. Garden of the Gods, Colorado (Scudder); Southern California (Riley).

I have examined one of Scudder's type specimens and it seems to be distinct as shown by its short lateral foveolæ. It is, however, very closely related to *S. decussata*.

5. STIRAPLEURA EUROTIÆ, Bruner.

Psoloëssa (?) *eurotiæ*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 62.

Hab. Laramie River (Bruner).

This species is said by Bruner to feed solely upon *Eurotia lanata* or sweet sage or winter-fat as it is variously known.

XXXI. **PSOLOËSSA**, Scud. Figs. 31a, 31b.

Vertex very slightly declivent, narrow, being less than half the short diameter of the eye and scarcely equal to the width of the frontal costa at the clypeus. It is deeply sulcate with high carinæ which are parallel throughout the greater part of their extent and which meet in front at an acute angle and are somewhat incurved posteriorly where they continue more or less distinctly along the summit of the head in

company with a median carina which scarcely extends forward farther than the posterior margin of the scutellum. The lateral foveolæ are deeply impressed, sub-triangular in shape, and less than twice as long as broad; the posterior is at right angles to the lower carina and the upper is the strongly arcuate hypothenuse. The frontal costa is scarcely sulcate, acuminate below and considerably divergent to the ocellus, beyond which it is parallel for some distance and finally again divergent to the clypeus. The face seen from the side is gently arcuate and considerably oblique. The antennæ are short, scarcely equaling the head and pronotum, sub-filiform, a little flattened, and very little expanded apically, and acuminate at the apex. The pronotum is similar to that of *Stirapleura* except that there are no carinæ on the lateral lobes. The episternal carina is present and the mesosternal and metasternal lobes have the same structure as in that genus. The tegmina exceed the abdomen in both sexes. The former are very slender and the discoidal area is destitute of the intercalary vein and is usually occupied by a single series of cross-veins. The posterior femora are robust and clearly marked with the triangular brown spots usual in this group of the sub-family. The posterior tibiæ are reddish or yellowish with the apical spurs on the inner side very unequal. The ovipositor is moderately exerted.

Psoloëssa, Scud., 1875. Ent. Notes, IV, 86.

This is a North American genus represented by three species which are all South-western.

KEY TO PSOLOËSSA, Scud.

A.¹ Anterior half of the tegmina not infuscated by the extension of the postocular brown band. Triangular brown spots on the upper face of the posterior femora sharply defined and very distinct.

B.¹ Tegmina thickly and rather evenly maculate everywhere except in the scapular area. Ash brown . . . . . 1.—*Maculipennis*, Scudder.

B.² Tegmina plain, reddish-brown . . . . . 2.—*Ferruginea*, Scudder.

A.² Anterior half of the tegmina infuscated by the extension of the postocular brown band. Triangular brown spots on the upper face of the posterior femora less distinct . . . . . 3.—*Buddiana*, Bruner.

1. PSOLOËSSA MACULIPENNIS, Scud. Fig. 31.

Psoloëssa maculipennis, Scud., 1875. Ent. Notes, IV, 87.

Psoloëssa maculipennis, Bruner, 1883. 3rd. Rept. U. S. Ent. Com., 56.

Psoloëssa maculipennis, Townsend, 1893. Ins. Life, VI, 31.

Hab. Texas to Southern California.

2. Psoloëssa ferruginea, Scud. Fig. 31a.

Psoloëssa ferruginea, Scud., 1875. Ent. Notes, IV, 87.
Psoloëssa ferruginea, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

Hab. Dallas, Texas, (Scudder), Arizona.

The United States National Museum contains specimens from the last mentioned locality.

3. Psoloëssa buddiana, Bruner.

Psoloëssa buddiana, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 61, pl. i, fig. 6.

Hab. Carrizo Springs, South-western Texas (Bruner).

The National Museum contains one of Bruner's types of this species.

Synopsis of Proceedings

Davenport Academy of Natural Sciences.

1889—1896.

[The records of routine and unfinished business are omitted from this Synopsis; also the minutes of a few meetings which, together with some official reports, have, unfortunately, been lost or mislaid.]

January 4, 1889.—Trustees' Meeting.

President C. E. Harrison in the chair, ten members present.

The matter of providing security on the note for $320.00 held by Mrs. P. V. Newcomb was discussed but no action taken.

January 16, 1889.—Annual Meeting.

President C. E. Harrison in the chair.

Recording Secretary's Report.

Present regular membership, 120; life members, 77. During the year 7 regular, 5 corresponding and 2 honorary members have been elected.

The list of deaths is a sad one—seven in all, viz: Life members, Hon. George H. French and William Riepe; regular member, John G. Dahms; corresponding members, Prof. A. K. Worthen and Prof. W. D. Gunning; honorary member, Dr. Asa Gray.

Fifteen Academy meetings have been held during the year with an average attendance of nine, this being also the average attendance at the Trustees' meetings held.

Interest has been revived in the Historical Section; it has held several meetings, increasing its membership by five.

Librarian's Report.

The Librarian's report shows 2,046 volumes and pamphlets added in 1888, including the archæological and other publications of the principal foreign scientific institutions, with the reports of 19 government departments and many of those of the several states. One daily,

15 weekly, 20 monthly, 3 bi-monthly, and 6 quarterly publications are regularly received.

TREASURER'S REPORT.

The Treasurer's report shows total receipts, in the general fund, $1,183.83; total expenditures, $1,177.96, leaving a balance of $5.87.

Reports were also read by the Corresponding Secretary, Curator, and Chairman of the Publication Committee.

Officers for the ensuing year (1889) were elected as follows:

President — Dr. JENNIE MCCOWEN.

First Vice-President — WILLIAM RIEPE.

Second Vice-President — W. H. HOLMES.

Recording Secretary — Miss S. G. FOOTE-SHELDON.

Corresponding Secretary — Miss LUCY PRATT.

Treasurer — GEORGE BARKER.

Curator — W. H. PRATT.

Librarian — C. E. HARRISON.

Trustees for three years — JAMES THOMPSON, E. P. LYNCH, H. C. FULTON, C. H. PRESTON.

The following resolutions were presented and adopted:

Resolved, That in the recent decease, January 13, 1889, of William Renwick, Esq., a life member of this Academy and connected with its active membership since its first organization, we mourn the loss of a wise counselor, a generous patron, an agreeable associate, and a faithful friend;

That in deeply sympathizing with his bereaved relatives and friends, we indulge the hope that his sterling character, his unswerving devotion to duty and the best interests of the community in which he lived, his wisdom in planning and success in achieving worthy enterprises, may prove a stimulating example for imitation to those who come after him, and that the noble heritage of a good name may rest upon his only son, to be perfected with ever increasing lustre to coming generations;

That these resolutions be spread upon the records of the Academy, and that a copy of the same be engrossed and presented to the family.

G. P. MCCLELLAND,
C. C. PARRY,
J. B. PHELPS,
Committee.

PRESIDENT'S ADDRESS.

C. E. HARRISON, January 16, 1889.

MEMBERS OF THE ACADEMY, LADIES AND GENTLEMEN:

The completion of another whirling journey around the sun brings us together at this annual meeting, the twenty-first anniversary of our

organization, to briefly review some of the history of our recent past; to consider whether the accomplished work is commensurate with the opportunities of the term; the causes, if any, which may have operated to retard our progress; and to hopefully plan anew, that the coming year, in all that pertains to the growth and work of the Academy, may exhibit a fullness of life and zeal which will gladden us a twelve-month hence with its noble record.

Probably no other year in the life of our society, certainly none in the last decade, has been entered upon, clouded with such discouragements or so burdened with doubts and fears as the one just rounding to a close. The inroads which death has made, depriving us of the veriest elements of strength, had brought us to realize our weakened condition, thereby lessening in us that self-confidence which is almost an essential to success, and which before had inspired our earnest efforts. Whether these established feelings of loss and dejection, coupled with the real deprivations which caused them, have most contributed to minimize the interest manifested in Academy work, or whether, as is probable, the showing would have been more gratifying but for the inefficiency of your presiding officer, need not now be discussed.

The fleeting present and swiftly approaching future are all-sufficient to engage our earnest thought; for never, I dare say, in the long period of humble devotion to our commendable work did we approach a broader and riper field. Let us arise to the necessities of the hour, and at this beginning of the new year repledge ourselves to renewed and greater effort that the measure of the fullness already reached may not only be maintained but increased.

In the various processes and agencies for the development of the human mind there are ever present (even if not always apparent) evidences of the universal law of change and progress. The methods of today are different, in that they are better than the methods of the past. Object teaching, which but awhile ago was scarcely known, has come to be considered essential in almost every department of learning; and the day cannot be far distant when such institutions as the Davenport Academy of Natural Sciences, with their teeming and growing libraries and cabinets, and with memberships alive and devoted to high and noble aims, will be recognized as powerful and necessary factors in the general scheme of education. May we not confidently hope that then, at least, an enlightened public will accord them a fuller appreciation and more generous support?

The several reports already read in your hearing, while not indicative of an active year, yet give assurance that the Academy has at least in some slight degree moved forward in the direction of its higher destiny.

The publication of proceedings has ever been the most important feature of our work, if it has not in fact been the very life of our organization. The committee in charge of this department have not

been idle, and bring us a cheering record. Continuing the printing of Vol. V., which was previously begun, 88 pages have been completed and paid for — an increase of 25 per cent over the previous report, and a better exhibit than has been made for several years. The excellent portrait of Prof. D. S. Sheldon, the honored first president and life-time friend of the Academy, which is to embellish the book, is provided and ready, and the volume, which approaches completion, will soon follow its predecessors, carrying the good name of Davenport and its Academy with honor to the libraries and savants of almost every land.

The Museum has received some valuable additions to its cabinets, though the showing here is less than in any one of recent years. Considerable improvement has nevertheless been made in this department whereby the Curator has been enabled to unpack and display many specimens not heretofore available to interest and instruct our members and visitors. The west basement room, with some slight alteration, has been put in order, and four large new cases (the need for which I mentioned in my address of last year) have been provided and set up at an expense of $70 or more. No part of this amount has, however, been drawn from the treasury — thanks to a few tried and free-hearted friends. In this connection it is proper to remark, and I deem it worthy of record, that our valued and now lamented friend and fellow citizen, Hon. George H. French, whose generous aid the Academy had often known before, was the first to respond to this expression of her necessities. He promptly proposed to bear one-fourth the cost of all the cases, and doubtless thus made possible the securing the whole amount. The Horticultural Society, another faithful friend (I might say friends), with great unanimity also voted to contribute a fourth. The third giver of a like amount forbids the mention of his name; but such an act of liberality by one whose riches consist not so much of worldly goods as of goodness and greatness of heart, could not have been necessary to prove his abiding interest and love in and for the Academy, which, if not wholly springing from his own suggestions, is and has been, from the day of its beginning, the object of his constant self-sacrificing care and attention. The remaining fourth was contributed and partly collected by the Academy's ever-faithful friend and supporter, Mrs. Putnam. Thus in the extremities of need great-souled, ministering friends arise. The new room has already become a useful annex to the Museum.

The Library has maintained throughout the year its usual steady and gratifying increase. Its importance and value, per consequence, grow with its growth, and if the Academy accomplished nothing beside the accumulation of these treasures in our midst, its existence would be amply justified and all our contributions of time, effort, and means abundantly rewarded.

A considerable addition to the book-shelves, reported last year as urgently needed, has been supplied and freighted, and ere long there will again be heard a cry for shelves. Let us not turn from the welcome

sound. These precious volumes, filled with living thought, flow in to us from every portion of the habitable globe in exchange for our own publications. Every book is a messenger of cheer to encourage and sustain us; every book is an addition not only to the extent but to the intrinsic value and usefulness of the whole collection.

Fellow members, do we and do the citizens of this progressive city appreciate the wondrous worth of these possessions? The responsibility of caring for and nourishing this magnificent trust, and the far-reaching benefits, now and hereafter, which must accrue to the people of this vicinity through the benign influence of this great scientific library?

Our finances give evidence of prudent management. Expenses have been less than for the preceding year. Our indebtedness has been materially decreased while the income is practically unchanged. No particular cause for discouragement here. The Academy, adapting itself as always heretofore to its meager means, we have reason to hope is moving slowly but surely toward a place of less restraint and greater usefulness.

Briefly summing up the doings and happenings which have occurred since our last annual meeting, while both in and out of the Academy, there is much to encourage this and similar institutions, there is, withal, a tinge of sorrow. The vicissitudes of the unfolding year have brought us many blessings, some poignant griefs. In common with the whole world of science we mourn the loss of Asa Gray and George W. Tryon, whose names gave lustre to our roll of honorary members; of Professors W. D. Gunning and A. H. Worthen, both of whom lent their aid and influence as corresponding members. So, too, we lament the going out of the venerable E. F. Squires, of the brilliant Richard A. Proctor, and others who in the broad field of scientific research have largely lent their lives to the service of mankind. But to us, fellow members, the great leveler has dealt his severest blows. Within our immediate roll of regular members John J. Dahms is no more, while the list of life members is shorn of the honored names of George H. French and William Renwick, both of whom will long be remembered for their active interest and generous contributions in and to the Academy work.

When we look back upon the stricken roll of Academy builders, on those strong pillars of support which have fallen, no wonder we turn with hesitation, if not serious apprehension, towards the conflicts that lie before. But these have left us legacies of accomplished work, examples of noble, self-sacrificing devotion to the exacting aims and objects of this society, and in no way can we do greater reverence to their memories than by lending every effort to perpetuate and carry forward the beneficent work so well begun. If we doubt our own strength and ability we have but to turn to those bands of young students, the local chapters of the Agassiz Association, to find abundant hope for reinforcements.

In now retiring from the honorable station wherein, by your com-

mand I have tried to serve you, and having through both terms had continuous evidence of your forbearance, I beg to thank you for your confidence and constant kindness.

Relying upon the greater efficiency, if not more earnest endeavor, on the part of whomsoever may succeed me, and your necessary, usual, and cordial support of all the officers to be chosen, I join you in the hope that the Academy's twenty-second year may be also her most auspicious one.

January 21, 1889.—TRUSTEES' MEETING.

President McCowen in the chair; nine members present.

A committee, consisting of W. H. Barris, C. H. Preston, and W. H. Pratt, was appointed to devise plans for the furtherance of scientific work in the Academy.

It was voted to retain the present Curator and Janitor at their present rates of compensation, and to leave to the President and Curator the distribution of the new Academy keys.

On motion of Mr. J. B. Phelps it was decided to increase the amount in the savings bank ($191.87) to $200, from the general fund, this latter amount to be invested in a safe loan on real estate at the first opportunity.

January 25, 1889.—REGULAR MEETING.

President McCowen in the chair; ten members present.

Mr. W. H. Smith was elected to regular membership, and Prof. J. A. Udden of Augustana College, Rock Island, was made a corresponding member.

A short sketch of the life of the late William Renwick was presented by Dr. C. C. Parry.

Dr. Parry also proposed an amendment to the constitution making provision for associate membership, which proposal was referred to the Trustees for consideration.

Prof. Pratt then read an interesting paper on "Electricity," the subject being continued for discussion at the next regular meeting.

February 22, 1889.—REGULAR MEETING.

President McCowen in the chair; seven members present.

The Curator reported the addition to the museum of a collection of fossil plants from Mr. Sternberg of Lawrence, Kansas, comprising twenty species of deciduous leaves, rare and very valuable.

A paper was read from Prof. E. L. Berthoud of the School of Mines, Colorado, on "The Rediscovery of an Ancient Turquoise Mine in Arizona."

March 18, 1889.—TRUSTEES' MEETING.

President McCowen in the chair; eight members present.

The meeting was called to receive the report of the committee appointed January 21 to devise plans for the furtherance of scientific work in the Academy. The report of the committee recommended—

(1.) The utilization of the material of the museum, by means of illustrative collections from its shelves, for the instruction of students from the public schools and others in the various branches of science; and—

(2.) Increasing the usefulness of the Library by the preparation and publication of a catalogue or list of its contents.

The first recommendation had already, since the appointment of the committee, been put into successful operation by the Curator without waiting for the assured approval of the trustees. By arrangement with the Superintendent and principals of the public schools, twelve classes, comprising all of the eighth and ninth grades—432 pupils in all—had during the past three weeks spent each the last school hour of one afternoon at the Academy, deeply interested in the study of comparative anatomy, as shown in "The Teeth" of various animals in the Museum. The High School classes would follow soon, and the next subject taken up would probably be "The Mound Builders and Their Works." The report was received and the Curator's work was approved.*

After much discussion it was decided to discontinue the work of thunderstorm observations, notifying observers to that effect by circular letter, and leaving to the United States Signal Service, which has just established a special system of observations in Iowa, the publication of data obtained.

March 29, 1889.—REGULAR MEETING.

President McCowen in the chair; six members present.

The reception, by exchange from Prof. O. W. Collett of St. Louis, of some flint implements from the Osage region was reported.

Prof. W. H. Pratt read an interesting paper on "A New Process of

A detailed statement, by Prof. Pratt, of his work in this direction, will be found in the minutes of June 13, 1890.

Iron Manufacture," a process which promises to revolutionize present methods.

April 5, 1889.—TRUSTEES' MEETING.

President McCowen in the chair; ten members present.

The Treasurer reported a balance of $45.61 in the general fund, with no indebtedness outstanding; also $1,200 in the endowment fund, invested in real estate.

A request by letter from Prof. Frederick Starr that the Academy use its influence to induce Congress to publish his "Thunderstorm Report" was not complied with, as the Senate was about to adjourn, and the Government had undertaken similar observations.

April 26, 1889.—REGULAR MEETING.

President McCowen in the chair; eight members present.

The Corresponding Secretary reported a very gratifying reception accorded to Vol. V. of the PROCEEDINGS by scientific bodies at home and abroad.

The Librarian reported the receipt of several valuable bound volumes, including the three large illustrated quartos constituting the "Report of the U. S. Fish Commissioner," volumes which must delight the disciples of Izaak Walton.

The Curator reported, among other additions to the Museum, a curious, thread-like creature, 17 inches long by $\frac{1}{32}$ inch in greatest diameter, found by a workman while sodding the dooryard of Mr. J. H. Harrison. It is different in important particulars from the *Gordia* or hair-snake, and is undescribed.

A letter was read from Mr. Edward Lovett of Brandon, England, desiring some Indian relics, and offering in exchange a set of specimens showing the manufacture of gun-flints, from the quarries at that place; also a letter from Prof. S. Calvin of the Iowa State University, on the "Formation of Sand."

Prof. B. Shimek of Iowa City was elected a corresponding member.

May 31, 1889.—REGULAR MEETING.

President McCowen in the chair; seven members present.

Only routine business transacted.

June 17, 1889.— CALLED MEETING.

President McCowen in the chair; nine members present.

The meeting was called to consider the best course to pursue during the expected absence from the city, for the summer, of the Curator, Treasurer, and Corresponding Secretary. It was arranged that the Museum should be kept open to visitors as usual, the President being empowered to provide an attendant; the treasurer's books and the cabinet keys being left in the hands of the Librarian, C. E. Harrison.

August 30, 1889.— REGULAR MEETING.

President McCowen in the chair; eleven members present.

The name of Thomas H. Jappe was at his request dropped from the roll of members, he declining to pay arrearages of dues.

Dr. C. C. Parry presented a paper on "*Ceanothus L.* Recent Field Notes, with a Partial Revision of Species."

J. H. Harrison, W. H. Pratt, and Dr. Jennie McCowen were appointed a committee to investigate the feasibility of obtaining a reduction of postage on scientific matter connected with the Academy.

September 20, 1889.— TRUSTEES' MEETING.

President McCowen in the chair; ten members present.

The publication fund being indebted to the chairman of the publication committee, Mrs. Putnam, to the amount of $250 — this sum being the excess of expenditure above receipts on Volume V. of the PROCEEDINGS to date — it was voted to repay the amount advanced, transferring the indebtedness to the general fund.

On motion the finance committee (H. C. Fulton, E. P. Lynch, and W. C. Putnam) were authorized to negotiate with Mrs. Patience V. Newcomb as to completing the purchase of, or reconveying to her, the four-foot strip of land adjoining the Academy lot on the north, they being given power to act.

September 27, 1889.— REGULAR MEETING.

President McCowen in the chair; twelve members and several visitors present.

The Curator announced the receipt from Mr. Velie of a crocodile and several birds, all mounted.

The publication committee reported 180 pages of Vol. V. printed.

Messrs. W. H. Bronson and M. Wheeler were elected regular members.

It was announced that classes from the public schools would be received the coming week.

Prof. Pratt then took up the subject of "Gravitation," presenting some original views which gave rise to an animated discussion. The subject was illustrated by beautifully executed diagrams and figures on the blackboard.

October 25, 1889.— REGULAR MEETING.

President McCowen in the chair; seven members and many visitors present.

An interesting lecture on "Coal Plants" was given by Curator Pratt.

November 29, 1889.— REGULAR MEETING.

E. S. Ballord, chairman *pro tem.*; seven members present.

Prof. P. C. Wolcott of Griswold College, and O. J. Gwynn, Assistant Signal Service Observer, were elected to regular membership.

Capt. W. P. Hall addressed the Academy on "The Markings of Ancient Pottery."

December 27, 1889.— REGULAR MEETING.

President McCowen in the chair; seven members present.

Messrs. E. P. Lynch, C. E. Harrison, and W. H. Pratt were appointed a nominating committee for the coming election of officers.

January 3, 1890.— TRUSTEES' MEETING.

President McCowen in the chair; eight members present

The treasurer reported receipts during the past year, $889.42; expenditures, $848.64.

January 14, 1890.— ANNUAL MEETING.

President McCowen in the chair; ten members present.

Reports of officers were presented, as follows:

RECORDING SECRETARY'S REPORT.

Beside the annual meeting there have been held during the year 10 regular meetings, with an average attendance of 8; 1 special meet-

ing, with an attendance of 9; 5 Trustees' meetings, with an average attendance of 9.

The following named societies have also held their meetings at the Academy rooms: The Agassiz Association, two chapters; the Scott County Medical Society; the Union Horticultural Society; and the Philomathian Debating Society.

Papers have been read before the Academy by Prof. W. H. Pratt on "Electricity," "Gravitation," and "A New Process of Iron Manufacture;" by Capt. W. P. Hall on "Markings of Ancient Pottery;" by Dr. C. C. Parry on "*Ceanothus*," or Jersey tea, and by Prof. E. L. Berthoud on "An Ancient Turquoise Mine in Arizona." Prof. Pratt delivered a lecture on "Coal Plants," and Mr. Thomas Brockett conducted a conversazione on "Spanish Antiquities."

The Academy has lost one regular member by death, and gained five regular members and one corresponding member by election during the year. The regular membership at present numbers 94.

There have been about 550 paying visitors to the Museum and as many more on business or by invitation.

January 14, 1890. E. G. FOOTE-SHELDON, *Sec.*

LIBRARIAN'S REPORT.

The growth of the Academy Library for the year 1889 just closed, when compared with other years in our history, is gratifying indeed, the total additions being 3,019, or nearly 1,000 more than in the preceding year. These publications comprise the transactions of most of the scientific and historical societies of the world, as well as many Government and state publications. The contributions to science of many of the brightest minds of the day relating to scientific research and thought are rapidly accumulating, and building up in our midst a vast storehouse of literary treasures.

The additions to the Library were:

Bound volumes	115
Unbound volumes and pamphlets	2,472
Miscellaneous	431

The Library now contains—

Bound volumes	1,890
Unbound volumes and pamphlets	8,949
Miscellaneous	1,498

But little progress has been made in the preparation of the card catalogue. It is to be hoped that this may be pushed more vigorously, and that my successor may be able to accomplish more in the direction of this valuable and necessary work.

The shelf-room recently added will probably meet all the requirements for the coming year; but there yet remains, as has been suggested by those preceding me, an urgent need for the binding of many valuable pamphlets, maps, etc.

As evidence of the increasing value and usefulness of the Library, we find it more than ever sought by the public for information which cannot be readily found elsewhere.

Respectfully submitted. C. E. HARRISON, *Librarian.*

January 14, 1890.

TREASURER'S REPORT.

The Treasurer's report showed no balance in the general fund. The amount of receipts and expenditures for the year, to date, were reported at the last Trustees' meeting.

ELECTION OF OFFICERS — 1890.

President — Dr. JENNIE MCCOWEN.
First Vice-President — WILLIAM RIEPE.
Second Vice-President — W. H. HOLMES.
Recording Secretary — Miss S. G. FOOTE-SHELDON.
Corresponding Secretary — Miss L. M. PRATT.
Treasurer — E. P. LYNCH.
Librarian — C. E. HARRISON.
Trustees for three years — (The four retiring Trustees were re-elected.)

Rev. A. M. Judy, W. H. Holmes and others spoke in commendation of the unselfish and impartial work being done by the Curator, work connecting the Academy with the public schools.

Mr. Judy suggested and advised an annual encampment of the Academy for collections and study, something after the Chautauqua plan.

President McCowen stated that, owing to unusual pressure of professional duties during this season of prevailing "grippe," she had not been able, as yet, to prepare the usual annual address.

February 21, 1890. — CALLED MEETING.

President McCowen in the chair.

The President stated that the meeting was called to take action with regard to the funeral of Dr. C. C. Parry, it having been arranged that the body should lie in state at the Academy rooms before being taken to Trinity Church for the funeral services.

The President appointed W. H. Barris, James Thompson, and William Riepe a committee on resolutions of respect, and E. H. Hazen, W. C. Putnam, and Isaac Rothschild as an escort to accompany the

remains from the residence to the Academy building on Sunday morning. Dr. J. W. H. Baker, G. P. McClelland, William Riepe, and S. P. Bryant were appointed bearers.

The following resolutions were reported and adopted:

WHEREAS, The inevitable end of life has come to our esteemed and respected fellow citizen and co-worker in the field of scientific investigation, Dr. Charles C. Parry, and left us to mourn the loss of his gentle presence and the guidance of his wise counsels; and,

WHEREAS, In his demise the Academy has lost not only one of its ablest members and its second Vice-President, but also one who, whether at home or abroad, whether pursuing his favorite botanical studies in the field or summing up their results for the benefit of science in general, never forgot for a moment the child he helped so much to attain a standing in the world—the Davenport Academy of Natural Sciences—therefore be it

Resolved, That we mourn the irreparable loss, not only of a brother member but also of a genial, companionable, modest, true, and ever reliable friend, known in every land where his favorite science of botany is pursued.

Resolved, That this Academy attend the funeral obsequies of our fellow member in a body.

Resolved, That these resolutions, feebly expressing the sympathy of this Academy, be presented to the bereaved family of the deceased.

Resolved, That these resolutions be entered in the minutes of the Academy, that a copy be furnished for publication in the city papers, and that, in token of our grief, the Academy be draped in mourning for thirty days.

March 3, 1890.—REGULAR MEETING (adjourned from Friday, February 28).

President McCowen in the chair; eleven members and about twenty visitors present.

The Curator reported the donation by William and George Ahrens of Haypole, Nebraska, of a catamount, the head and skin of an antelope, two prairie dogs, and a white owl, which were being prepared for preservation.

The order of the evening was the illustration, by Prof. Pratt, of Foucault's experiment demonstrating the rotation of the earth on its axis. A 72-pound ball was suspended by a 30-foot wire extending from the dome of the rotunda through the first floor to just above the floor of the basement. The ball, surrounded by a screen to cut off disturbing air currents, was drawn six inches to one side and held there by a thread. Having been left thus for a long time so as to be perfectly still, it was released at 8 o'clock by burning the thread, and allowed to swing in an exact north and south direction. The Professor, by means of a convenient turntable constructed for the purpose,

proceeded to show that a ball, while suspended from a bracket attached to the wheel and turning with it, when started to swinging in a certain direction, had a tendency to continue its swing in the same direction as at first, and that, the table being revolved horizontally, the direction of the swing of the ball would not change with it. Thus an ant, for example, being upon the table and observing the swing of the ball and not being aware of the movement of the surface on which he stands, would see the direction of swing constantly changing in relation to a graduated circle on the surface beneath the ball. It was explained that we are in similar circumstances on the surface of the planet whose motion is imperceptible to us as we move with it. Hence, as the ball swings on a circle drawn upon the floor, the floor itself, turning with the building and the earth's surface, changes its position under the swinging ball whose direction does not change, just as the turntable changes under the small ball as above described. It was shown that at the pole such change would be around the entire circle in 24 hours while at the equator there would be no change.

After some furthar explanation of details and discussion of the subject the meeting adjourned at 9:30 to the museum and basement to see how the ball was acting. Truly enough, it was found to have apparently changed from the north and south direction and was swinging about ten degrees east of north and west of south. Then it was realized that not the swing of the ball but the position of the building itself had thus changed, and that in 1½ hours a visible motion of rotation of the earth had taken place, producing the relative displacement due to this latitude.

March 28, 1890.— REGULAR MEETING.

President McCowen in the chair; nine members present.

A vote of thanks was extended to Mr. L. M. Crawford of Vinton, Iowa, for valuable specimens donoted, and for his offer of gratuitous services as taxidermist.

President McCowen and Curator Pratt were instructed to call on Mrs. C. C. Parry and express the desire of the Academy to retain in its museum the valuable herbarium collected and deposited by Dr. Parry.

The Curator then took up the vexed subject of the "Antiquity of the Mound Builders," citing evidence and authority for the claim that they antedate all known Indian races or tribes.

April 25, 1890.— REGULAR MEETING.

President McCowen in the chair; eleven members and several visitors present.

Additions to the Museum were reported as follows: A specimen of fungus, together with some flint implements, from Crawford county, Iowa, and a specimen of topaz from Mexico, presented by M. E. Reid; also, some minerals from the salt-mines of Germany.

Mr. Warren Watson of Kansas City and Dr. W. R. Sedbury of Detroit were elected corresponding members.

Mr. F. J. Walz, local Signal Service observer, then delivered an instructive lecture on "Meteorology," explaining the methods and instruments used in the Government service, also the more prominent atmospheric changes the concerted observation of which makes possible fairly accurate prognostications. Factors entering largely into the calculations of the bureau are the direction and force of the wind, and these are influenced by three things — unequal atmospheric pressure, the specific gravity of the air, and the rotation of the earth. The lecturer explained the workings of the barometer, showed that a high barometer indicated heavy atmospheric pressure, and a low barometer the opposite. He then cited the self-evident fact that the air in an area of heavy pressure had a natural tendency to rush into an area of light pressure, and invariably did so. Thus, owing to the weather bureau having reduced its barometrical observations and comparisons to an exact science, it is enabled to locate storm centres with exactitude. It has barometers placed all over the country. Their results are corrected for variations in the instrument, for altitude, and for temperature; and every day these figures are placed upon a chart or map of the United States in all of the signal service stations. Lines are then drawn from stations showing a certain atmospheric pressure to other stations showing the same pressure. These lines naturally resolve themselves, especially in times preceding a storm, into a comparatively regular series of concentric circles, the center being the area of lowest pressure. The natural conclusion is that the winds are going to tend from the outside area of denser atmosphere to the inner area of less pressure. The charts drawn on the 27th of last month, just before the heavy storm which occurred on the evening of the 28th, showed a very pronounced storm center in the central region of the country. The chart for the 28th showed the storm center moved several states to the east, while on the 29th the storm was located on the Atlantic coast

and just getting ready to pass onto the ocean. The progress of the storm was shown to the audience as plainly as though it were being watched in reality.

May 9, 1890.—SPECIAL MEETING.

By special request Sergeant Walz delivered a lecture supplementary to that of April 25, taking up the subject of "Weather Proverbs." Mr. Walz believes that many of the old proverbs are the result of long and shrewd observation of atmospheric phenomena, and he treated the subject in an interesting and convincing manner.

June 13, 1890.—REGULAR MEETING—adjourned from May 30.

President McCowen in the chair; twelve members and several visitors present.

The following report of the work of the Academy in connection with the public schools was submitted by Prof. Pratt, and referred to the publication committee:

DAVENPORT ACADEMY OF NATURAL SCIENCES,
June 13, 1890.

In order to make the history of the Academy lessons to classes from the public schools thus far a matter of record, I desire to offer a brief report of that work, which was concluded for this school year on the 21st of last month, May, 1890.

In accordance with a proposition from the Academy and its acceptance by the school-board in February, 1889, as heretofore reported, six courses of lessons have been given; one lesson each on six different subjects to each of the following classes, viz.: the eighth and ninth grades of all the city grammar schools and all grades of the high school. The subjects, dates, and attendance were as follows, viz.:

First Series.—On "Teeth." February 27 to March 26, 1889; 18 lessons; aggregate attendance, 509 pupils, 20 teachers.

Second Series.—"The Mound Builders and Their Works." April 10 to May 17, 1889; 16 lessons; attendance, 551 pupils, 18 teachers.

Third Series.—"Primitive Rocks; the Story of a Few Pebbles." May 20 to June 18, 1889; 14 lessons; attendance, 493 pupils, 16 teachers.

Fourth Series.—"Coal Plants and Their Products." September 29 to October 25, 1889; 19 lessons; attendance, 660 pupils, 22 teachers.

Lesson to Eighth Grade of School Year 1889–1890 only.—"The Mound Builders and Their Works." February 3 to February 11, 1890; 7 lessons; attendance, 243 pupils, 9 teachers.

Fifth Series.—"The Vertebral System in Man and Animals." Feb-

ruary 12 to March 13, 1890; 19 lessons; attendance, 550 pupils, 20 teachers.

Sixth Series.—"Crystallization." April 28 to May 21, 1890; 15 lessons; attendance, 480 pupils, 16 teachers.

Aggregate, 108 lessons; attendance, 3,581 pupils, 121 teachers; average attendance, 33.16 pupils, 1.12 teachers.

Extra lessons given were—to Davenport teachers (evening), 1; Orphans' Home classes, 2; Kemper Hall class, 1; public (evenings), 2; Lend-a-Hand class, 1; Rock Island school classes, 2; Moline high school class, 1. Total, 10.

Superintendent Young, in his annual report, July, 1889, makes favorable mention of these lessons as a part of the public school instruction of the year, three series having then been given.

The work has received the approval of the patrons of the schools without exception so far as I have learned, and has been popular with pupils and teachers, and I have had many and frequent evidences of awakened interest and observation of natural phenomena among the children, and some very gratifying and kind testimonials of their appreciation.

This plan of coöperation with the public schools, which is original with ourselves, met with the most cordial approbation of scientific persons and educators elsewhere, and has been favorably noticed in various scientific publications.

Though it was an experiment previously untried, and has been carried out but to a limited extent as yet, it is already sufficient to fully demonstrate its feasibility, usefulness, and popularity, and to show unmistakably that it could be advantageously extended to one or two lower grades, and that all might attend somewhat oftener—each class coming once in each month if no more.

Having thus introduced this method and given it as I believe a fair and reasonably successful trial, my confidence in its usefulness and importance, both to the schools receiving instruction and to the institution affording it, is greater than ever; and I would here express the hope that it may be continued under still more favorable conditions, and become a regular system and part of the public school course of instruction, and may exert a strong influence in favor of an extension of natural science instruction in the school rooms. W. H. PRATT.

In view of his contemplated early removal from the city Prof. Pratt then presented an address on "The Academy's Past and Future," which, after extended remarks on the needs of the institution by W. H. Holmes and others, was referred to the Trustees for consideration and action.

President McCowen was chosen to represent the Academy at the coming meeting of the American Association for the Advancement of Science.

October 3, 1890.—TRUSTEES' MEETING.

President McCowen in the chair; nine members present.

Prof. W. H. Barris was appointed acting Curator for the remainder of the year in place of W. H. Pratt, resigned, at the same salary—$500 per annum.

October 8, 1890.—CALLED MEETING.

President McCowen in the chair.

The meeting was called to take leave of Prof. W. H. Pratt, he, with his family, being about to remove to Minneapolis, Minn., for permanent residence.

An earnest expression of the regret felt by his Academy friends at his departure was given in an address by James Thompson; and another long-time friend and associate, William H. Holmes, in a few well-chosen remarks, presented him, on behalf of the Academy, with a large photograph album containing the portraits of many of his associate members. At the close of the meeting the following resolutions were presented and unanimously adopted:

WHEREAS, Prof. W. H. Pratt, one of the founders of the Davenport Academy of Natural Sciences and for so long a time its efficient Curator, is about to sever the close relationship that has existed between himself and the Academy through so many years of devoted and earnest labor on his part for the upbuilding and maintaining of the institution;

Resolved, That the members of the Academy hereby express their heartfelt regret at the necessity for his departure from this the field of his life's labor, of work which has always been thoroughly and conscientiously performed for the best interests of the institution so dear to his heart, for the upbuilding and firm establishment of which he has done more than any other one person. We desire hereby to place on record an evidence of our appreciation of his earnest labor and of our respect and love for him as a scientist and man. It is our heartfelt desire that peace and success may be with him in his new home, and our strong hope that this Academy may so grow in usefulness as to reflect additional honor on him to whom is due so much of the credit for what it has done and for what it is yet capable of doing.

At a meeting in November, at which four members were present, President McCowen gave an interesting account of her recent trip to Arizona and of her visit to the cliff dwellings near Flagstaff.

December 26, 1890.—REGULAR MEETING.

President McCowen in the chair; six members present.

Dr. Radenhausen presented for inspection some fossil shells found in the quarries below the city; also some meteorite fragments.

The following resolutions of respect were presented and adopted:

WHEREAS, In the sad and sudden termination of the earthly life of Prof. W. C. Preston by the electric car accident of September 1 last, the Academy has lost an active member, cut off in the prime of his life and usefulness;

Resolved, That we mourn his loss not only as a member of this Academy but as an able educator, a genial gentleman, and a social friend.

Resolved, That these resolutions be entered on the minutes of the Academy, that copies be furnished for publication in the city papers, and that a copy be sent to the bereaved family.

JAMES THOMPSON,
FRANK NADLER,
E. S. BALLORD,
Committee.

A committee was appointed to prepare resolutions of respect to the memory of the late Ross Woodmansee; and J. H. Harrison, F. Nadler, and F. E. Stratton were appointed a nominating committee for the approaching annual election of officers.

January 7, 1891.—ANNUAL MEETING.

President McCowen in the chair.

The reports of officers were read and ordered placed on file.

RECORDING SECRETARY'S REPORT.

The Recording Secretary's report showed the present membership to be as follows: Regular members, 78; life members, 70; honorary members, 11. Six regular members have died and 11 have removed from the city during the year.

LIBRARIAN'S REPORT.

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your Librarian begs to report the condition of the Library as follows: The total number of additions for the year 1890, exclusive of our city papers, is 1,746. These additions comprise the transactions and reports of about 100 scientific, philosophical, and historical societies in the United States and Canada, and of 150 foreign societies; the publications of the U. S. Government, scientific and statistical, of eighteen of the general departments at Washington, received regularly; the geological reports of fourteen States, and the agricultural, historical, statistical, health, and other publications of nearly all the States of the Union.

Of periodicals received regularly there are 11 weekly, 17 monthly, 1 bi-monthly, and 4 quarterly. Of many of these the Academy is in possession of full files.

The Library now contains — bound volumes, 1,920; unbound volumes, pamphlets, and miscellaneous papers, 22,558.

With the bare mention of thousands of pamphlets, many of them containing the results of original investigations in every department of natural science, and at times accompanied by the most costly illustrations, we are confronted with the practical question of their preservation. It comes up as one of our greatest needs. They call for a wise discrimination and division, binding those that are the most important and procuring for others cases in which they may be properly classified and labeled, for protection and ready reference.

The reading table is furnished with the new publications as they are daily received; and the books already on the shelves are consulted almost daily by persons seeking information on some of the subjects contained in them, every facility being afforded those who choose to avail themselves of the opportunity during the hours the Academy is open to visitors.

The cataloguing of the Library by subjects, commenced some time ago, though progressing slowly, is receiving daily attention as far as our limited force will admit.

With the daily accessions to the Library emphasis is given to the recognized value of the publications of the Academy by the frequent requests coming from new organizations in this country and the older institutions abroad, proffering their own issues in exchange for ours.

January 7, 1891. C. E. HARRISON, *Librarian.*

CURATOR'S REPORT.

The Curator's report showed valuable additions to the Museum in its several departments. No mound explorations had been made during the year. In closing, Curator Barris said:

We have come to a point in our history where the further accumulation of new materials is not so important as the utilization of what we already have in abundance — the arrangement, classification, and systematic cataloguing, especially of our geological and mineral treasures, so as to do credit to an academy of science. In urging this I am but giving expression to the cherished hope of your first curator, and none more than himself would rejoice at its realization.

REPORT OF THE PUBLICATION COMMITTEE.

The committee reported Part 1 of Volume V. printed and ready for distribution. Fewer scientific papers than usual had been presented for publication in the past year, chiefly because of the lack of funds on

the part of the Academy to publish them promptly. Frequent requests for our published PROCEEDINGS were continually being received from home and foreign institutions.

TREASURER'S REPORT.

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

I herewith respectfully submit the Treasurer's report for the year ending January 7, 1891:

RECEIPTS.

From Dues	$195 00	
Memberships	5 00	
Annual subscriptions, 1890	323 00	
Contributions	7 00	
Subscriptions, 1891	30 00	
Use of rooms and door receipts	93 65	
Interest on endowment fund	80 00	
		$733 65

DISBURSEMENTS.

Paid on account of Curator	$391 60	
Janitor	60 00	
Fuel	23 65	
Light	10 85	
Water	16 00	
Freight and express	8 15	
Incidentals, including postage and repairs	76 99	
Note at Davenport National Bank	100 00	
Interest	43 11	
Cash on hand	3 30	
		$733 65

LIABILITIES.

Note to Mrs. Newcomb, 8 per cent	$320 00	
Davenport National Bank	450 00	
Due Curator	125 00	
Gas Company	70	
A. J. Lerch & Bro	6 45	
Jarvis White & Co	13 40	
		$915 55

FUNDS AVAILABLE.

Endowment fund	$1,200 00	
Uncollected dues	108 00	
Uncollected subscriptions	64 00	
		$1,372 00

C. E. HARRISON, *Acting Treas.*

The resignation of W. H. Holmes as Trustee was presented and accepted.

ELECTION OF OFFICERS — 1891.

President — JAMES THOMPSON.

First Vice-President — Dr. W. L. ALLEN.

Second Vice-President—W. H. HOLMES.
Recording Secretary—Dr. JENNIE MCCOWEN.
Corresponding Secretary—Prof. W. H. BARRIS.
Curator—Prof. W. H. BARRIS.
Treasurer—FRANK NADLER.
Librarian—Miss A. J. S. MCCRUM.
Trustees for Three Years—G. P. MCCLELLAND, W. C. PUTNAM, W. H. BARRIS, and A. M. JUDY.
Trustees to Fill Vacancies (caused by the death of William Riepe, the removal from the city of W. H. Pratt, and the resignation of W. H. Holmes)—Mrs. C. E. PUTNAM, C. E. HARRISON, and W. L. ALLEN.

PRESIDENT'S ANNUAL ADDRESS.

DR. JENNIE MCCOWEN, January 7, 1891.

The retiring President, Dr. McCowen, after summing up in brief the progress of the year, making special and appreciative mention of the work of Prof. Pratt connecting the Academy with the public schools, continued as follows:

From the very inception of this Academy one of the principal objects has been the advancement of public interest in knowledge of the natural sciences, and especially by the most intimate practical co-operation with the public educational system. To this end it has been the constant effort on the part of the Academy to encourage visits of classes and teachers to the rooms, but no way was found during past years to realize this cherished object to anything like the extent hoped for. But within the past year (1890) a promising beginning has been made.

At a meeting of the Board of Education in February a definite plan proposed by Prof. Pratt, then Curator of the Academy, for receiving classes of pupils from the public schools directly into the Academy rooms for systematic scientific instruction was considered and approved. A programme was arranged by the principals, and all parties entered into it with hearty good-will. At the afternoon recess a teacher, with her class, repaired to the Academy building, where an ample collection of specimens to illustrate the lesson given by Prof. Pratt was arranged for the close and personal inspection of the pupils; the same lesson being repeated until all the classes had received it in turn. The high school and the eighth and ninth grades of the grammar schools have taken one lesson each during each term.

This plan, which originated with the Davenport Academy of Natural Sciences, has been sufficiently tested to demonstrate the entire feasibility, usefulness, and popularity of the method. It has, more-

over, become plain that the same might be advantageously extended to one or two lower grades. The obvious advantage of this method is that it makes possible a much more complete illustration with the actual objects than could be made by means of such collections as could be found at each school. The present arrangement as to time presents no material interference with regular school work.

The removal of Prof. Pratt from the city is a serious loss to the Academy in the prosecution of this work no less than in many other ways; but we hope some arrangement may speedily be made for continuing the Academy classes.

While we express the keenest regret that, hedged about by sharply limiting conditions, much of the desirable work of an academy is, as yet, impossible of accomplishment, we may congratulate ourselves on what has been done by dint of personal exertion on the part of those who, busy all day in the vocations by which a livelihood must be earned, have yet spared for science an occasional hour. We own our building free from encumbrance, and enough ground for the extension and completion of the building as contemplated in the original plan.

The value of the collections, especially in the archæological department, is very considerable. A careful estimate has placed the actual money value of the building and contents as scarcely short of $100,000. A painstaking examination of the records, made by the late Curator, shows that of that amount the following has been received from the community during the past 22 years:

Fees and dues	$ 5,325 00
Proceeds of lectures	325 00
Proceeds of entertainments	1,950 00
Total	$ 7,600 00
Cash contributions and life memberships	$11,000 00
Total	$18,600 00

For the $7,600 the patrons have had in return the usual privileges of membership. Of the $11,000 donated a very considerable portion has been contributed by the active members themselves, while about $1,000 has come from distant friends. Of the balance, it certainly is not extravagant to assume that it has been fully returned to the public in the reputation abroad which it has given the city; for in every scientific institution of the world the name of Davenport is well known, the Academy of Sciences having been a potent factor in the very best kind of advertising — that which shows not only business activity but the force of intelligence and education, which appreciates and cultivates all sources of material and intellectual welfare, than which none can be with less justice overlooked than scientific labor and scientific knowledge.

In the material prosperity with which Davenport is being blest, as the years go by, and which of late seems to be taking on new activity

in every direction, so much is due directly to the results of scientific study, research and experiment, that it is inconceivable that an institution whose chief aim is scientific study and the dissemination of scientific knowledge should not be adequately sustained, should not have a share in the general prosperity which it has helped to forward.

And now, gentlemen, in retiring from the office with which you have honored me for two terms in succession, allow me to express my appreciation of the honor which I accepted not as a personal matter but as a compliment to my sex, which, from the beginning of the institution, as has been acknowledged many times, has been active in promoting its interests. Your flattering preference has found scant justification, as I confess with regret, owing to the active duties of professional life which leave but limited opportunities for the adequate promotion of all the interests of the Academy, such as might reasonably be expected of its chief executive. I thank you for the cordial support and co-operation which you have ever given me as your presiding officer and for the uniform courtesy and consideration accorded me personally. The harmony, hopefulness, and good feeling of these years, in spite of the very heavy burdens and very great disadvantages under which we have labored, give me undisguised satisfaction; and as we begin the new year, 1891, I trust it may indeed prove to the Academy a happy New Year of new zeal and high resolves, of greater achievements, of a wider range of usefulness, of a better understanding in the community of our purposes, and in consequence thereof, a more substantial support.

INAUGURAL ADDRESS.

JAMES THOMPSON, January, 7, 1891.

President Thompson, on taking the chair, paid a graceful tribute to the efficiency of his predecessor, and after modestly recognizing the fact that "He who putteth on the armor may not rejoice like him who putteth it off," said:

A word or two on the threshold of the new year may not be out of place. How often have the older members wished and hoped that they might live to see this institution endowed with funds sufficient to carry out the original design of its founders and to enable it to get out of this hand-to-mouth beggarly way of life. O, men of means and influence! when plans are being laid for the improvement and enriching of our beautiful city let it not be forgotten that this institution, even in its youthful state, has made Davenport better known in the world than any other, than all other institutions together. If it has done so much in its adolescence, under such difficulties, what may it not do when it is enabled to stand on its feet, self-supporting and independent? What a chance for some Davenport Girard or Peter Cooper to step forward and endow the academy, to thus bless it and

the city, and in so doing doubly bless himself. Surely it were better to see the good one does before going hence to be no more on earth than to leave one's wealth to be fought over and scattered to the winds.

And let me say a word to the young men of the city, many of whom are drifting into idleness and crime, just for want of a purpose: Remember we do not live by bread alone. The mind needs food as well as the body. What a chance is yours to come here and learn of Nature and her ways. Here are books and specimens and every inducement to go out and investigate for yourselves the wonders of the world we live in.

A fine example for young men is that of our former librarian, H. A. Pilsbry. Working at his trade of printer he put in his spare moments in the study and classification of shells, and is now professor of conchology in the Philadelphia Academy of Science. He thirsted for knowledge, searched for the spring, and drank deep. There are a great many springs right here in this academy to begin on if you are thirsty—and it would be a good thing to begin now. This is a kind of thirst that no man need be ashamed of, and what pleasure there is in the search for the springs of truth. Lessing says, "If God held all knowledge in his right hand and in his left the desire to search for truth, and asked me to choose, I would fall reverently on his left hand and say, Father, give!" In the search for knowledge lies happiness, and in the strength of the endeavor lies its secret recompense.

January 30, 1891.— REGULAR MEETING.

President Thompson in the chair.

The auditing committee appointed at the last meeting reported the accounts of the Treasurer for the past year examined and found correct.

The Curator reported as the most interesting addition to the museum during the month a colored drawing made by an Indian convict.

Rev. George K. Hoover was elected a regular member, and Mr. S. F. Smith a Trustee to fill the vacancy caused by the election of James Thompson to the presidency.

The President announced the appointment of standing committees for the year as follows:

Finance—W. C. Putnam, E. S. Ballord, Dr. W. L. Allen.

Publication—Mrs. M. L. D. Putnam, H. C. Fulton, Prof. W. H. Barris, Dr. C. H. Preston, James Thompson.

Library—Miss A. J. S. McCrum, C. E. Harrison, Rev. A. M. Judy.

Museum—W. H. Pratt, Archæology; Miss S. G. Foote-Sheldon, Conchology; Prof. Jerome McNeill, Entomology; Prof. W. H. Barris, Geology and Palæontology; Dr. E. H. Hazen, Natural History;

Frank Nadler, Mineralogy; J. J. Nagel, Botany; J. M. DeArmond, Historical Collections.

February 27, 1891.—REGULAR MEETING.

President Thompson in the chair.

Dr. A. W. Elmer and Mr. Louis Block were elected regular members.

March 27, 1891.—REGULAR MEETING.

President Thompson in the chair.

Hon. John C. Bills was elected to regular membership.

The Secretary was instructed to call in all the keys of the Academy building for change of lock and redistribution to authorized holders.

A letter was read from Prof. W. H. Pratt on "Inheritance of Acquired Characteristics." An informal discussion of the subject followed.

April 24, 1891.—REGULAR MEETING.

The following resolutions were read and adopted:

Resolved, That we have learned with deep regret of the death of Prof. Alexander Winchell, a corresponding member of this Academy. Specially gifted for his life's work and prosecuting it with conscientious and persistent enthusiasm, he was everywhere recognized and appreciated by his co-laborers in the cause of truth. Whether viewed as author, educator, or scientist, he had achieved in each field the equally high distinction of national reputation.

Resolved, That we extend our deepest sympathy to the family in their great bereavement, and that copies of these resolutions be sent them.

May 29, 1891.—REGULAR MEETING.

President Thompson in the chair; five members present.

Routine business only was transacted.

July 31, 1891.—REGULAR MEETING.

Rev. George K. Hoover, President *pro tem;* five members present.

A communication was read from Capt. Willard Glazier asking the Academy to send a representative to join an expedition to explore the head-waters of the Mississippi river, he to pay all expenses for a six weeks' trip. No member feeling ready to spare the requisite time, the

Secretary was instructed to inform Captain Glazier of the Academy's regret at not being able to avail itself of his generous offer.*

September 25, 1891.— REGULAR MEETING.

President Thompson in the chair; six members present.

The curator reported a collection of over 300 specimens, representing more than 30 species of fossil shells from the Hamilton group, made recently by himself at Rockford, Illinois, and presented to the museum of the Academy. The number of paying visitors (about 125) during the past month, had been larger than usual, owing to the River Carnival and Fair.

Mr. C. E. Harrison was requested to prepare a sketch of his recent trip with the Glazier expedition to the head waters of the Mississippi and present it at an early date.

January 6, 1892.— ANNUAL MEETING.

The Academy met in regular annual session, President Thompson in the chair.

After some discussion it was decided to adjourn to the first Wednesday in February to receive the reports of officers.

February 3, 1892.— ANNUAL MEETING.

(Adjourned from January 6.)

Eleven members present.

The President being absent on account of illness, Vice-President Allen occupied the chair. The reports of officers were presented and ordered placed on file.

CURATOR'S REPORT.

It is natural at the close of the year, to ask as to the present status of the Academy. Is it realizing the expectations of those most interested in its welfare? Is anything being done to make it attractive to the people? As one of the officers of the Academy, and simply from the standpoint of the Curator, we reply to these questions:

First, as to additions made to our cabinet. These are considerably in advance of those made in the past year whether we consider their numbers or value. Accessions have been made in almost every de-

* Mr. C. E Harrison finally arranged to accompany the expedition.

partment of natural science — geology, mineralogy, palaeontology, ornithology, archæology, conchology, entomology and botany.

Among the extensive collections are a series of fossils from the Rockford shales of this state, comprising about 30 species and between two and three hundred specimens, all of which have been properly labeled and are on our shelves.

Another and most remarkable addition has been made by Prof. Shimek of Iowa City, comprising many species of sea urchins, basket fish, serpent stones, crabs and corals from the Atlantic and Pacific coasts, and land and water shells from Tennessee, all in excellent condition, identified and labeled by the giver, who has made special study of the objects presented. The Academy is most fortunate in securing such a donation.

Mr. Wickham of Iowa City has generously furnished to the Academy the first installment of a series of specimens in entomology to supply deficiencies, and perfect our already extensive collection, in that department.

Mr. Williams of St. Louis has favored us with over a hundred botanical slides, supplying a want much felt in the Academy.

We notice in the next place the opportunities for the Academy to afford instruction have, the last year, been unusually favorable. Specialists have taken occasion frequently to visit us for study in their several departments. The archeological department has been in especial favor. A new impulse has been given to the study by the insertion in our primary geographies of one or two chapters on the Mound Builders. Hence teachers have not only come from a distance to acquaint themselves with the works of an ancient race now passed away, but during the past year whole schools, accompanied by their teachers, have frequently visited the Academy.

Is anything being done to awaken an interest in the community in behalf of the Academy? Before answering this question let me say the great work, the legitimate work of this Academy, has been and is now being realized in its publications. They stand as the cause, aim and end of its existence. In our non-appreciation of this fact we may ignore it, but our ignoring does not change it. The frequent applications of scientists for the special papers published in our fifth volume, to aid them in completing their work, and the frequent enquiries as to when the sixth volume will be ready for distribution, made by leading societies of Europe and of this country, show their appreciation of the work.

And now for the practical question, "What are we doing now to incite a popular interest in the Academy?" The curator has adopted the expedient of accompanying each visitor through the museum and explaining to him the several objects of interest claiming his attention. The success of this direct personal effort is evinced not only in the increasing number of visitors but in their uniform expressions of appreciation of that which they see and hear. The teaching function of the institution is thus made prominent, and is extended most freely to all

who choose to place themselves within the reach of its exercise. The year has certainly shown what may be accomplished in this direction. Definite ideas are thus gathered as to the varied objects of natural history upon our shelves. As a consequence visitors go away satisfied with and emphasizing their satisfaction with what they have learned. A new interest is thus awakened which it is hoped will go on deepening, and doubling in intensity, and in time it is hoped it may become a powerful factor for permanent good to the Academy.

I need not say this has been a work of time, and has interfered most materially with the special labor which the curator most desired to accomplish. This labor was partially outlined in his last report. He there emphasized the necessity of a thorough revision of the fossils contained in our collection. It will be remembered that many of the specimens gathered at an early date were deposited on the shelves with scarcely any notice other than that of locality, some wanting even that. These required study and identification. No science has made more rapid advances during the past twenty years than that of palæontology. New genera and new species are constantly being discovered and described, so that the nomenclature of to-day is widely different from that of a few years ago. This change calls for an entire and radical change in the classification of our fossils. The work is in satisfactory progress and would have been finished but for the frequent interruptions to which reference has been already made. The curator has procured a book in which will be recorded the names of fossils as given years ago and then the new names by which they are now known, with full references to the authorities in accordance with which the changes have been made.

Thus, it seems from the standpoint of the curator the past year has brought with it much to encourage us. It has witnessed the gradual increase of the museum, as well as valuable additions to its collection. It has ministered to the necessities of those who most needed its aid. Its teaching power has been brought into contact with every visitor and its efficiency abundantly proven, and it is hoped the special work of the curator in the palæontological department will issue in a thorough scientific classification of the palæontological treasures now scattered over its shelves.

W. H. Barris.

February 3, 1892.

LIBRARIAN'S REPORT.

To the Officers and Members of the Davenport Academy of Natural Sciences:

The library of the Academy for the year just closed has exhibited a very gratifying growth, the accessions numbering 1,702, exclusive of the daily papers, the present total being 26,203. It was thought best at the beginning of the year to discontinue registering a great amount of matter which daily comes to us and is of no value or interest on the shelves, else the number would have been much larger.

The additions comprise the reports of most of the scientific societies of the world, reports of the many departments of the Government, files of various scientific journals and periodicals, geological State surveys, and reports from nearly every State in the Union, representing almost every subject pertaining to the natural sciences.

Slow progress has been made during the year upon the index catalogue previously commenced, the limited time of those in charge of the Library permitting them to give but a small part of their labor daily to this work. The great needs of the Library — and these are assuming immense proportions — are the binding and preserving of the many thousand unbound volumes and pamphlets, and the completion of the index. I trust the day is not far distant when provision will be made for these pressing needs, greatly enhancing the value of this department of the Academy.

C. E. HARRISON, *Librarian.*

February 3, 1892.

PRESIDENT'S ANNUAL ADDRESS.

JAMES THOMPSON, February 3, 1892.

The following address, prepared by Mr. Thompson as a review of the year's work was, in his absence, presented by his daughter:

FELLOW MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES — LADIES AND GENTLEMEN:

I believe it is the rule as well as the custom for the President of the Academy to give an annual address, a summing up of the year's progress. I am of the opinion that in my case this rule would be better honored in the breach than in the observance, inasmuch as the material is scant, the laborers few, and the skill to exhibit what little there is, sadly lacking. It is like making bricks without straw, and consequently the task is rather difficult. It may be true that in looking at the years passed over and the labor spent we are ready to exclaim, in the words of the poet —

> Of all sad words of tongue or pen,
> The saddest are these: It might have been.

It might have been that we would have seen the Academy building extended to its originally contemplated dimensions, if — if — ! It might have been that some big-hearted, rich lover of science would have endowed the society with a fund large enough to place it upon a sure and lasting basis, if — if — ! It might have been that greater numbers of young men, imbued with love of science, would have followed the example of some of the earlier workers and trained themselves to continue the work begun, if — if — ! It might have been that some of us might have done more and better than we have, if — if — ! All these and more might have been, if — ; but each one can fill out the sentence to please himself.

But despite difficulties, hopes not realized, and regrets for what

might have been, we still live; and with the means at our disposal we have no reason for discouragement. "Things are not always what they seem." Failure and success are relative terms. What often seems failure is embryonic success, resulting in the birth of improved methods, clearer intelligence, better work and higher attainments. Every one is familiar with examples of this in studying the history of events as they transpire. The very things that seem to destroy and overwhelm are, by some occult alchemy, changed into deliverance and salvation. The very wrath of men is made to praise and hold up the truth. For example, the War of Independence seemed disastrous, but it resulted in the birth of a nation and the independence of a great people. The shot at Fort Sumter and the first battle of Bull Run had a disastrous look, but we now know that the black cloud had a silver lining and culminated in the emancipation proclamation of Abraham Lincoln and the surrender of Lee to Grant at Appomattox. We have notable examples of this in our own institution. But for the assertions of some professors of science in a national institution—but for this seeming evil, we would never have seen that able and unanswerable defense of our institution and relics as given to the world by our late lamented President, Charles E. Putnam, which resulted not only in proving the genuineness of the relics as found and the honesty of the finders, but of convincing the scientific world of the same — proofs of which convictions come to us from almost all scientific bodies in Europe as well as America.

Speaking reminiscently, we must not fail to remember gratefully and regretfully our former fellow member and Curator, W. H. Pratt: gratefully when we think of his zeal and untiring labor for so many years in building up and keeping in order our collections: regretfully when we think of his departure to another city just as he was beginning to develop a favorite theory of his, viz, making our Academy an efficient auxiliary of the public school, by taking classes weekly, and teaching practically, visually and orally the nature of the things and animals which they have read about in their books. It is not too much to hope that some one equally capable and imbued with equal zeal will take up this work so auspiciously begun and carry it forward to a successful issue. The heart fills with sorrow and the eye with tears as, year by year, numbers of our efficient members leave us, some to other places, as Fulton, Pilsbry and others, but the greater number to join the silent majority — Sheldon, the Putnams, father and son, Farquharson, French, Riepe, Renwick, Adams, Preston and others. Verily they rest from their labors and their works follow them, while we sadly miss them in their accustomed places and long for the "touch of a vanished hand." Still speaking reminiscently, we must not fail to mention with admiration the unflagging enthusiasm and successful labors of the Chairman of the Publication Committee, Mrs. M. L. D. Putnam. Able, efficient and persistent in her efforts from the first; meeting the objections of the few opposers who doubted the wisdom of publishing the proceedings; she has been the projector of

ways and means as well as the collector of the funds which have made the publication a success, which has been the means of making us as well as, if not better known abroad than at home; thus by its success compelling the acknowledgement of the doubters and the public generally, of the wisdom and the benefit of our publication, the importance of which we must keep constantly in view and endeavor to raise a permanent publication fund in order that original papers can be published in due time before they are sent out to the world from other sources. I believe a great many more papers would be sent to us if it were assured that they would get immediate publication.

Leaving the imperfect review of the past we come face to face with the present, and of course the prospect of providing for the future. And first we will note, with thanks to the same indefatigable worker, the successful completion of her efforts in the renewal of, and adding to the subscriptions for the Curator's salary, thus securing, as you will see by the report, that necessary expense for the next five years. In the absence of a permanent fund it is a grand thing to be able to say that so much is provided for.

We are all aware that nothing has been done for some time in outdoor excursions, exploring mounds or adding any new discoveries to the museum. Alas! The old field marshals are either gone or laying up in ordinary, and we are sadly in need of new recruits in this field of interesting labor, and it is hoped that a revival may take place in this direction. In the exceedingly interesting lectures of the University Extension Course on Geology, Prof. Calvin mentioned the rich region, geologically considered, lying in the vicinity of Montpelier, down the river some twenty miles, and intimated that an excursion to that locality would take place some time in the spring, and that he would accompany the party and describe, *in situ*, the strata that he had exhibited on the black-board. Would it not be well for us to be represented in that excursion and report to the Academy whatever of interest may be pointed out by the professor? It may be well to state here that the Academy is pleased to extend the use of its library room to the Quiz classes of the University Course with such books from the museum as they may need, to carry on their work. You will see that the Curator reports additions in almost every department of natural history, and work done in his own special line. In conclusion permit me to suggest that, as you are aware, the great Columbian World's Fair is to be held in Chicago next year, and also that a new book by the editor of the *American Antiquarian* entitled "The Mound Builders, Their Works and Relics," is to be published in the spring, which will contain a description of the Davenport relics. Now, as we have the honor of holding in our possession by the right of discovery, a unique relic of prehistoric art, as well as a survival of prehistoric civilization, the genuineness of which has been proven by honest and unimpeachable witnesses, I think it would be advisable if possible to send our tablets and some other mound builder's relics, such as the elephant pipe, copper axes, etc., as part of the Iowa or Davenport exhibit, so

as to give visitors from all parts of the world a chance to see something that has made a little stir in the scientific world and now is only waiting, like the Rosetta Stone, for some Marietta to decipher the story hidden in its hitherto undecipherable hieroglyphics.

ELECTION OF OFFICERS — 1892.

President — JAMES THOMPSON.
First Vice-President — Dr. W. L. ALLEN.
Second Vice-President — W. H. HOLMES.
Recording Secretary — Dr. JENNIE MCCOWEN.
Corresponding Secretary — Prof. W. H. BARRIS.
Curator — Prof. W. H. BARRIS.
Treasurer — FRANK NADLER.
Librarian — C. E. HARRISON.
Trustees for three years — Dr. C. H. PRESTON, S. F. SMITH, W. F. ROSS. H. H. ANDRESSEN; the latter two taking the places of Messrs. H. C. Fulton and E. P. Lynch, recently removed from the city.

Dr. A. W. Elmer was elected a trustee to fill the vacancy caused by the removal of Dr. E. H. Hazen to Des Moines.

A vote of thanks was extended to Mrs. M. L. D. Putnam for her work in securing a $400.00 subscription to meet current expenses. The thanks of the Academy were also extended to Mr. W. F. Ross for an invitation to attend the meetings of the Davenport Humane Society.

The following resolution, presented by Rev. A. M. Judy, was unanimously adopted:

Recognizing an inestimable advantage to learning in the accumulation of a scientific Library such as this Academy is acquiring, chiefly through the exchange of its publications, for the proceedings of other learned societies;

Resolved, That the public of Davenport is earnestly solicited to contribute toward the cost of the forthcoming volume of the Academy Proceedings.

Messrs. Judy, Allen, and C. E. Harrison were, on motion, appointed a committee to devise means of increasing interest in the museum.

February 11, 1892. — REGULAR MEETING.

Vice-President Allen in the chair.

The committee appointed to draft resolutions expressive of the Academy's sense of loss in the death of its honored President reported as follows:

WHEREAS, In the inevitable order of events death has again invaded the membership of the Academy and stricken down our honored and beloved President, James Thompson, who for twenty-four years, or nearly the entire period of the Academy's existence, has been one of its faithful friends and supporting members; therefore—

Resolved, That while the community at large—the city of his adoption and home, has suffered a great and grievous loss, the Davenport Academy of Natural Sciences is most sorely stricken, having long had the benefit of his counsel, aid, and fellowship, with opportunity to know and appreciate the beauty and symmetry of his sterling character.

Resolved, That we place his name with reverence and love upon the proud and precious roll of our honored dead.

Resolved, That the Academy extends to the bereaved family the assurance of sympathy and condolence.

T. W. MCCLELLAND,
W. F. RIEPE,
J. H. HARRISON,
Committee.

March 25, 1892.—REGULAR MEETING.

President Allen in the chair.

After the usual reports the subject of an exhibition of the Academy's collections at the World's Fair was discussed but no action taken.

April 29, 1892.—REGULAR MEETING.

Ten members present.

Resolutions on the death of J. M. Parker and of Nicholas Kuhnen were passed, and a large crayon portrait of the late president, James Thompson, was presented by Mr. Harrison on behalf of the family.

President Allen appointed the following standing committees for the year:

Finance—J. B. Phelps, C. A. Ficke, H. M. Henley.

Publication—Mrs. M. L. D. Putnam, W. H. Barris, C. H. Preston, J. B. Young, Prof. S. Calvin.

Library—C. E. Harrison, Miss A. J. S. McCrum, A. M. Judy.

Museum—W. H. Pratt, Archæology; Miss S. G. Foote-Sheldon, Conchology; W. H. Hatch, Ichthiology; Miss J. Sanders, Entomology; W. H. Barris, Geology and Palæontology; F. Nadler, Mineralogy; A. W. Elmer, Natural History; J. J. Nagel, Botany; J. A. De Armond, Historical Collections.

E. S. Hammatt was elected a regular member.

IN MEMORIAM — J. MONROE PARKER.

WHEREAS, The hand of death has removed from among us our life-long associate and life member, J. Monroe Parker;

Resolved, That in his death the Academy has lost a member whose kind words of encouragement have always cheered our efforts and whose generous aid has ever been ready to assist us.

Resolved, That while we deplore his death as a great loss to us, we will ever cherish the memory of his kindness and support of all good works, and his most generous provision for the future of this Academy.

Resolved, That these resolutions be spread upon our records and a copy thereof be sent to the bereaved widow and children.

E. S. BALLORD,
S. F. SMITH,
WILLIAM J. ROSS,
Committee.

IN MEMORIAM — N. KUHNEN.

Again has death invaded the ranks of the Academy and taken away one of its foremost members, Nicholas Kuhnen. It is fitting that we come with reverent hearts to offer this tribute to his memory.

A firm friend of the Academy in its time of need, a loyal citizen to every public duty, a courteous gentleman in every relation of life, generous to a fault, it might be said of him, "His life was gentle, and the elements so mixed in him that Nature might stand up and say, 'This was a man.'"

It is ordered that a copy of this minute be presented to the bereaved family, and that the Academy wear the usual badge of mourning for thirty days.

GEO. P. MCCLELLAND,
S. P. BRYANT,
C. E. HARRISON,
Committee.

May 27, 1892.—REGULAR MEETING.

President Allen in the chair.

A letter from Prof. S. Calvin of Iowa City was read, accepting a position on the publication committee. "But for its publications," he wrote, "the Davenport Academy of Natural Sciences, notwithstanding all the brilliant names it has had and still has on its roll of membership, would never have been known outside of Davenport. As it is, the publications of the Academy, with their important contributions to the sum of human knowledge, have made Davenport honorably known, at least among men of science, throughout the civilized world. The cultured people of your beautiful city, when they realize what the Academy has done and is capable of doing, will, I am sure,

rally to its support, and will see to it that its usefulness from the point of view of science, and its usefulness from a more selfish point of view, in advertising the intelligence and progressiveness of Davenport, shall not be hindered or impaired."

The Curator reported the donatian from the Hon. Whit. M. Grant of a very remarkable specimen of mica-schist containing numerous garnets. On motion a vote of thanks was extended to Mr. Grant.

The fine specimens of fur-seal skins of different ages, previously donated by Mr. Grant, were brought out for discussion as to the causes operating toward the extermination of the seal.

The following resolution was presented and adopted:

Resolved, That the publication committee be instructed to publish the papers now on hand, and such as may hereafter be accepted by the Academy, in brochure form, as soon after their reception as practicable, and issue them at once (without delaying for the completion of a volume) to such subscribers and exchanging societies as may elect to receive them thus.

October 28, 1892.—Regular Meeting.

President Allen in the chair; seven members present.

The Curator mentioned, among recent donations to the Museum, a handsome slab of crinoidal limestone, presented by Mrs. C. C. Parry.

The chairman of the publication committee reported Volume V. of the Proceedings in the hands of the binder, and three papers presented for Volume VI.

Curator Barris announced that he would, as requested by the committee, prepare a paper on "The Local Geology of Davenport," for Volume VI.

A comprehensive Index to the first five volumes of the Proceedings, was announced as in course of preparation, under the direction of Prof. W. J. McGee of Washington, D. C.

The following resolution of respect to the memory of Mrs. J. Monroe Parker was adopted:

Resolved, That in the death of Mrs. J. Monroe Parker this Academy realizes the loss of a firm friend and a life member of this institution, and would place on the minutes this recognition of her interest in its welfare.

Mrs. C. E. Putnam.
W. H. Barris,
W. H. Holmes,
Committee.

December 14, 1892.—TWENTY-FIFTH OR "SILVER ANNIVERSARY" MEETING.

In the afternoon the Museum was thrown open to the children of the city, music being furnished by a children's orchestra. In the evening there was a fair gathering of interested friends in the main Academy hall.

An interesting sketch of the history of the Academy from its beginning, December 14, 1867, was read by Dr. Jennie McCowen; and letters from absent friends were read conveying many expressions of good will.

A delightful musical programme was rendered by the Misses Bruning, Mrs. Swiney, Miss Hoyt, and others. A bountiful repast was served in the supper hall, and altogether the anniversary proved a very enjoyable occasion.

ANNIVERSARY ADDRESS.

DR. JENNIE MCCOWEN, December 14, 1892.

LADIES AND GENTLEMEN:

The Davenport Academy of Natural Sciences was organized December 14, 1867, just twenty-five years ago to-night.

Of the four gentlemen who met that night in a dingy little office upstairs on the corner of Third and Perry streets and pledged themselves to united efforts towards the acquirement and dissemination of scientific knowledge, towards the encouragement of scientific research and the promotion of practical scientific instruction in the public schools, not one remains to-day in active membership in the Academy. Of the first year's officers of that infant society not one remains. Of the ten gentlemen who formed the first Board of Trustees, but a single one remains, Dr. W. H. Barris. At the end of 1868 the membership had increased from four to fifty-four.

The first donation from abroad to the new museum was a collection of *crinoids* from Mr. Enoch May of Burlington.

The first lot of specimens received in exchange was a collection of marine shells, sponges, etc., from the Portland, (Me.) National History Society, an institution which has long since ceased to exist.

The first case for holding specimens was a home-made one, manufactured for the Academy by one of the original members.

The first lecture under the auspices of the Academy was by Prof. Gustavus Hinrichs, then of the Iowa State University, given at the German Theatre.

The first paper read in Academy meeting was on "The Relation of the Outer World to Our Senses," by Mr. W. H. Pratt, who, during the twenty-four years that have elapsed since that time, has been un-

tiring in his devotion to the Academy and has but recently transferred his residence to another city.

That this infant society anticipated the good advice of Dr. Edward Everett Hale in an inclination to "Look up and not down," is shown by the fact that its first purchase of a scientific nature was a telescope. This instrument is still in the possession of the Academy and has been from time to time the source of much pleasure and profit.

During the early years of the existence of the Academy it accepted the hospitality of the Library Association and one and another office of private individual or firm, but as time passed on it grew until it could no longer be accommodated in the house of its friends, and in 1873 it became an independent householder and paid rent at the rate of $6.00 a month for a small room. We cannot trace our history step by step, but in 1877 — in our tenth year — the corner stone of the Academy building was laid, and in February of the next year, the building was completed and opened to the public with much ceremony and great rejoicing.

In looking over the early records of the society I was interested to find that the first woman proposed for membership was a physician — Dr. Delia S. Irish — though owing to her intended absence from the city her name was afterwards withdrawn. The first elected to membership was Mrs. M. L. D. Putnam, who is still an active member. The first elected an honorary member was Mrs. M. A. Sanders.

From the very beginning of the Academy the women of the city have been interested in it and have done what they could for its advancement. As early as January 18, 1868, scarcely a month from the date of organization, an entry shows that "Mrs. M. A. Sanders contributed a large collection of minerals, fossils and recent shells, which alone filled a cabinet case." And not long after, we find mention of a "Ladies' Furnishing Fund," which provided "seven cases for specimens and books, matting for the floor, curtains, etc."

When sufficient scientific material had been accumulated to warrant the publication of Proceedings, it was made possible by the Woman's Centennial Association. The lot for the new Academy building was given by a woman, Mrs. Patience V. Newcomb. In 1879, a woman, Mrs. M. L. D. Putnam, was elected to the presidency, a thing then unheard of in the scientific world, (an indiscretion which was repeated at a later date in the election of Dr. McCowen in '90, and her re-election in '91.)

Time forbids more than mere mention of many good works; among them, of the efforts of father and son, Charles E. and J. Duncan Putnam, each notable in his own way in building up the Academy and protecting its interests.

The gentlemen of the Academy, now present, who have borne the heat and burden of the day, can bear testimony to the fact that, commenced without funds and year by year through two and a half decades, having to contend against the difficulty of want of means to prosecute its work to the best advantage, yet the Academy has lived,

and more, has grown; and further, has secured recognition even in foreign countries as one of the American Academies worthy of a place among scientific institutions.

Of the material prosperity with which Davenport is being blest, so much is due directly to the results of scientific study, experiment and research, that it is inconceivable that any institution whose chief aim is scientific study and the dissemination of scientific knowledge, should not be adequately sustained. The exact knowledge which is sought in scientific pursuits is the sure ground of prosperity, and comparing to-day with fifty years ago and realizing that the almost inconceivable advances which have been made all along the line are chiefly the result of *applied* science, we can but expect that the Academy, too, will share in the general forward movement inaugurated in our city.

EXTRACTS FROM ANNIVERSARY LETTERS.

Prof. E. L. Berthoud of Golden, Col., a member of the New York Lyceum and of the Philadelphia Academy of Science, wrote:

Assure the members of the Academy to whom I owe the honor of being a member, that I warmly appreciate the honor conferred and look forward with pleasurable anticipation to the time when I may be permitted to attend a society meeting. I am preparing for a winter's trip south to Mexico, and anything I may see that is archæologically interesting will be duly imparted to the Davenport Academy.

Prof. T. S. Parvin of Cedar Rapids:

You know the deep interest I feel in the welfare of the Davenport Academy, and I trust that your anniversary occasion may serve to interest some of your wealthier citizens who may lend a helping hand and so contribute to its further usefulness.

Edward K. Putnam, Detroit, Mich.:

I wish I could be there to help celebrate the silver anniversary of the Academy. I really miss the Academy here. The Chicago Academy, as you may know, has received a gift of $75,000. Davenport's turn will come some day.

Robert H. Lamborn, New York City:

I hear from time to time of the good work you are doing and am thereby impressed with the great importance of local academies like yours. I have recently been instrumental in starting one at Grand Junction, Colorado, which is already doing valuable work.

W. C. Brewster, New York:

I do not know of anything that would afford me more pleasure than an opportunity to meet my old friends on an occasion like the silver anniversary of the Academy of Natural Sciences.

Prof. W. H. Pratt. Minneapolis:

We should each and all feel a just and reasonable pride in the great value and excellence of the work done—largely by those who are gone—resulting in the establishment of one of the most creditable and valuable institutions in Davenport.

George F. Henry, Des Moines:

The history of the Davenport Academy has been one of honor, a credit to all its members, and, putting it in a position of deserved prominence in the scientific world, may well be made a matter of congratulation and pride.

January 4, 1893.—ANNUAL MEETING.

President Allen in the chair; nine members present.

REPORT OF THE PUBLICATION COMMITTEE.

The Chairman, Mrs. Putnam, reported Volume V. of the PROCEEDINGS now in the hands of the binder, and the first pages of Volume VI. already printed.

The Publication Endowment Fund, started by the late Prof. S. D. Sheldon by the payment of $50.00, entitling him to all the publications of the Academy, has been added to in equal amount by Charles Velie, of Evansville, Indiana, and Austin Corbin, of New York City.

The Academy sends its PROCEEDINGS to all Scientific, Historical and Art Institutions, and to authors or publishers of Scientific or Historical Works, in exchange for their own or other publications.

Since the last annual meeting we have sustained a great loss in the death of President James Thompson, a most earnest advocate and supporter of this particular branch of the Academy's work, and especially helpful in his sympathy and faith in the future of the publication. The Academy is most fortunate in having secured the consent of Prof. Calvin, of Iowa City, to act in his place on the Publication Committee.

CURATOR'S REPORT.

The Curator submitted the following report:

The additions to the museum for the past year have hardly averaged those recorded in preceding reports. While small contributions have occasionally been made, there have been no large accessions in any department of Natural History. The museum has had a better opportunity than heretofore to test its teaching qualities and thus practically widen its influence. This is especially noticeable in the fact that a more than usual number of schools, with their teachers, have come from the neighboring state to avail themselves of the opportunity

of familiarizing themselves with an exhibit of the varied works and remains of the Mound Builders. These, as object lessons, have appealed to the senses and thus illustrated the knowledge they have derived from the teaching of their text-books.

In addition to such instances, parties engaged in the pursuit of special studies have regularly resorted to our rooms for the prosecution of their work. Every effort has been made by the Academy to facilitate such work by the proffer of the free use of the varied material upon our shelves for examination and comparison, while the books in our library have, for the time being, been placed at their disposal. The thorough modern classification of our large array of fossils, recommended years ago, and even then insisted on as a necessity by your former Curator, Prof. Pratt, has been commenced and prosecuted to a considerable extent. The fragmentary and otherwise imperfect condition of specimens has made it a slow, tedious task, while the daily interruptions to which your Curator is subjected have helped still further to cripple him and sadly interfere with the early accomplishment of the work. Respectfully submitted,

January 4, 1893. W. H. Barris, Curator.

LIBRARIAN'S REPORT.

To the Officers and Members of the Davenport Academy of Natural Sciences:

Your Librarian begs leave to report 1458 additions to the library for the year just closed, these additions comprising the transactions of scientific societies, government and state publications, etc., are regularly received in exchange for our own publications. As stated in the report of your Librarian one year ago, the means of properly caring for and preserving this valuable collection are wholly inadequate. There has been no binding done, nor shelf room provided during the year, both of which are urgently needed. To relieve our immediate wants for shelf room, I would recommend that the present shelving in the library room be extended to the ceiling, thus utilizing much valuable space. Respectfully submitted,

January 4, 1893. C. E. Harrison, Librarian.

CORRESPONDING SECRETARY'S REPORT.

During the past year the Secretary has written 113 letters and received 107. The correspondence has been mainly in reference to the publications of the society and applications for the same.

In addition to these a large number of letters have been received acknowledging the receipt of publications. Our regular forms for such acknowledgement have been exhausted, and to write them out in full has devolved on the Secretary an unusual amount of labor.

Respectfully submitted.

January 4, 1893. W. H. Barris, Corresponding Secretary.

TREASURER'S REPORT.

RECEIPTS.

Balance on hand February 6, 1892	$ 7.84	
Subscriptions and dues	492.11	
Door receipts	42.95	
Interest	49.00	
Cash and other donations for cleaning Academy	56.66	
Entertainment	14.50	
Sale of publications	4.00	
		$667 06

DISBURSEMENTS.

Curator's salary to January 2, 1893	$455.86	
Fuel, light and incidentals	138.11	
Publication fund	4.00	
Cleaning Academy	56.66	
Water	12.00	
Balance on hand	.43	
		$667 06

Respectfully submitted,

January 4, 1893. FRANK NADLER, *Treasurer.*

PRESIDENT'S ANNUAL ADDRESS.

DR W. L. ALLEN, January 4, 1893.

LADIES AND GENTLEMEN:

The year 1892 has passed, marked with but few events of importance in the history of the Academy.

The Curator's report shows that the Museum has received the usual number of additions, with, however, a falling off in the number of mound builders' relics. We ought to enlarge our natural history collection so as to have at least one specimen of every bird and animal to be found in Iowa.

The Librarian's report shows a continued and most wonderful growth of our Library, 1,430 books and pamphlets having been received during the year, some of them of very great value. Our Library now numbers 27,500 books and pamphlets, and although it is of the greatest value we have not adequate room for its proper preservation.

The report of the Recording Secretary shows that our meetings have been few and but poorly attended, and that our membership has consequently not increased. Early in the year our worthy President, Mr. James Thompson, was taken from us, and at about the same time occurred the death of Mr. Nicholas Kuhnen and of Mr. and Mrs. J. Monroe Parker.

I recommend that we devote the meetings in March, June, September, and December to certain subjects, and that we procure papers or lectures for those quarterly meetings. The intermediate meetings can be devoted to the routine business which interests but few of our members.

The publication committee reports that a part of Volume VI. is in the printer's hands, while Volume V. is still waiting for its index, and is otherwise ready for binding.

The Treasurer's report for the past year shows our receipts to have been equal to our expenditures, and that we still have a debt of about $400. During the year the Academy has received notice of four bequests, namely: $1,000 from Mr. J. Monroe Parker, $1,000 from Mr. Nicholas Kuhnen, $1,000 from Mrs. J. Monroe Parker, and $1,000 from Mr. E. Newbold. With an additional endowment of $10,000 the Academy would have an ample income for its maintenance without rendering it necessary that a few of its enthusiastic members devote a large amount of their time annually to the unpleasant and thankless task of circulating a subscription paper. With the endowment safely secured we should not then find it a difficult matter to enlarge our building so as to exhibit to best advantage our unequaled collections of mound builders' relics. In our basement are hundreds of valuable specimens of the pottery and implements, and many boxes and barrels containing the bones of that extinct race.

Through the indefatigable efforts of Mrs. Putnam the Academy can at last boast of a thorough house-cleaning and renovation.

On December 14, the twenty-fifth anniversary of the organization of the institution, the ladies of the Academy gave a very delightful concert, followed by an informal reception, which was enjoyed by a number of our friends and members.

This is not the time to deliver an address on the subject of mound builders, but I cannot be too emphatic in stating that a natural pride in our city and its reputation should impel every citizen to familiarize himself with, and then show his children, the "Davenport inscribed tablets" and the "Davenport elephant pipes." The earliest mention of mounds made on our records was in 1873, when Mr. George H. French stated that there were interesting mounds near Albany, Illinois. Shortly after that the members of the Academy began making their first explorations of mounds, which they continued all over Illinois and Iowa. Captain Hall explored many, and sent the Academy hundreds of the most valuable specimens from Arkansas and Missouri and other Southern States. Copper and stone axes, pipes, beads, arrow and spear-heads; pottery in great variety, and bones in different conditions of preservation — these were the usual relics found, until in 1877–1880 the inscribed tablets and the elephant pipes came to light. Some scientific men hold that when Columbus discovered America he found a country without a history. No Pompeii had existed here, no Athens, no Troy, only wandering tribes of Indians, a people pictured in school histories as roving from place to place, living by hunting and fishing. These Indians built no permanent abodes, none such were discovered, nor were they known to possess the art of writing or a mechanical turn of mind. A camping band of hunters, the men fished, smoked, and followed the chase, the women did the work. Such we have seen them here in Iowa, such have they

ever been reported. On the other hand, the mound builders were a domestic people; they built cities and fortifications in which to defend themselves against a warlike enemy; they made brick, smelted copper, wove cloth, and moulded pottery. They were driven south into Mexico some 1,500 years ago; how long before that they lived here it is hard to tell. Trees have been found growing on top of their mounds which indicated an age of more than 800 years; and the Davenport elephant pipe and the picture of an elephant or mastodon on one of the tablets show accurately that these mound builders knew of such beasts. In 1877 Dr. Farquharson wrote of these tablets: "You need scarcely be told that the recent discovery of engraved tablets of stone in one of the mounds of this vicinity is one of great, even transcendent importance, not only to scientific persons but to the world at large." And again he writes, speaking of one of our tablets: "The last link in the chain of evidence of the coeval life of man and the mastodon on this continent bears the date of 1877, and is to be found on the face of the hunting-scene tablet now before you." In Wisconsin the mound built in the form of an elephant, 135 feet long and 66 feet high, is another link. The elephant pipes are still another link.

The last ten years have seen a wonderful interest developed in the mound builders question. Not only state and federal archæologists have been actively at work, but local scientific institutions and many eminent archæologists on their own account. Hundreds of ancient mounds have been explored in all parts of the United States; a few inscribed tablets, beside the ones we own, have been discovered, but no carving of the elephant other than the two we possess. Prof. J. T. McLean, in his work on the mound builders, says: "In all the mound builders' relics from the valley of the Ohio no trace of the elephant family has been found. The remains of the mastodon have been found in the gravel and other deposits. These animals must have ceased to exist in the United States long before the mound builders began to flourish. Still the mastodon must have existed somewhere. The mound of Wisconsin is no ideal structure. If the report of the Davenport Academy of Sciences is to be accepted, then this effigy is not an isolated case. It states that a member of the association has found a carved pipe in the form of an elephant. This, however, is not incredible, on account of the discovery of the Wisconsin mound. It is evident that in order to have delineated the form of this animal it must have been seen. If, however, the builders of the mound saw the mastodon in the valley of the Ohio or Mississippi, then the mound builders must be assigned an antiquity which other evidences would not warrant."

We possess probably the finest collection of relics of this ancient people in existence, and I believe that these insignificant elephant pipes and unintelligible tablets will some day be appreciated as of more value than any "curiosity" of any kind or nature in this country. Future discoveries will probably disclose the fact that these people lived in these valleys several thousand years ago. Should we not en-

deavor to preserve some of these ancient mounds which should have such deep interest for every American? The ruins of Fort Ancient in Ohio, which is probably the largest yet discovered, being over three miles in length, will fortunately be preserved, the site having been bought by the state.

The work that this Academy has done is marvelous, and I can only urge upon you to continue that work. There is nothing so important to us as a systematic exploration of mounds and graves, and if possible we should carry the work into Missouri and Arkansas. This Academy is known from London to Tokio, from St. Petersburg to Cape Town, and amongst thousands of scientific men all over Europe and America. For example, we correspond or exchange reports of proceedings with historical or scientific societies located as follows: Eleven in Algiers, Cape Town, Cairo and other places in Africa; 16 in South America; 15 in Shanghai, Bombay, Calcutta, Tokio and other cities in Asia; in Australia, 10; Austro-Hungary, 25; Belgium, 20; Denmark, 4; France, 112; Germany, 108; England, 65; Ireland, 8; Scotland, 16; Wales, 1; Greece, 1; Iceland, 2; Italy, 28; Netherlands, 10; Norway, 11; Portugal, 4; Russia, 17; Spain, 6; Sweden, 6; Switzerland, 16; Turkey, 1; Guatemala, 1; San Salvador, 1; Mexico, 5; Havana, 3; Trinidad, 2; Peru, 2; Jamaica, 1; and in the United States and Canada, 130. Davenport, as a city, is known in but a few states. Explain this clearly to our fellow citizens, who have always the greatest pride in our city's name and reputation for wealth and learning; inform and satisfy them that our collections are of world-wide reputation and importance, and not a lot of old rubbish buried with the braves of the retreating Sioux and Fox Indians — do this and the money needed to continue our work will be quickly forthcoming.

ELECTION OF OFFICERS — 1893.

President — Dr. W. L. ALLEN.

Vice-President — EDWARD S. HAMMATT.

Recording Secretary — A. W. ELMER.

Corresponding Secretary — Prof. W. H. BARRIS.

Curator — Prof. W. H. BARRIS.

Treasurer — FRANK NADLER.

Librarian — C. E. HARRISON.

Trustees for Three Years — W. H. BARRIS, GEO. P. MCCLELLAND, A. M. JUDY, and W. C. PUTNAM.

Trustee to fill vacancy (made by electing Dr. Allen to the Presidency) — B. F. TILLINGHAST.

G. K. Hoover read a letter from Prof. Clement L. Webster of Charles City, Iowa, proposing to deliver a lecture for the benefit of the Academy at an early date, the Academy to defray his expenses.

The offer was accepted and the matter referred to the entertainment committee to arrange date and details.

The President announced the appointment of standing committees for the year as follows:

Finance—W. C. Putnam, C. A. Ficke, H. M. Henley.

Publication—Mrs. M. L. D. Putnam, Dr. Jennie McCowen, Prof. S. Calvin, Prof. W. H. Barris, Dr. C. H. Preston, Prof. J. B. Young.

Museum—W. H. Pratt, Archæology; Miss S. G. Foote-Sheldon, Conchology; Prof. W. H. Hatch, Ichthiology; Miss J. Sanders, Entomology; Prof. W. H. Barris, Geology and Palæontology; Frank Nadler, Mineralogy; Dr. A. W. Elmer, Natural History; J. J. Nagel, Botany; James M. De Armond, Historical Collections.

Library—Charles E. Harrison, Louis Block, Rev. A. M. Judy.

January 27, 1893.—REGULAR MEETING.

President Allen in the chair; six members present.

A letter from Mr. W. C. Wyman was read, requesting that a collection of mound builders' relics be sent by the Academy for exhibition at the World's Fair at Chicago; also a request from Mr. Henry Stearns for the Academy publications for the Fair. The Secretary was instructed to learn particulars as to the latter request, but as to the former it was decided, after some discussion, not to risk the loss of valuable relics in transit.

Mr. C. E. Harrison was appointed to correspond with parties at Toolsboro, Iowa, and Corinth, Kentucky, in regard to obtaining permission for the Academy to open certain promising mounds near those places.

February 10, 1893.—TRUSTEES' MEETING.

(Held at the Business Men's Rooms, Masonic Temple).

President Allen in the chair; eight members present.

The meeting was called to introduce Mr. Becket, who wished to present the entertainment, "*Ben Hur*," in this city, under the auspices and for the benefit of the Academy of Sciences. After a full explanation of the proposal and some discussion thereon the matter was referred for decision to a committee composed of President Allen, C. E. Harrison, Mrs. M. L. D. Putnam, and Dr. A. W. Elmer.

February 24, 1893.—REGULAR MEETING.

President Allen in the chair.

The President reported that the Trustees had agreed with the "*Ben Hur*" company for an exhibition, to be given April 12 to 15 inclusive.

April 28, 1893.—REGULAR MEETING.

President Allen in the chair; four members present.

The lecture by Prof. Webster which had been arranged for the March meeting, not having been delivered at that time, was indefinitely postponed.

The Curator reported the receipt of a box of specimens from Dr. S. C. Bowman of Bennett, Iowa, including a Virginia rail, a jack-rabbit, and a small specimen of *mephita mephitica*.

A letter from Prof. F. Starr was read proposing a continuation of his work on "Iowa Antiquities" by adding to the "Bibliography," already published by the Academy, a "Summary" of what has been written on the subject, and enlisting, so far as possible, by circulars of instruction, etc., the co-operation of new explorers throughout the State. He asked of the Academy only the expense of publication and aid in distributing circulars, and it was decided to authorize him to proceed.

A paper on "Historical Criticism and an Ancient Gem Mine," sent by Prof. E. L. Berthoud of Golden, Colorado, was read and referred to the publication committee.

Mr. George T. Baker was elected to regular membership.

The President reported that the "*Ben Hur*" entertainment had netted the Academy about $375.

The following resolutions, presented by Mr. C. E. Harrison, were unanimously adopted:

Resolved, That the thanks of the Academy are hereby extended to our friends who so ably and cheerfully assisted in presenting the pantomime, "*Ben Hur*," on April 12, 13, 14, and 15, for the benefit of the Academy.

Resolved, That a complimentary pass to the Museum for the current year be issued to each of the performers and chaperones.

July 28, 1893.—REGULAR MEETING.

The chairman of the publication committee stated that the first half of the index to the first five volumes of the Academy PROCEEDINGS was now printed, and that Prof. McGee donates to the Academy his

many months of labor in preparing the same, for which the society had expected to be at an expense of several hundred dollars. A unanimous vote of thanks was tendered the professor. The thanks of the Academy were also extended to Mrs. C. C. Parry for the engraved portrait of Dr. Parry, donated for the PROCEEDINGS.

August 25, 1893.—CALLED MEETING.

President Allen in the chair; six members present.

Mrs. Putnam for the publication committee reported the distribution of 750 copies of the last volume of the PROCEEDINGS to American correspondents, the foreign copies being ready for shipment. She also reported as delegate to the A. A. A. S. at its late meeting at Madison, Wisconsin.

A motion by Dr. A. W. Elmer to reconsider the action taken as to sending a collection of relics to the World's Fair was lost.

September 18, 1893.—SPECIAL MEETING OF TRUSTEES.

The meeting was called to consider the advisability of buying the lot adjoining the Academy lot on the north, consisting of 45 feet fronting on Brady street, and offered at $25 per front foot. It was voted to make the purchase if approved by vote of the Academy.

Mr. W. C. Putnam of the finance committee stated that he had effected a settlement with the Kuhnen estate on the understanding that Mr. Kuhnen's bequest of $1,000 be paid and his subscription of $25 a year be remitted. On motion, this agreement was approved.

A biographical sketch of the late Dr. C. C. Parry, prepared by Dr. C. H. Preston, was read by title and referred to the publication committee.

September 22, 1893.—CALLED MEETING.

Held at Harrison's pharmacy; nine members present.

The following resolution was presented and adopted:

Resolved, That the Davenport Academy of Natural Sciences accept the proposition of the executors of the estate of Mrs. Patience Newcomb, deceased, for the purchase of the lot adjoining the present lot of the Academy on the north, and consisting of forty-five (45) feet, more or less, facing on Brady street, for the consideration of twenty-five ($25) dollars per front foot, and that the trustees or officers of the Academy be authorized to pledge or mortgage the property or securities of the Academy, so far as may be necessary for that purpose, and to execute all necessary papers.

December 7, 1893.— CALLED MEETING.

President Allen in the chair; nine members present.

The meeting was called in memory of Prof. W. H. Pratt, and of Prof. John Tyndall, the former one of the founders and the latter an honorary member of the Academy.

A large framed portrait of Prof. Pratt was set up on the President's table, vividly recalling the features so familiar and endeared to the members and friends of the organization for which he labored so assiduously and so long. A number of short addresses were made by those present, all breathing the same spirit of warm appreciation of Prof. Pratt's self-denying labors in behalf of the Academy.

Mrs. Putnam read extracts from a number of letters received from him since his removal from the city, showing his love for and continued interest in the institution, and his desire for its welfare. The following resolutions were unanimously adopted:

WHEREAS, W. H. Pratt, one of the founders and a lifelong member of this Academy, has been called to rest from his earthly labors;

Resolved, That in his death we recognize the loss of a worker than whom the Academy has known none more disinterested and devoted; of a friend than whom it has had none more steadfast and true; of a man, the influence of whose life, spent in the love of and search for truth, will never cease from bearing good fruit.

Resolved, That we hereby testify our appreciation of his worth and our sorrow for the loss of one who honored this Association by long service in its most honorable offices.

Resolved, That we tender our heartfelt sympathy to the bereaved family, to whom, and to the papers of Davenport and Minneapolis, the Secretary is instructed to transmit copies of these resolutions.

W. H. BARRIS,
C. E. HARRISON.
C. H. PRESTON,
Committee.

Mrs. Putnam was requested to prepare a biographical sketch of Prof. Pratt for publication in the PROCEEDINGS.

The committee appointed to prepare resolutions on the death of Prof. Tyndall reported the following, which were on motion adopted:

WHEREAS, It is fitting that an institution devoted to the advancement of science should honor the memory of those who have been eminent in promoting scientific research: and—

WHEREAS, In the death of Prof. John Tyndall the scientific world has lost a worker distinguished among original investigators, and a lecturer on scientific subjects of high reputation and of great usefulness, therefore—

Resolved, That the Davenport Academy of Natural Sciences unites with

other scientific associations in offering a sincere tribute of respect to his memory.

Resolved, That these resolutions be spread upon the records of the Academy, and that copies of the same be sent to the city press.

JENNIE MCCOWEN,
C. E. HARRISON,
Committee.

December 29, 1893.— REGULAR MEETING.

President Allen in the chair: six members present.

The addition to the museum of a number of stone axes and flint arrow-heads, collected by Capt. W. P. Hall, was reported, the Captain himself being present.

A nominating committee for the approaching election of officers was appointed.

The resignation of Mr. B. F. Tillinghast, as trustee, was presented and accepted.

January 3, 1894.— ANNUAL MEETING.

President Allen in the chair; ten members present.

RECORDING SECRETARY'S REPORT.

The Recording Secretary begs leave to report as follows:

In addition to the annual meeting January 4, and a memorial meeting December 7, there have been held during the year seven regular and two trustees' meetings with an average attendance of seven.

An entertainment, the "*Ben Hur*" pantomime, was given April 12 to 15.

The regular membership, increased by the election of one, is now sixty-eight.

We have lost by death one life member, W. H. Pratt, and two honorary members, J. H. Murphy and E. H. Pendleton.

The number of visitors to the museum was 540. Respectfully submitted.

A. W. ELMER, *Recording Secretary.*

LIBRARIAN'S REPORT.

MR. PRESIDENT:

The Librarian has the honor to report for the Academy year just closed, additions to the library by exchange and contributions, volumes and parts of volumes to the number of 1,305, about one-third of this number being from foreign societies.

In my report as Librarian, one year ago, I urged the necessity of properly binding many hundreds of valuable books and pamphlets now

on our shelves. I regret to say that, as yet, nothing has been done in that direction. I trust the Academy may find it possible to make an appropriation for this work in the near future. Until such time as the Academy can procure some one to give his entire time to library work, I fear but little progress will be made on the index already begun; owing to press of other work I have been unable to accomplish anything in that direction during the year.

January 3, 1894. C. E. HARRISON, *Librarian.*

REPORT OF THE PUBLICATION COMMITTEE.

In the first presidential address, read before the Academy in 1869, Dr. C. C. Parry recommended the publication of the proceedings. In every succeeding president's address, especially since the issue of Volume I., in 1876, the sentiment has prevailed that the most important work of the Academy, after original investigations and the writing of papers, was publishing them for the benefit of other scientific societies.

Volume I. was an unexpected success, and since then the interest in the publication has never flagged, although circumstances at times have almost suspended active work. From that time – the Centennial year—to this—the Columbian year—five volumes have been published, recording a most interesting story of struggles and triumphs over difficulties, of an enterprise wholly dependent upon the unselfish devotion of a few; supported by subscriptions to volumes, by entertainments and donations. The Publication Committee has seldom had a printer's bill presented without funds provided for paying it.

The most important event in the history of the publication this year is the completion and distribution of Volume V. This labor of distribution, no light task, was performed by Dr. W. H. Barris, occupying a month of arduous work.

Volume V. contains 370 pages, forty-seven wood cuts and illustrations and a portrait of the late Professor D. S. Sheldon; also an index of the entire publication — Volumes I.–V., prepared by J. W. McGee, chief of the United States Ethnological Department, Washington, D. C.

This work of Prof. McGee was a gratuitous donation to the Academy. The clerical work alone, which he has done, is worth $350.00, which is his donation to the enterprise. The index covers eighty-nine pages and is complete in all its details, gotten up on methods original with Prof. McGee, and much commended by all who have examined it.

Volume V. has been distributed to all scientific societies, both home and foreign, the latter through the courtesy of the Smithsonian Institution, which kindly attends to sending the ACADEMY PROCEEDINGS, if properly addressed, to various foreign societies.

We have already received many acknowledgements from all over the

world, showing the promptness with which the Smithsonian has distributed the books.

The binding of two hundred copies of Volume V. in cloth has been delayed to secure an appropriate design for the die on the cover.

As Volume V. closes the first series of the ACADEMY PROCEEDINGS and contains a number of Dr. Parry's original papers, among them his last one, it seems proper that a flower discovered by and named for him should be represented on the outside cover. So far we have not been able to determine the proper flower.

Another work of your committee is the publication of fifty-two pages of Volume VI., comprising a "Bibliography of Iowa Antiquities," by Prof. Frederick Starr, Ph.D.; "Buddhism in America," by Edward L. Berthoud, and "Ancient Grooved Rocks in Arkansas," by W. A. Chapman (illustrated).

Beside these a very interesting and carefully prepared "Biographical Sketch of the Late Charles C. Parry" has been written by Dr. C. H. Preston, supplemented by a list of the papers published by Dr. Parry, prepared by his wife.

Mrs. Parry has presented two thousand copies of a fine steel plate portrait of Dr. Parry to accompany Volume VI.

Prof. Starr has stated his willingness to prepare a summary of all the matter that has been written on Iowa archeology, if he can have the assurance that the Academy will publish it. Your committee would recommend the assumption of this important work.

It is with grateful remembrance that the chairman of your committee would speak of the zeal and untiring labor of Prof. W. H. Pratt, whose death occurred in Minneapolis on Dec. 4, 1893. He was a member of the first publication committee, and from the inception of the movement threw his enthusiasm into it with an appreciation of its importance contagious to his co-laborers. Ready alike with pencil and pen, the first volumes of the PROCEEDINGS teem with his illustrations and descriptions of mounds and other papers.

The first publication committee consisted of W. H. Pratt, J. D. Putnam, C. H. Preston, R. J. Farquharson and George H. French, of whom Dr. Preston alone remains and is still on the Publication Committee doing most efficient work.

At a memorial meeting of the Academy held in honor of our late lamented friend W. H. Pratt, a committee was appointed to prepare a biographical sketch to appear in Volume VI. of the PROCEEDINGS.

Perhaps an interesting item in connection with the publication is the fact that aside from the returns in valuable donations of curiosities and a library of at least 28,000 volumes, five hundred to one thousand dollars has been realized from the sale of the PROCEEDINGS, which receipts have always been used to continue the publication. For this reason the publication fund has been kept separate from the general fund and has always been in bank on the account of the chairman of your committee.

The total expenditure for 1893 has been $354.66, distributed as follows:

Preface and Table of Contents, Vol. V	$ 15.00	
Clerical work on Index, Mr. Van Doren	48.00	
Judd and Detweiler, on account	170.00	
Printing Covers	10.00	
Total expense of Vol. V. for '93		$243.00
Volume VI., printing four forms	60.00	
Illustrations	13.66	
Printing Parry biography	38.00	$111.66
Total expenditure in 1893		354.66

LIABILITIES.

Due Judd & Detwiler	$166.00	
Due Egbert, Fidlar & Chambers	118.00	$284.00

Total expenditure on Volume V. to date, $1,021; balance due, $284.00; total cost of Volume V., $,1305.00.

Respectfully submitted,

M. L. D. PUTNAM, *Chairman Publication Committee.*

January 3, 1894.

TREASURER'S REPORT.

The treasurer's report showed receipts during the year of $1,993.71, expenditures of $1,956.72, leaving a cash balance of $36.99. The expenditures included the payment of the floating debt of the Academy, amounting to $411. Of the receipts nearly $400 was derived from the proceeds of the four Ben-Hur performances last April.

In this connection the finance committee reported the purchase of the fifty-foot lot adjoining the Academy property on the north, at a cost of $1,560. The amount necessary for the purchase was received as follows: From Kuhnen estate, $1,025; Newbold estate, $80; individual subscriptions, $165; loan, $260.

The above amount ($1,560.00) includes, together with the present purchase of forty-six feet, settlement in full for four feet previously purchased at fifty dollars per foot, with accrued interest on the same.

ELECTION OF OFFICERS — 1894.

President — Dr. W. L. ALLEN.

Vice-President — EDWARD S. HAMMATT.

Recording Secretary — A. W. ELMER.

Corresponding Secretary — Prof. W. H. BARRIS.

Treasurer — FRANK NADLER.

Curator — Prof. W. H. BARRIS.

Librarian — C. E. HARRISON.

Trustees for Three Years — Mrs. M. L. D. PUTNAM, Dr. JENNIE MCCOWEN, C. E. HARRISON, and E. S. HAMMATT.

Standing Committees were announced as follows:

Finance—W. C. Putnam, Frank Nadler, H. M. Henley.

Publication—Mrs. M. L. D. Putnam, Dr. Jennie McCowen, Prof. S. Calvin, Prof. W. H. Barris, Dr. C. H. Preston.

Library—Charles E. Harrison, Dr. Jennie McCowen, E. S. Hammatt.

A vote of thanks was extended to Mrs. C. C. Parry for the gift of Dr. Parry's portrait for the PROCEEDINGS.

PRESIDENT'S ANNUAL ADDRESS.

DR. W. L. ALLEN, January 3, 1894.

LADIES AND GENTLEMEN:

The year just passed has been apparently an uneventful one to the Academy. We have made no archæological explorations, have added little of importance to our museums, have had few original essays for our publications, have strengthened our membership by but one new member; nevertheless we have done well financially, and the year 1893, on account of the Columbian Exposition with its beauties and wonders of art and of mechanical skill and ingenuity, and its historical and archæological treasures has so awakened and stimulated the intellect of the people all over the United States, that neither the cares of business nor the struggle for wealth can efface the deep impression made by that wonderful spectacle. This impression will beget an appetite for knowledge, and this desire for intellectual food will bring the people to the store-houses of knowledge, the libraries and academies of science and art. I feel, therefore, that we have the greatest cause for congratulation over the year just passed, for it is bound to bring many new members to us, not that we need their money, for time will bring many endowments, but we do want their intellectual strength and interest. We have just sustained in the death of Professor W. H. Pratt a loss which will be felt by this Academy for many years. Being one of the original four who, twenty-six years ago, founded this Association, he continued to work for it with such constancy and zeal that our publications will ever reflect his good work and stand as a monument to it.

Our Secretary's report shows a decrease in the number of meetings held, but the average attendance about as usual, with the addition of one new member during the year.

The Curator's report gives the usual additions to the museum beside some two hundred stone and flint implements obtained from various parties by that "Ancient Mariner," Captain Hall.

Our Librarian reports that over 1,300 books and pamphlets have been added to our library, which brings the number up to 28,800.

Among these are books of the greatest value and the recent publications of scientific societies all over the world.

Our Treasurer's report is very encouraging:

Receipts	$1,993.71
Expenditures	1,956.72
Cash balance	$ 36.99

This includes the payment of the floating debt, which amounted to $411. Nearly four hundred dollars of the receipts were derived from the proceeds of the four performances of "Ben Hur," conducted by our friends last April and so liberally patronized by the people of this city.

Our Finance Committee reports the purchase of the fifty-foot lot adjoining our property on the north, at a total cost (including the amount due for the four feet purchased several years ago, and on which no payment was made) of $1,560. To meet this we received from

Kuhnen Estate	$1,025
Donations by Messrs. Smith, Putnam, and Phelps	195
Newbold Estate	80
Loan	260
	$1,560

There is in the endowment fund the sum of $1,200 invested in two seven per cent. farm mortgages, one of $200 and one of $1,000. There are also the two bequests of $1,000 each, of the late Mr. and Mrs. J. M. Parker, and an interest as residuary legatee of the Newbold estate, which will bring us about $500.

Our Publication Committee reports the first part of Volume VI. finished. Volume V. was completed and delivered early in the year at a cost of $1,300. The committee needs the sum of $300 to pay for additional copies and binding. All the funds necessary for these publications have been secured, as in the past, by the individual and indefatigable efforts of Mrs. Putnam.

While the actual needs of the Academy are small, yet I hope to see: First — Five thousand dollars expended on our library for binding and publishing a catalogue—this would give us the finest scientific library in the West, and would add many professional men in this vicinity to our membership: Second — The sum of $20,000 as an endowment to our publications, so that our PROCEEDINGS could be gotten out as soon as desired without requiring personal subscriptions in advance: Third — Twenty thousand dollars to extend our building in order to have room to exhibit our collections, more than half of which are at present either boxed up or so cramped for space as to be overlooked: Fourth — A large endowment for archæological explorations. This Academy was the pioneer in this work in this section of the country, and had we a large fund, the interest of which could be used in sending out members to make explorations, we would draw hundreds of young men to our membership.

Our archæological collection now consists of 350 copper-beads, 14 copper awls, 33 copper axes, 62 mound-builders' pipes, 4 inscribed tablets, 250 vessels of ancient pottery, also of Indian relics, 1,100 stone implements and 15,000 flint—principally arrow and spear-heads. In evidence of the value of this part of our collection, not as specimens in a museum, but as proofs in the study of the history of mankind, as guide-posts in the search for truth regarding the earliest inhabitants of this country, I need only call your attention to the original essays of Dr. Farquharson, Prof. Seyffarth and Mr. Putnam, found in our own proceedings.

Dr. Farquharson wrote in 1875 concerning our copper axes, and the article attracted wide attention. At that time there were but eleven copper axes besides the twenty-five we had in our collection, known or reported in this country. Did the mound-builders possessing copper axes belong to the copper period corresponding to the same period in Europe? As these axes were covered with cloth, did they not make cloth? If not, where did they get their copper axes, and who made them?

Concerning the inscribed tablets found in 1877 on the Cook farm below Davenport, Prof. Seyffarth writes: "They are the first discovered phonetic and astronomic monuments of the primitive inhabitants of this country which sooner or later will cast unexpected light upon the origin, the history, the religion, the language, the science and intellectual faculties of our ancient Indians." Further on he says: "The Northmen, it is true, discovered America prior to Columbus, but the Indian characters on the Davenport monuments point us clearly to the Chinese syllabic figures and not to the alphabetic runes." Again, speaking of the third tablet, he says: "This is, no doubt, the most interesting and most important tablet ever discovered in North America."

These essays, with that of Mr. Putnam, bring out strongly the different views of archæologists as to the origin of the mound-builders and their great antiquity. Prof. Seyffarth claims that one of these tablets is a memorial of the Noachian deluge, while other eminent scientists translate it as a hunting scene, and believe its great value is due to the representation of an elephant thereon. When we consider that there are at present but few inscribed tablets in this country, and that we have the largest and most complete collection of curved-base pipes and copper implements, it ought to stimulate the society to devote most of its time and work to this particular branch of archæological research.

February 19, 1894.—Trustees' Meeting.

(Held at the Rooms of the Business Men's Association, Masonic Temple.)

President Allen in the chair; six members present.

The meeting was called to consider a proposition from Mr. D.

Cheeney to give a musical entertainment at an early date for the benefit of the Academy. Mr. Cheeny, being present, described in brief the sacred Cantata, "*Egypta*," which he desired to present, showing photographs of costumes, etc.

After some discussion the matter was referred to a committee consisting of W. C. Putnam, Edward S. Hammatt, and C. E. Harrison, with power to act.

Fcbruary 23, 1894.—REGULAR MEETING.

President Allen in the chair; six members present.

The Curator reported the donation of a number of stone and flint implements collected by Capt. W. P. Hall.

Mr. Edward Borcherdt and Dr A. Behr were elected to regular membership.

The resignation of Mr. S. F. Smith as Trustee was presented and accepted, and Mr. C. A. Ficke was elected to fill the vacancy thus caused.

The Entertainment Committee reported the acceptance of the operetta "Egypta," its presentation to be deferred until May.

It was announced that the executor of the estate of Edward Newbold, a resident of Scott county who died a year or more ago making the Academy of Sciences his residuary legatee, has paid over the sum of $400, and that a further sum may be realized before the estate is closed.

A paper by Mr. John M. Helmick on a "Serpent Mound," discovered by the author in South Dakota, was read and referred to the Publication Committee (See p. 150).

Mr. Benjamin R. Putnam read a very interesting paper on the iron and copper ores of Mount Hope, New York, and of the Lake Superior region; illustrating the subject by specimens which he presented to the Academy, accompanied by the following descriptive notes:

NOTES ON SPECIMENS OF ORES PRESENTED BY B. R. PUTNAM TO THE DAVENPORT ACADEMY OF NATURAL SCIENCES.

DESCRIBED ACCORDING TO LOCALITIES.

MOUNT HOPE, N. J.

Magnetite—$Fe_3 O_4$—from the mines of the Mount Hope Mining Company.

Iron deposits of Northern New Jersey are nearly all lenticular beds of magnetite occurring in archean gneiss and rarely in crystalline lime-

stone, and having a north-easterly strike, a small dip one way or the other, and pitching along the strike. At Mount Hope there are five nearly parallel beds in hard gneiss, but only two are of much importance. The ore averages between 50 and 55 per cent iron, is hard and uniform, but is mostly non-Bessemer owing to the presence of apatite. The specimen is a fair average of the ore hoisted.

FRANKLIN FURNACE, N. J.

Franklinite — $(Fe\ Zn\ Mn)\ O$, $(Fe\ Mn)_2\ O_3$ — variable.
Willemite — $2Zn\ O$, $Si\ O_2$.
Zincite — $Zn\ O$.

Three specimens, showing different combinations of the above minerals. At Mine Hill, where the specimens were collected, the ore bodies consist of two converging, nearly vertical beds or veins, in white crystalline limestone overlying the archean gneiss. The ore consists of varying proportions of the above minerals in a calcite gangue, the specimen being richer than the average. It is first treated for zinc, and the residue smelted for spiegeleisen. The region is very rich in minerals and is remarkable as being the only place in the world where the above minerals are of anything like economic importance.

HAZELTON, PENN.

Two coal plants and specimen of pyrites from the anthracite colliery of Coxe Bros. & Co., at Oneida.

ISHPEMING, MICH.

Hematite — $Fe_2\ O_3$.

Three specimens. Iron is found around Lake Superior in five ranges or districts — Marquette, Menominee, Penokee-Gogebic, Vermilion Lake, and Mesaba — all of which have many characteristics in common. Ishpeming is in the Marquette district. This is a very disturbed region, and the geology and origin of the ore bodies have been a subject of controversy. The ore is almost entirely hematite, but is either soft and red or hard and specular, and occurs in various shapes but commonly has a trough or basin shape. The geological section is usually diorite, soapstone or jasper, ore, chert, quartzite.

First specimen, "hard ore," or specular hematite, from the Lake Superior Hard Ore mine.

Second. Same from the Lake Superior Hematite mine.

Third. Soft, red hematite from the Lake Superior Hematite mine.

The first and third are average ores.

KEWEENAW POINT, MICHIGAN.

Specimen of Copper Ore.

The copper in this region is entirely native — remarkably few copper minerals being found. The copper-bearing horizon consists of layers of igneous rocks and conglomerate beds dipping to the North-

west under the lake at angles varying from 30° to 60°. Only certain of these beds are copper-bearing. According to the character of the deposits they may be classified as follows:

1. Conglomerate beds. The copper occurs as cement and partially replaces pebbles. Examples. Calumet and Hecla, Tamarack.

2. Amygdaloid mines. Copper filling small blow-holes in upper portion of igneous sheet. Example. Atlantic, Osceola.

3. Irregular masses, often of large size, of copper in true veins at right angles to bedding of strata, with a gangue of calcite, epidote, etc. Example. Copper Falls.

The first two are of the most importance. Some of the amygdaloid mines furnish a great deal of "mass" copper besides the ordinary "stamp rock." All the ore, except the masses, is broken by Blake crushers, then crushed by enormous steam stamps, and the copper concentrated on jigs, tables, etc., to about 80 per cent. The concentrated mineral and pieces of mass copper are then melted down and refined in reverberatory furnaces, and cast into ingots of unrivaled purity.

The specimens are as follows:

Amygdaloid Ore, from the Atlantic and Osceola mines. Native copper in melaphyr gangue. Average of Atlantic ore is .66 per cent. copper, and of Osceola 1½ per cent.

Trap, hanging wall of Atlantic mine.

Sheet Copper, Osceola mine.

Shot Copper, Osceola mine.

Native Copper, Osceola mine.

Conglomerate, two specimens, coarse and fine, from the Tamarack mine. This mine is working the same vein as the Calumet and Hecla.

February 23, 1894. BENJAMIN R. PUTNAM.

June 29, 1894 — REGULAR MEETING.

President Allen in the chair; six members present.

The Curator reported the receipt of a number of mounted ornithological specimens from Dr. S. Bowman of Bennett, Iowa; also from Mr. G. H. Hinrichs of this city, a post or log of wood bored by toredos and thickly covered with barnacles. This specimen was obtained by Mr. Hinrichs during a recent visit to Florida.

The following resolutions of respect were presented and adopted:

Resolved, That in the death of Rev. S. S. Hunting, which occurred at Des Moines, June 2, 1894, this Academy has sustained the loss of an honored life member and former president, and of a co-worker whose energy and enthusiasm were ever helpful and inspiring throughout the time of his resident membership. In him the world has lost a true man — honest, fearless, strong; one who did his duty and sought the light, untrammeled by prejudice or tradition. We honor him for the invaluable example of a life

thus spent, and for his unselfish devotion to humanity, not alone in the work of his chosen calling but also in the cause of abolition, of education, of temperance, and of prison reform.

Resolved, That we extend to the family our deep sympathy in their loss, and that copies of these resolutions be transmitted to them and to the press of Davenport and Des Moines.

C. H. PRESTON,
C. E. HARRISON,
ARTHUR M. JUDY,
Committee.

Prof. J. H. Udden of Augustana College, Rock Island, was elected to regular membership.

September 28, 1894 — REGULAR MEETING.

W. H. Barris, President *pro tem.*

Capt. W. P. Hall presented to the Academy one copper axe and ten stone axes, with one hundred and twenty-one flint implements and a discoidal stone, all collected by himself for the museum. There had been no other additions since the June meeting. The number of paying visitors in the past three months was one hundred and twenty.

October 26, 1894 — REGULAR MEETING.

Vice-President Hammatt in the chair; four members present.

The Curator reported the reception from Dr. S. C. Bowman of several valuable donations — birds, fish, Indian relics, etc.

A vote of thanks was extended to the many friends of the Academy who contributed to the success of the operetta, "Egypta," recently rendered under its auspices.

January 2, 1895 — ANNUAL MEETING.

President Allen in the chair; ten members present.

TREASURER'S REPORT.

Treasurer Nadler in his report stated that the Academy was free from debt, with $127.93 in the treasury, exclusive of $36.00 in the hands of the publication committee.

CORRESPONDING SECRETARY'S REPORT.

Your Corresponding Secretary respectfully reports: The number of letters received during the year 1894 is 83, and the number written 168.

These letters embrace a variety of topics, many having no other

than a mere passing, individual interest. Among these are questions as to the determination of mounds, the identification of fossils, the sale of mound relics, the locality and means of obtaining them, proffers of work in such directions as the Academy may need, the books needed in our work, etc.

Many are of an entirely different character, having reference to the Publications of the Academy. For these, applications come to us from colleges, from universities, from societies of natural history and from organizations having scarce one object in common with us.

Many letters come from abroad, and from some of the most prominent foreign institutions of learning, recounting the number of volumes they have received for their publications, directing attention to the fact that certain numbers are missing, trusting the Academy will kindly supply the volumes needed to complete the series, and stating that if we find any of their reports missing they will be most happy to reciprocate the favor.

Thus emphasis comes from all quarters showing the interest taken in our publications and the estimation in which they are held by those best qualified to judge of them.

I need scarcely say, in reference to all letters written or received by the Corresponding Secretary, that they are recorded, with date of reception (or writing), in a book of registry kept for the purpose. The present Secretary has thought best, with each entry and date, to give in few words the subject matter of the letter, so that instead of being necessitated to overhaul a whole year's package, we may at once find, under proper date in the register, the subject matter of each letter written or received, thus reducing labor and facilitating inquiry.

January 2, 1895. W. H. BARRIS, *Corresponding Secretary.*

LIBRARIAN'S REPORT.

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your Librarian begs to report additions to the library for the year just closed, as follows: January, 100; February, 126; March, 116; April, 126; May, 138; June, 112; July, 118; August, 105; September, 105; October, 97; November, 111; December, 120; total, 1,374.

I desire to renew my plea of a year ago for more shelf-room and better means of properly caring for our rapidly increasing and valuable library. There has been no expenditure during the year for either shelving or binding, both of which are urgently needed and must be had before the Library can be made available for use or study.

Respectfully submitted. C. E. HARRISON, *Librarian.*

January 2, 1895.

CURATOR'S REPORT.

The Curator respectfully reports that one of the By-laws of the

Academy distinctly defines his duty to keep a record of all donations made to the Museum and report all additions at the annual meeting.

It will be seen that the additions made to the cabinet during the past year compare very favorably with those of preceding years.

With the advent of the year we naturally expect to find among the earliest contributors the name of Captain W. P. Hall. It would be a tedious duty to give in detail the different collections he has brought to the Academy the past year. To summarize them we may note that the number of flint implements of every conceivable form, color, and variety of finish is over 250; there are over thirty stone axes, large and small, one copper axe and several discoidal and hammer-stones.

Captain Hall has not only worked himself but influenced others to aid him in his work, to whom, as well as to himself, acknowledgments have been made. In one such collection, presented by John C. Vogel, was the horn of an extinct ox—not a common find, especially this far north.

Mr. B. R. Putnam presented for the Museum a very choice collection of minerals, which he described in a paper read before the Academy. It comprises *magnetite*, *Franklinite*, *mellenite*, *zincite*, *pyrites*, *hematite* in the massive state (specular), and the soft, red species (amygdaloid), with copper in the native state, also as shot and in sheet. This is a model collection, with carefully noted locality and description, making it a most desirable addition to the cabinet.

There was left in the Academy a pair of leather gloves one of which had been through the fire, the heat reducing it in size so regularly and gradually as to preserve its true proportions though with less than half the size of its companion. While not a purely scientific relic, yet, as a freak of nature that could scarcely ever be repeated, it is worthy a place on our shelves.

Through the kind offices of Mr. G. H. Hinrichs the Academy received from Florida a long post of wood somewhat resembling cedar, which had stood, nearly submerged in mud and water, not only perforated through and through by the action of a borer but in addition having its entire surface literally covered with barnacles.

In May the Academy received from Dr. S. C. Bowman of Bennett, Iowa, to whom we are indebted for so many favors, two mounted birds—one a fine, large, well-preserved great blue heron, and one equally well preserved, rarer form, the night heron.

Another consignment came from the Doctor in October bearing witness to his breadth of study as a naturalist. In the department of archæology we have the spine of a conch from the shell heaps of Florida, with peculiar forms of sinkers and plummets from the same beds. In ornithology are the Massina partridge of Texas and five humming-birds in a glass case. In ichthiology is a single specimen of the trunk-fish of Southern Florida. In mineralogy fine specimens of selenite and common salt. In comparative anatomy a skeleton of the red-tailed hawk; head of an old coyote from Inland, Cedar county; head of a young coyote which died in captivity, as the doctor states,

during eruption of permanent teeth. Of Indian relics there are arrows, perforators, and axes from New Mexico, Yucatan, and Andalusia, Illinois; a complete outfit of an Indian brave — bow, arrows, and gun — accompanied by a history of the owner, with his apparatus for kindling fire, also bow-string and iron-tipped arrows from the plains of Texas.

H. S. Wagner of this city has added to our oölogical collection the egg of his African parrot (*Psitacus erythacus*, Lin.), only two of which, he states, were ever laid on this continent, hence he thought it might prove a desirable acquisition to the Academy.

During the past week a visitor asked whether we would be pleased to have the head and attached horns of the buffalo, proposing to spare us two specimens. The next day they were found at the door, evidently one old head and one younger, in a good state of preservation.

As I said in commencing this report, the additions made to the museum compare very favorably with those of preceding years: there is scarcely a department of Natural History not to some extent represented. This holds good in geology, mineralogy, archæology, ornithology, oölogy. Even in the matter of Indian relics and remains, we could not part with any trusting to find its duplicate.

January 2, 1895. W. H. Barris, *Curator.*

REPORT OF THE PUBLICATION COMMITTEE.

Your committee would report that the publication of Volume V. and Part I. of Volume VI. has brought many most interesting and valuable publications in exchange from scientific societies, and proved to the world at large that the Academy is a live institution.

The indebtedness of the publication at the end of last year was $284.00. This has been paid by funds raised at the entertainments given and by subscriptions to Volume VI., and there is a balance in bank of $36.00.

Professor Frederick Starr of the Chicago University has prepared a "Summary of Iowa Archæology" which will be included in Volume VI., to be published in the near future.

The recommendation of your President last year, for an endowment of $20,000 for a publication fund has not, so far, elicited a response. In these days when thousands change hands as Christmas gifts, will not some friend of the Academy remember that thus placing the publication of the Davenport Academy of Natural Sciences on a sure footing is to perpetuate the good name and fame of the City of Davenport and build up a scientific library that is already superior to many others in the United States?

M. L. D. Putnam,

January 2, 1895. *Chairman Publication Committee.*

ELECTION OF OFFICERS.

President—Edward S. Hammatt.

Vice-President — C. H. Preston.

Recording Secretary — A. W. ELMER.
Corresponding Secretary — W. H. BARRIS.
Treasurer — FRANK NADLER.
Curator — W. H. BARRIS.
Librarian — C. E. HARRISON.
Trustees for Three Years — W. L. ALLEN, C. A. FICKE, C. H. PRESTON, J. B. PHELPS.
Trustee to fill vacancy (caused by the election of E. S. Hammatt to the Presidency) — J. H. HARRISON.

Dr. Clarence B. Moore of Philadelphia was elected an honorary member.

PRESIDENT'S ANNUAL ADDRESS.

[President Allen, after reviewing the work of the Academy during the past year and strongly urging the need for more workers and for means to increase the availability and consequent usefulness of the Library and the Museum, took up a detailed consideration of Prof. Thomas' article in the last report of the Bureau of Ethnology on the Davenport tablets and elephant pipes. As this matter was ably and fully discussed by Mr. C. E. Putnam in Volume IV. of the PROCEEDINGS, it is not thought necessary to publish the address in full.— PUB. COM.]

January 4, 1895.—TRUSTEES' MEETING.

President Hammatt in the chair; trustees present, Edward S. Hammatt, C. A. Ficke, W. H. Barris, W. C. Putnam, Mrs. M. L. D. Putnam, Frank Nadler, C. E. Harrison, and J. H. Harrison.

Due notice having been given, it was on motion unanimously resolved to amend Section 2 of Article III. of the Constitution and of the Articles of Incorporation (which section defines a quorum of trustees) by striking out the words "a majority" in the fifth line and inserting in lieu thereof the word "five."

It was also voted that the sum of $50 be placed at the disposal of the Library Committee.

February 22, 1895.— REGULAR MEETING.

President Hammatt in the chair.

The action of the trustees changing the number necessary to constitute a quorum of trustees from eight to five was reported, and on motion approved unanimously.

Messrs. Edward S. Hammatt and C. E. Harrison, appointed at a former meeting to suggest a design for a corporate seal, submitted

sketches and estimates of cost. The design representing a female filling the lamp of science, surrounded by the legend "Davenport Academy of Natural Sciences. Incorporated MDCCCLXVIII." the whole in a circle 4.5 cm. in diameter, was adopted.

Dr. Adella R. Nichol was elected to regular membership.

April 26, 1895.—REGULAR MEETING.

President Hammatt in the chair; four members present.

The Curator reported the receipt of aboriginal relics from Florida, donated by Clarence B. Moore; also of some beautiful specimens of corals and shells, in glass cases, donated by Mrs. W. C. Wadsworth.

Fred P. Bemis and Dr. Joseph A. Daniel were elected to regular membership.

May 31, 1895.—REGULAR MEETING.

President Hammatt in the chair; eight members present.

Mrs. Putnam reported the receipt of a bequest to the Academy of $10,000, which would become available in about a year.

The Curator reported the receipt from Dr. S. C. Bowman of several boxes containing many interesting additions to the Museum. A vote of thanks was extended to the doctor for his valuable donations.

Charles E. Sheriff was elected to regular membership.

Professor Frederick Starr, being present, spoke at some length on the subject of "Archæological Research." The same evening Prof. Starr delivered a lecture at the First Presbyterian Church on the subject, "Whence Came the North American Indian?" Those who attended were greatly interested in the professor's presentation of the subject. He first gave a description of the Indians of the far Northwest from Vancouver's Island to Sitka, and to the north of that place. He stated that while the tribes, of which there are a great many, resemble each other in what they eat and wear, in their general manner of living, and in their physical characteristics, they have seven totally different languages—as dissimilar as are the French and German, or the German and Finnish of Europe, which whole continent has but four different language stocks. Their stories, too, are entirely different. In the north they all center about the raven as the great power which has figured most conspicuously in their ancient or mythical history; further south the mink is the special object about which their songs are sung, while in the southern tribes nothing is heard of the

raven or the mink; but the sun and the moon, as sister and brother or as husband and wife, are the great themes of the story-tellers. In the northernmost portions the tribes are nature worshipers. They worship the trees and the mountains. The more central tribes worship the sky, while those near Vancouver worship the sun. Major Powell states that there are fifty-eight language stocks among the Indians of North America without counting those of Mexico or Central America. The Pueblos have a language not in the least similar to that of the Sioux, and wherever some dialect of the Sioux is spoken there will be found the "sun dance." The savages fast for four days, and then putting skewers through the muscles of their chests attach thongs to them. The other ends are fastened to a post, and the Indian, facing the sun in the morning, leans back with his whole weight; and keeping his face toward the sun as the day passes, endures till the skewers tear out of the flesh. The question, "Whence came these tribes, so different and yet so alike?" has been answered by various people in various ways. One theory is that they originated in this country — that they "evoluted." There are no fossil remains to support the theory. Another is that they all came from one place — from Egypt, or from Japan, or from Russia, or from the North of Europe — and afterwards became diversified in speech and worship. A favorite supposition is that they are the "lost tribes" of Israel. A third theory is that they are from different places and have slowly acquired similarity in feature and habit. The professor ventured the proposition that as time goes on the people of this country will again acquire common characteristics of features and complexion.

June 28, 1895. — REGULAR MEETING.

President Hammatt in the chair; nine members present.

On behalf of the publication committee Mrs. Putnam presented a proof of the following circular prepared under the direction of Prof. Starr for the enlistment of workers in archæological research:

CIRCULAR OF SUGGESTION REGARDING WORK IN ARCHÆOLOGY.

The Davenport Academy of Natural Sciences desires to organize a systematic and thorough field-work in Archæology through the State of Iowa. As a result of such work the Academy hopes ultimately to publish a final report upon the archæology of the State. This report should accurately locate and properly describe all the mounds, earthworks, village sites, shell-heaps, and other monuments of the aboriginal inhabitants of Iowa; it should

contain a satisfactory archæological map ; it should describe and figure all types of relics found within the State. It is evident that such a work, if complete and accurate, would be of great value ; it is equally evident that it lies beyond the power of any single worker. The Academy asks the co-operation of Iowa workers everywhere in collecting the material necessary. A minimum space of five years should be devoted to this part of the work. All who are interested are asked to assist. In the report due credit will be given to all faithful helpers. The following suggestions may show what information is needed and how work should be done :

1. Where are there mounds, earthworks, shell-heaps, village sites, rock-shelters, aboriginal workshops, quarries, cliff carvings or paintings ? *Exact* location of such is very desirable. Local maps with position of such sites accurately marked upon them are requested.

2. Groups of mounds should be carefully surveyed and plotted. The plottings should show the location, relative positions, form and size of all the mounds in the group, and their relation to surrounding topography. Earthworks or individual monuments of peculiar character should also be surveyed and carefully plotted.

3. No mound should be excavated until it has been properly surveyed, plotted, and described. Proper excavation is slow and careful work. The best method destroys the mound, but gives absolute knowledge of construction and contents. It consists in removing the whole tumulus, slice by slice. First, a trench is dug, tangent to the mound ; this trench, at its middle point, touches the mound ; it should be a little longer than the greatest diameter of the mound, and should be carried to a depth of a foot or two below the natural surrounding surface. Then a slice of the mound adjacent to this trench is removed ; this slice should be one or two feet wide, and should be carried down to the depth of the trench itself. Afterwards slice after slice is removed. The earth of these slices should be examined with great care as removed. Every object found should be at once numbered, and a note made of its exact position. There should be no haste about this ; all necessary time should be given. If skeletons are found they should be carefully uncovered, and, if accompanied by articles of any interest, should be photographed as they lie, before they are disturbed. When first uncovered, bones are apt to be fragile and soft ; if an attempt is made to remove them at once they are likely to be broken ; they should be allowed to dry, not too rapidly, for a little time, when they can be carefully taken out. Skulls, skeletons and bones are often as important as relics of human handiwork, and should be always preserved. Exact note of location and position of these remains should be made, and all the bones of a single skeleton should be kept together by placing them in a separate sack or package ; this should be carefully labeled to prevent any confusion or uncertainty. All mound material, relics and remains, gains in importance with exactness of knowledge regarding source. Details of mound structure are important, and should be both description and measurements. After a mound has been properly excavated, it should be possible to reconstruct it with every article from it exactly placed, by reference to the notes made. In cases where

slicing is impracticable, two trenches should be run across the mound, intersecting at the centre, and carried to some distance below the original surface on which the mound was built. These trenches should be two or three feet wide.

4. Earthworks other than mounds should be trenched across to show their construction ; the section should be carefully examined, marked, and described ; the trench should be refilled to preserve the original form of the work, and its position should be indicated on the plot and in the notes.

5. Shell-heaps should be carefully cut across and picked to pieces along the exposed section ; a diagram showing stratification of the heap, relations of the shells to underlying and overlying deposits included, and the thickness of the layers should be drawn ; the relation of the heap to topography and water-courses should be described and the form and area of the heap should be determined. Collections should be made of all species of shells and bones contained therein ; also of relics of human remains. The position of each object found should be exactly noted.

6. Village sites should be studied ; the evidence for their being such, stated ; the area should be determined, and a plot made, upon which the location of old homes or hearths should be marked, if possible. All relics found, however crude and imperfect, should be preserved, and a list and tabulation of them made.

7. Rock-shelters or caverns in cliffs have often been used as homes. If such are found they should be carefully described, with their surroundings. Evidence of construction or artificial modification of the retreat should be noted. The walls should be examined for carvings or paintings. The floors should be carefully excavated. The objects found should be located and dealt with the same as mound finds. Diagrams, sections, drawings and photographs should be made of interesting points.

8. Look for aboriginal workshops or factory sites. What was made ? What relation does the site bear to any source of supply of material ? Collect broken and rejected objects, raw materials, tools and implements. Make full notes.

9. Seek for aboriginal quarries or diggings for materials. Collect data like last. Carefully describe, photograph, measure, and diagram.

10. Search after carvings or paintings on cliffs, cavern walls, or boulders. Carefully make tracings of such in natural size and original colors, or make rubbings of them. Photograph the designs in such a way as to show their relations to surroundings.

11. Occasionally caches or "deposits" are found. These are groups or clusters of objects intentionally buried in the earth. Describe such. Where were the objects found ? At what depth ? How were they placed ? What is their number ? Were all of one type ? Describe the specimens—forms, material, size, grade of workmanship. Draw each type. Such caches should be kept entire and not divided or scattered.

12. Where are there archæological collections of Iowa specimens, public

or private? Are they of utility and accessible to public study? Give some idea of character and importance.

13. Have you a collection? If so, will you kindly send notes regarding it? Descriptions and outline drawings of choice specimens in your possession are solicited.

14. Have notes or articles on Iowa archæology appeared in your local papers? If so, can you send exact titles and dates? Can you send copy? Can you loan copy, to be returned?

The Academy solicits help in these various directions. It cannot promise to undertake expensive field exploration, but it desires to know what is doing and to help by direction and otherwise. Although possessing an important and valuable collection of specimens, it is less anxious to secure relics than to help to stimulate good work. Correspondence is solicited. Data covering points above indicated will be carefully preserved, and when published credit will be given to collaborators.

The Academy has recently published a *Summary of Iowa Archæology*, by Prof. Frederick Starr, Ph. D., of the University of Chicago. It presents in a condensed form what has so far been done by workers, and gives a needed foundation to students. It may be purchased from the Academy for a nominal sum — 50 cents.

All correspondence in this matter should be sent to

DIRECTOR OF ARCHÆOLOGICAL STUDY,
Davenport Academy of Natural Sciences.

It was voted to print one thousand copies of the circular, as read, for distribution throughout the state; and Prof. Starr was on motion appointed to represent the Academy at the *Congress International des Americanistes* to be held in the City of Mexico in September.

M. N. Richardson and W. McClelland were elected regular members.

The thanks of the Academy were extended to Mr. F. L. Bills, florist, for his very acceptable gift of flowering plants to ornament the Academy grounds.

Mr. M. S. Miller, Prof. Starr's assistant at the Chicago University, spoke by request on the archæological work being done at that institution.

July 26, 1895 — REGULAR MEETING.

President Hammatt in the chair; five members present. Only routine business.

September 11, 1895. — REGULAR MEETING.

(Adjourned from August 29.)

President Hammatt in the chair; seven members present.

Miss Emma A. Rice, Dr. C. R. Baker, F. J. Walz and Edward C. Roberts were elected regular members.

September 27, 1895 — REGULAR MEETING.

President Hammatt in the chair; five members present.

The Curator reported the removal of the mineral collections from the library room above to the south front room below, thus making additional shelf room for books, amounting to five hundred feet.

Dr. Edward Gudeman and M. Spelletich were elected regular members.

A committee was appointed to prepare resolutions on the death of Prof. C. V. Riley.

October 24, 1895 — ADJOURNED MEETING.

President Hammatt in the chair; nine members present.

Further additions to the museum from Dr. S. C. Bowman, now of Andalusia, Ill., were reported by the Curator.

The Librarian reported progress in the re-arrangement and classification of the library.

A report was read from Prof. Frederick Starr of his recent visit to the City of Mexico to attend the *Congress International des Americanistes*. Being unable to remain for the congress as the date of meeting had been postponed, he had left a paper descriptive of the work of the Davenport Academy.

The following biographical sketch of the late Prof. C. V. Riley, prepared by Prof. H. F. Wickham of the Iowa State University, was presented by Mrs. M. L. D. Putnam. Prof. Riley was an honorary member of the Academy and much interested in its welfare:

CHARLES VALENTINE RILEY, A. M., PH. D.

Though the fame of Dr. Riley rests chiefly on work done in this country, he was by birth and early training a foreigner, having been born in England in 1843. His early education was received in Great Britain and on the continent where he acquired that familiarity with the French and German languages which proved of so much value in his later investigations. At about his seventeenth year he came to America, where, after spending a few years on an Illinois farm, he became a member of the journalistic force of a Chicago paper and, by his writings therein on economic entomology, laid the foundation of the high regard in which he is everywhere held.

His first official work seems to have been in the capacity of state

entomologist of Missouri. He was appointed to this place when about twenty-five and held it for nine years. The annual reports covering this period contain a great mass of practical and scientific information and show the most acute power of observation combined with a quick appreciation of what would be of real value to the agriculturist. This latter characteristic of Dr. Riley must be due in no small part to his actual experience as a farmer. His ability as an artist is shown in the illustrations of these reports, for he furnished his own drawings. Some of these figures are to be found to-day in almost every American work on economic entomology published since they appeared. The nine volumes still form an essential part of the library of every worker on the life-histories or economic importance of insects.

With the formation of the United States Entomological Commission, Dr. Riley was placed at the head of that body which carried on researches into the habits of and methods of combatting some of the greatest insect plagues with which man has had to struggle. Five extensive and valuable reports have been published, the first, for 1877, treating of the Rocky Mountain locust; the second, following two years later, with an additional account of the same scourge. The third relates some further observations of the locust and contains also important treatises on several other pests. The fourth is occupied by a careful treatment of the cotton and boll worms, while the fifth deals with the insect enemies of forest and shade trees. A number of bulletins were also issued by the commission.

Dr. Riley also edited, in connection with Prof. B. D. Walsh and Dr. George Vasey, the *American Entomologist*, which, after two years of usefulness, was allowed to drop for a decade, but was revived in 1880 for another volume, after which it was discontinued. Here, as elsewhere, the practical side of the study of insects received the chief share of attention.

His connection with the entomological commission did not hinder Dr. Riley in the acceptance of new responsibilities and the performance of other duties. Leaving his Missouri position he accepted, in 1876, the post of entomologist to the United States Department of Agriculture; and the report for that year is from his pen, though he shortly resigned the place. Three years later the Division of Entomology was created with Dr. Riley at the head, and this has given to the public each year a report of the principal pests observed, and in addition has published a series of thirty-two bulletins on various subjects connected with insect injuries, besides a number of separate papers and several volumes of *Insect Life*—the whole forming an almost perfect history of the advance of economic entomology during these years.

One of his achievements which has attracted a great deal of public attention and has been productive of great good, is the introduction into this country of the native Australian enemies of the "Fluted Scale" or *Icerya*, which at one time threatened the very existence of the orange industry in California. As early as 1886 Dr. Riley became convinced of the advisability of the importation of the parasites of the

scale and, after much trouble, succeeded in finding the means to send an investigator to study and collect them. By careful attention and judicious distribution whole districts were rendered nearly free from the pest, and a means shown to be open for keeping it under control.

In 1894, on account of failing health, he severed his connection with the division, but retained that of Honorary Curator of Insects in the National Museum. This post had been given him some years before, and in consequence of the necessary provisions being made for its care and preservation, he made over to the museum his entire private collection, containing about 18,000 species, represented by over 115,000 specimens in all orders of insects. He had expected to devote his remaining years to the study of pure science, and all the world must regret that his plans were cut short by the accident which terminated his life. On the 14th of September, while on the way to the City of Washington from his home on Columbia Heights, his bicycle struck a stone lying on the concrete and Dr. Riley was thrown from it head-foremost, striking the pavement with such force as to fracture the skull. Though given the best of medical care his death followed early the following morning — September 15th.

H. F. WICKHAM.

Messrs. M. Bunker, C. A. Mast, and Ira R. Tabor were elected regular members.

Mr. C. E. Harrison called attention to the fact that in a paper by W. R. Hoffman, published in the *Modern Illustrator and Home Journal* for October, 1895, entitled "Pottery of the American Indians," a number of specimens in the Museum of this Academy were accredited to the National Museum at Washington. The Corresponding Secretary was instructed to direct the attention of the editor to the mistake.

November 21, 1895.—TRUSTEES' MEETING.

President Hammatt in the chair; six members present.

It was voted to put a new furnace in the Academy building.

November 29, 1895.—REGULAR MEETING.

A paper by Prof. H. F. Wickham of Iowa City on "Some Species of Coleoptera from the Southern Shore of Lake Superior;" and a paper by Prof. Jerome McNeill of the University of Arkansas entitled "A Revision of the Truxalinæ of North America," were presented and referred to the publication committee.

December 27, 1895.— REGULAR MEETING.

President Hammatt in the chair; five members present.

The Curator reported the addition to the Museum of over 400 flint implements and a number of stone axes, collected by Capt. W. P. Hall. The donation from Mrs. C. C. Parry of a Pino Indian blanket, from native cotton, made by hand, was also reported.

Sixty-two new species of orthoptera, representing the work and study of years and accompanying a fully illustrated paper describing them, which will appear in the forthcoming Volume VI. of the Academy PROCEEDINGS, were presented by Prof. Jerome McNeill.

The President reported the new furnace recently purchased as being in place and in good working order.

The following named applicants were duly elected to regular membership: J. H. Whitaker, Dr. J. P. Crawford, E. W. Boynton, William H. Hender, E. M. White, George J. Washburn, James F. Lardner, Paulo Roddewig, Rev. William Stevens Perry.

Prof. H. F. Wickham of the Iowa State University, and Prof. Jerome McNeill of the University of Arkansas, Fayetteville, were elected corresponding members.

January 7, 1896. — ANNUAL MEETING.

President Hammatt in the chair; thirteen members present.

RECORDING SECRETARY'S REPORT.

TO THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

The Recording Secretary begs leave to report that there have been held during the year, besides the annual meeting, ten regular meetings with an average attendance of seven, and two trustees' meetings with an average attendance of six.

Twenty-seven members have been elected — 24 regular, 2 corresponding and 1 honorary. At present there are 72 regular members and 54 life members. One honorary member, Prof. C. V. Riley, has died.

A. W. ELMER

January 7, 1896.

LIBRARIAN'S REPORT.

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your Librarian respectfully reports as follows: Additions since last report, exclusive of the daily papers, bound volumes, 129; unbound volumes and pamphlets, 1,126; total, 1,255. Of this number 485 were from foreign countries.

Thus from time to time this department of our important trust is increasing in extent and value. Early in the present year, owing to the need of space in the library, it became necessary to remove there-

from the large cases of specimens which occupied the west wall and to rearrange and largely add to the book-shelves, so that now the entire wall space, from floor to ceiling is utilized, each section being numbered and each shelf designated for convenience in indexing. All this has been accomplished without great expense, but with no inconsiderable labor, a few zealous members having assisted your Librarian with generous contributions of mechanical skill and physical strength.

In this department my successor in office will find much yet to be done. There is work for him and work for the binder, and some of it should not be long delayed. An appropriation of, say $50, would make a good beginning, and is recommended.

Then the Finding List should be pushed to completion — this is a crying need — the index must be made, and I fear it is futile to expect it by voluntary or gratuitous labor. The expense, whatever its amount, is abundantly warranted, and under the direction of the new Librarian, some competent person should be employed to execute the work.

January 7, 1896. C. E. HARRISON, *Librarian.*

CORRESPONDING SECRETARY'S REPORT.

The Corresponding Secretary most respectfully reports that during the year 1895 he has received 102 letters and has written letters and special acknowledgments numbering 200.

The correspondence has been as varied as in former years. Among the most important communications are those in reference to special and valuable gifts made to the Museum. Individuals seek information on particular subjects in which they are interested, which information can only be found in our publications. Societies and institutions, at home and abroad, either ask exchange of publications or desire to make up deficiencies in their series.

When new papers are issued on subjects of interest to the Academy application is made for them and their authors uniformly respond favorably.

Other subjects coming before the Secretary, and appeals made to us for help from so many sources, emphasize the position of the Academy in the public favor. W. H. BARRIS, *Corresponding Secretary.*

January 7, 1896.

CURATOR'S REPORT.

In January last Dr. John E. Stevenson presented to the Academy some specimens of pottery, several species of flint implements from Tuscararas River and near the mouth of Stillwater Creek, Ohio; also a piece of a tree from the celebrated cemetery at Garden Hutton, with a carefully detailed history of the same.

In February Capt. Hall, the life-long friend of the Academy, made his usual visit and donated 3 stone axes and 200 flint implements; also, as the gift of a friend, 1 very large axe and 24 arrows, and at the same time a small collection of arrows from Father Thebes of Rap-

ids City. In December he added another equally extensive collection of flint implements and 20 stone axes.

In March Mrs. William C. Wadsworth presented to the Academy 2 extraordinarily fine specimens of the coral known as the *madripora convexa*, the larger mounted in a glass case. These were new to the Academy. Accompanying these were 3 specimens of *aricula margatifera*, finer and larger than any in the Academy; also 3 specimens of *haliolites iris*, large and perfect.

In April a collection was received from Dr. Clarence B. Moore of Philadelphia, comprising the following aboriginal relics from Florida: Five long celts of exquisite proportions, made of very fine sandstone; 2 conch shells, with perforations to admit handle; 1 unique drinking-cup of shell, having a perforation for suspension to the person; 1 box of crimson pigment, always associated with human remains; 2 flint arrows, and 1 piece of smooth quartz rock.

In May the most comprehensive and one of the most important additions made to the Museum for years came from Dr. S. C. Bowman of Andalusia, whose frequent gifts have so often enriched our shelves. The wide range of his material and its diverse character make it difficult to arrange it so as to give a satisfactory presentation of it in a short, compact way. There is an extensive palæontological collection. It comprises a series of fossils from the Cincinnati group, mainly from Ohio. These in number and preservation compare very favorably with those presented to us years ago by Mrs. Haines. There is another series from the Niagara group gathered at the Bridgeport quarries near Chicago — shells, crinoids, and trilobites — all new to our collection. The Hamilton of Ohio furnished a few species, but the largest series is from our own state, and mainly gathered in the neighborhoood of Andalusia and Buffalo. There is no doubt truth in Dr. Bowman's statement that this collection is probably the most complete ever made of the Hamilton in Eastern Iowa, and could not now be duplicated. Forms occur not only new to us but new to science, and which we trust may be described and illustrated in Volume VI. of the PROCEEDINGS of the Academy. Another and fourth collection is from the silurian and cretaceous of El Paso, Texas, and the cretaceous of Wyoming. From the conglomerate of El Paso we have three large elephant teeth — enamel fairly well preserved. In these various collections the locality in all instances is given.

In palæobotany mainly from the coal measures of Andalusia, are well preserved plants, mostly *lepidodendra*, *sigillaria* and *stigmaria*; some fruits in good condition all the more valuable as the doctor claims the locality is now exhausted.

There is a box of marine shells from West Florida and land shells from West Texas.

In comparative anatomy there are skeletons of an African monkey, a white-fronted goose and a yellow-legged tattler; also a porcupine skull.

In ornithology we have a number of mounted birds from Illinois and Iowa.

In oölogy we have a collection of rare birds' eggs, such as the frigate bird, gulls, terns, etc., from Florida and Yucatan; the scaled partridge of West Texas, an accurately colored cast of the egg of the great auk, with many eggs from the Calumet marshes near Chicago—about 75 species—all numbered according to the Smithsonian check list of eggs.

There is also a cast of the egg of the *epiornis maximus*, from the original in the British museum.

Archæology is represented by specimens from Illinois and New Mexico.

In mineralogy we have from Andalusia crystals of selenite, and at least 75 pounds of gold, silver and lead ores from Black Hawk, Colorado.

There is one extraordinary specimen of crystals of molybdate of lead which Dr. Bowman prized highly on account of its size and rarity.

In entomology, we have been favored with a collection of *coleoptera* from Prof. Jerome McNeill of the Arkansas Industrial University, Fayetteville, Arkansas. Each specimen represented is new to science and they are to be made the subject of a paper the author is preparing for the forthcoming volume of the PROCEEDINGS of the Academy. The collection numbers 62 species, embracing 120 specimens. Should these prove to be, as I have every reason to believe, type specimens, the value of the collection is greatly enhanced.

No one can look on this list without feeling the Academy is to be congratulated in view of such additions to its museum as this year has witnessed. They are considerably in advance of those made for many years, whether we consider their number or their value. They are well selected, well preserved and represent many departments of natural science. Geology, mineralogy, palæontology, ornithology, oölogy, archæology, conchology and entomology have each bountifully contributed to us their treasures.

W. H. BARRIS, *Curator.*

January 7, 1896.

REPORT OF THE PUBLICATION COMMITTEE — ABSTRACT.

Mrs. M. L. D. Putnam, chairman of the committee, reported in substance as follows:

The binding of 200 copies of Volume V. in cloth, completes a volume, the first page of which was printed in April, 1895. The die used on the cover of Volume V. is a reproduction of the seal of the Academy which was designed by a committee and accepted by the Academy as its seal in 1895.

While awaiting the completion of Volume V. your committee has not been idle, and the first page of Volume VI. appeared December 14, 1892.

The first paper was the "Bibliography of Iowa Antiquities," by Frederick Starr, Ph. D., followed by a paper on "Buddhism in America," by Edward L. Berthoud; "Ancient Grooved Rocks in Arkan-

sas," by W. A. Chapman; "Biographical Sketch of Charles Christopher Parry," by Dr. C. H. Preston, and a list of papers published by the late Dr. C. C. Parry.

The work proper for this year began February 9, 1895, when your committee published a "Summary of the Archæology of Iowa," by Frederick Starr, Ph.D. This very valuable contribution of 72 pages was bound in paper and distributed to those interested in the subject.

A circular of "Suggestions Regarding Work in Archæology," and a statement made by the Academy, were sent to every prominent newspaper in Iowa. A number of responses have been received, showing an awakened interest in the opening of the mounds in a scientific manner.

On October 17, 1895, H. F. Wickham, Associate Professor of Zoölogy, State University of Iowa, presented a most acceptable biographical sketch of the distinguished entomologist, the late Prof. C. V. Riley, who was an honorary member of the Academy. This paper was read before the Academy and will appear in the regular proceedings.

There is now in press a paper entitled "A List of Coleoptera from the Southern Shore of Lake Superior, with Remarks on Geographical Distribution," by H. F. Wickham, M. S. Prof. Wickham purposes to place a series of the insects mentioned, so far as they are to spare, in the cabinet of the Academy, where they may be consulted by those interested in the paper.

Another paper received for publication is a "Revision of the Truxalinæ of North America," by Jerome McNeill, Professor of Biology and Zoölogy, University of Arkansas. Illustrations will be made of the typical specimens of all the generæ (about 80, of which 10 are new) and drawings of the new species.

Prof. McNeill has already sent to the Academy 62 species and 120 specimens.

Other papers that have been presented are: One on "Geology" by Dr. W. H. Barris, and one on "Serpent Mounds" by J. M. Helmick.

An endowment of the publication fund has been made by the Chairman of this committee to the amount, at present, of nine thousand five hundred ($9,500) dollars, as a memorial to the late Charles E. Putnam and Joseph Duncan Putnam, former Presidents of the Academy, the funds for this purpose being derived from a generous bequest of the late Mary Putnam Bull of Tarrytown, New York.

PUBLICATION COMMITTEE'S FINANCIAL STATEMENT FOR 1895.

RECEIPTS.

Balance in Bank	$ 36.00	
From Sale of Publications	58.65	
From Trustees' Fund	118.00	
Borrowed from Chairman of Publication Committee	77.00	— $289.65

EXPENDITURES.

Paid on account Volume V.		
Brass Die	$ 10.00	
Binding Volume V	52.50	
Binding 20 Copies Volume II	3.00	— $ 65.50
Paid on account Volume VI.		
Binding 600 Summaries	$ 4.50	
600 Covers, Summaries	5.50	
2,100 Map Inserts	3.50	
Printing Summary of Iowa Archæology	156.50	
Wood-cuts	14.00	
Electrotypes	6.50	— 190.50
Balance on hand January 7, 1896		33.65
		$289.65

Respectfully submitted,

January 7, 1896.

MARY L. D. PUTNAM,
Chairman Publication Committee.

TREASURER'S REPORT FOR 1895.

RECEIPTS.

Balance on hand January 1, 1895	$ 107.93
Subscriptions	109.00
Dues	171.00
Door Receipts	37.74
Membership Fees	45.00
Interest	70.00
Newbold Estate	106.00
Sale of Proceedings	16.00
Rent	11.00
Refunded by Mrs. Putnam	4.00
Collected by Mrs. Putnam for General Fund	368.23
Total Receipts	$1,045.90

DISBURSEMENTS.

Curator	$ 328.36
Fuel and Light	32.75
Water	16.00
Insurance	34.00
Captain Hall	3.50
Publication Fund (Mrs. Putnam)	20.00
Plumbing	6.90
Repairs	23.42
Lumber and Hardware	8.40
Walk	36.50
M. Bunker	12.60
Refunded to Mrs. Putnam	24.23
Paid out by Mrs. Putnam (Curator's Salary and General Fund)	368.23
Incidentals (Janitor, Postage, Expressage, etc.)	89.77
Balance on hand	41.24
Total Disbursements	$1,045.90

Respectfully submitted,

January 7, 1896.

FRANK NADLER,
Treasurer.

PRESIDENT'S ANNUAL ADDRESS.

EDWARD S. HAMMATT, January 7, 1896.

In reviewing the work of our Academy for the past year, a few suggestions may be made, which possibly leading to others of greater importance, may prove an incentive to renewed activity in the field of original investigation.

In some departments of the museum, as in mineralogy and conchology, little has been accomplished except in the way of getting ready for work by re-arranging cases for these collections. In zoölogy and ornithology a number of interesting specimens have been added to the collections. Chemistry is one of the departments of the museum, and at one time biology was also on ourlist. Workers in both should find facilities for original investigations in this building. To carry on such work a thoroughly equipped laboratory is necessary and should be secured as soon as may be. Such a laboratory would also be of the greatest advantage to workers in other departments of natural science.

Our botanical collections have been put to good use during the past year by students in this branch of science. It may be well to state again, as has been repeatedly done, that our valuable collections are, under proper regulations, available for study to those not members of the Academy.

We are still receiving large numbers of stone and flint implements secured for us by that most zealous collector, Captain W. P. Hall. Our already priceless collection of mound relics will receive valuable additions in the coming year if workers and funds can be secured. Several mounds of promising value have recently been located as a direct result of Prof. Frederick Starr's "Summary of Iowa Archæology," and the circulars of instruction sent out under the auspices of the Academy. While the archæological field of Iowa is in a measure limited, as far as we know at the present time, to the work of the mound builders and Indians, the subject is one of great importance in the almost modern field of anthropology. To this field and Egyptian history, Prof. Petrie's marvelous explorations, early in the past year, gave a new race, a race totally unlike the ancient Egyptians, contemporaneous with them, but more cultivated.

One of the most important parts of museum work is the accurate labeling of specimens. For this, with a special reference to palæontology, we are fortunate in having the valuable services of Prof. W. H. Barris, our curator.

The Library is constantly receiving valuable additions in the way of exchanges and government publications. To further increase the library it would be well if foreign governments could be induced to place our Academy on their publication lists; some means should be devised to secure this end. Good work has been done by part of the Library Committee and a few other interested members in adding more shelf-room, numbering sections and shelves, and in re-arranging books and pamphlets. As soon as funds are available an appropria-

tion should be allowed the Library Committee for needed binding and for cataloguing our more than 30,000 books and pamphlets.

A serious question which must be met in the near future is that of securing more room for our always increasing collections. The building is already overcrowded. A small amount of additional space could be secured were donors willing to allow us to separate their collections and re-arrange them according to the general classification required, due credit being given the donor of specimens on each label. Many of the larger museums refuse to accept donations conditional on their being kept intact — a wise precaution which we should adopt.

That the Academy may extend a wider educational influence, short descriptive papers on different topics of natural history, illustrated by our specimens, might be prepared by Academy members in the line of their special studies. Such elementary pamphlets would serve to permanently fix in the minds of the youth of the public and private schools the objects seen in the collections; and these pamphlets, if properly arranged, might in time serve as a complete catalogue to the Museum. Popular scientific lectures should also be made a regular feature of Academy work at an early date. In speaking of the museum it may be mentioned that while our duplicates are carefully labeled, listed, and used for exchanges, casts of unique specimens might also be added to the exchange list.

It has been suggested by our Librarian, Mr. C. E. Harrison, that a museum extension be arranged with other museums. This timely suggestion should be worked out to a practical result.

An important function of the Academy is the publication of scientific papers on original investigations. This work has been successfully carried on, almost from the beginning of our organization, without an endowment fund, mainly through the indefatigable and persevering labors of Mrs. M. L. D. Putnam. Through the same generous friend, an endowment of $10,000, chiefly from the estate of Mrs. Mary Putnam Bull of Tarrytown, New York, has been secured for the publication fund, as a memorial to Mr. Charles E. Putnam and his son, J. Duncan Putnam, both of whom were active workers in the Academy and ably filled the presidential office.

By means of this endowment fund, all regular and life members of the Academy will hereafter be entitled to its publications free. Gratifying results of this stimulus to original research have already been felt, for the committee have now in process of publication two valuable papers: "A List of Coleoptera," by Prof. H. S. Wickham, of the University of Iowa, and "A Revision of the Truxalinæ of North America," by Prof. Jerome McNeill, of the University of Arkansas. These, with others in course of preparation, will insure the issuance at an early date, of the remaining parts of Volume VI. of the ACADEMY PROCEEDINGS.

In future publications of the PROCEEDINGS, and parts as issued, it might be advisable for the Publication Committee to investigate the proposed plan of the Royal Society of London, of a uniform method

of cataloguing scientific publications, as more fully explained by the Harvard University Council. Each society should accompany its own publications with duplicate card catalogues, and request them with all exchanges.

In looking over some of the past volumes of our PROCEEDINGS a lack of uniformity is seen in the system of measurement adopted. It is said that one of the greatest reforms of the Nineteenth Century is the adoption of the metric system, legally adopted by this and many foreign countries. This uniform system should be used exclusively in scientific work and publications and should be made an imperative requirement in papers accepted for publication.

At the first meeting of the Academy, December 14, 1867, among the honorary members elected was Prof. Charles Valentine Riley, whose career has but recently been brought to a sudden close with seemingly many years before him for useful scientific work. In Prof. Riley the Academy loses an interested friend and the world a distinguished entomologist.

During the past year the regular membership has been somewhat increased, and new as well as old members should be reminded that they are expected to take an active interest in the Academy. It is hardly necessary to further dwell upon the needs of the Academy; suffice it to say, that an institution such as ours, to do efficient scientific work must have funds at its disposal to carry on explorations and investigations.

ELECTION OF OFFICERS — 1896.

President — EDWARD S. HAMMATT.
Vice-President — DR. A. W. ELMER.
Recording Secretary — EDWARD BORCHERDT.
Corresponding Secretary — Prof. W. H. BARRIS.
Treasurer — FRANK NADLER.
Curator — Prof. W. H. BARRIS.
Librarian — C. E. HARRISON.
Trustees for Three Years — Mrs. M. L. D. PUTNAM, GEORGE P. MCCLELLAND, Rev. A. M. JUDY, W. C. PUTNAM.

Prof. Frederick Starr was proposed as an honorary member of the Academy and was unanimously elected.

At the close of the business session Dr. Edward Gudeman read an able and instructive paper on "Old Theories in Chemistry," presenting a scholarly review of the growth of chemical science.

January 23, 1896. — TRUSTEES' MEETING.

President Hammatt in the chair; eight members present.

Treasurer Frank Nadler presented his report for the year just closed, showing a balance on hand, January 1, 1896, of $41.24 in the general fund. The report was referred to the Finance Committee.

The Trustees discussed the financial outlook for the year, which was thought fairly favorable.

On motion, the sum of $50 was placed at the disposal of the Library Committee to be expended on Library needs.

January 31, 1896. — REGULAR MEETING.

President Hammatt in the chair; six members and a number of visitors present.

The Publication Committee reported Prof. Wickham's paper on "Coleoptera" printed.

Messrs. A. Tredick and C. N. Newcomb were elected regular members.

The President announced Standing Committees for the year as follows:

Finance — W. C. Putnam, J. B. Phelps, J. H. Harrison.

Publication — Mrs. M. L. D. Putnam, Prof. W. H. Barris, Dr. Jennie McCowen, Prof. S. Calvin, Dr. C. H. Preston.

Museum — Archæology, C. E. Harrison; Geology and Palæontology, Prof. W. H. Barris; Conchology, Miss S. G. Foote-Sheldon; Chemistry, Dr. Edward Gudeman; Zoölogy, Dr. A. W. Elmer; Mineralogy, Fred P. Bemis; Botany, Louis Block; Historical Collections, E. S. Ballord.

Library — C. E. Harrison, Edward Borcherdt, C. H. Preston.

Prof. Udden of Augustana College delivered an interesting lecture on "Kansas Mounds," illustrating his remarks by crayon sketches.

February 29, 1896 — REGULAR MEETING.

President Hammatt in the chair; seven members and a number of visitors present.

The Curator reported the donation from T. Richter & Sons, furriers of this city, of a carefully preserved skin of a white skunk, received by their agent in a collection from the Sac and Fox Indians. This is a very rare specimen, the donors having never before in their business seen or heard of such a one.

The following resolutions on the death of Prof. Charles Wachsmuth of Burlington, Iowa, were read and adopted:

Resolved, That the Academy has heard with profound regret of the death of Prof. Charles Wachsmuth, an honored member of this Academy and a valued contributor to its PROCEEDINGS. It is fitting that, while we record our sense of the loss we have sustained, we should express our appreciation of the great work he has wrought for science in the particular department to which he devoted his life—a work accepted at home and recognized abroad by naturalists engaged in the same and similar research, as one of the most important in the history of geological and palæontological investigation. As we call to mind the amount of conscientious labor he performed through a score of years, we wonder how it could have been accomplished, while so often battling with bodily suffering, his iron will, with cheerful fortitude, rising superior to physical infirmity and nerving him to fresh devotion to his work. We may note as a marked characteristic of this student of nature that the treasures he gathered at such vital cost to himself were distributed freely and generously to others. All were encouraged to come to him for assistance. His work accomplished, he passed quietly away, in the very locality whose surroundings had first awakened his early enthusiasm. Remembering the happiness of his home, with his affectionate and devoted wife, fit sharer in his labors and encourager of his work, we extend to her our warmest sympathy in her great affliction.

Resolved, That these resolutions be recorded in the minutes and that copies be sent to the family of the deceased and to the press.

W. H. BARRIS,
C. H. PRESTON,
Committee.

Mrs. W. F. Peck, Mrs. C. A. Ficke and Mr. Emil Geisler were elected to regular membership.

Observer Walz delivered an interesting lecture, illustrated by charts, on the work of the U. S. Weather Bureau.

March 27, 1896.—REGULAR MEETING.

President Hammatt in the chair; seven members present.

The Curator reported the donation to the museum by Mr. A. F. Mast of some historical relics, viz: Two appointments of the donor to the office of deputy postmaster of Davenport; the first signed by President Pierce in 1856, and the second by President Buchanan in 1860, both stamped with the seal of the United States.

The donation from Dr. Clarence B. Moore, of the columella of a large conch shell worked into marketable shape, was also reported. Such worked shells are sometimes found in Florida mounds, but not, the donor believes, in those of Iowa.

On motion of Dr. Gudeman, a committee consisting of Messrs. F. J. Walz, J. H. Harrison and M. Bunker was appointed to draw up resolutions endorsing the proposed adoption of the metric system by the government, copies of the resolutions to be sent to our members of congress.

Following the business session the Academy adjourned to the rotunda where Prof. Launcelot W. Andrews of the Iowa State University, assisted by John D. Fish, Electrician, delivered an interesting lecture on the subject, "Some Properties of Highly Rarified Gases." The lecture was listened to by a select audience filling the rotunda and presented a highly instructive consideration of the nature and properties of the recently discovered "Roentgen" or "X" rays.

April 24, 1896— REGULAR MEETING.

President Hammatt in the chair; six members present.

The Curator reported valuable additions to the library from Miss Clara Holmes and Hon. George T. Baker. The thanks of the Academy were extended to Prof. L. W. Andrews for his instructive lecture of March 27, and on motion of Mr. C. E. Harrison, the following supplementary resolution was adopted:

Resolved, That the thanks of the Academy be tendered Mr. A. W. Vander Veer, president of the Peoples' Light Company, and Messrs. J. Charles Young, J. D. Fish of this city, and Dr. Wm. H. Ludewig of Rock Island, for assistance rendered in making the lecture of Prof. Andrews a success.

May 29, 1896— REGULAR MEETING.

President Hammatt in the chair; six members present.

The Curator reported the donation from Hon. C. A. Ficke of an Egyptian mummy and case, shipped by him from the Boulak museum, Cairo, Egypt, and received at the Academy in good condition. This very generous donation, made yet more valuable by the known scholarship of the giver and his carefulness as a collector, had been announced by the following letter:

CAIRO, March 21, 1896.

ACADEMY OF NATURAL SCIENCES, DAVENPORT, IOWA:

Gentlemen— I take pleasure in stating that I have to-day purchased and caused to be shipped to the Academy by the Museum here, a mummy with box, which I request the Academy to accept from me. The mummy and case are supposed to be from the 20th dynasty or thereabouts. I was able to arrange for the prepayment of freight only as far as New York, but have

instructed my office to pay the freight from New York to Davenport upon the arrival of the box containing mummy and case, which was addressed and ordered shipped direct to the Academy, however.

Respectfully yours, C. A. FICKE.

Curator Barris congratulated the Academy on this addition to its archæological treasures, acknowledged its indebtedness to the donor, and expressed his conviction of the unquestionable genuineness of the relic.

Mrs. Putnam announced that the bequest of $9,500 by Mrs. Mary Putnam Bull had been received and was now at interest for the use of the publication.

June 26, 1896 — REGULAR MEETING.

President Hammatt in the chair; five members present.

The donation of 75 flint implements and a stone axe from Capt. W. P. Hall was reported.

Messrs. Charles Francis and Claude L. Adams were elected regular members.

The following resolution, presented by Dr. C. H. Preston, was on motion adopted as the sense of the Academy:

WHEREAS, A bill restricting the practice of vivisection has recently been presented and urged for congressional action, and

WHEREAS, Such a law, if enacted, would not only injuriously affect the work of the government experiment stations, but might serve as a precedent for state restrictions; therefore

Resolved, That the Davenport Academy of Natural Sciences joins most earnestly in the general protest of scientific associations throughout the Union against so unwise and unjust a measure.

While condemning and deprecating all cruelty and the infliction of unnecessary suffering for any purpose whatsoever, we believe there is no call for legal restrictions on vivisection as conducted by the biologist in the interest and for the promotion of scientific research.

Such legislation must seriously hamper, if indeed it did not discourage and prevent, investigations essential to the knowledge and control of communicable diseases, both those affecting man and those pertaining to the domestic animals, and would thus become responsible for perpetuating the causes of infinitely more suffering than it could possibly prevent.

July 31, 1896 — REGULAR MEETING.

President Hammatt in the chair; five members present.

The donation of some flattened minnie bullets from Atlanta and some Aztec "pocket-deities" from Mr. A. C. Fulton was reported.

Mr. R. P. Osborn was elected a regular member.

The Executive Committee reported that a contract had been made with the Davenport Granitoid Company to lay a cement floor in the west basement room of the Academy building at an expense of 9 cents per square foot, the contractors to remove the present wooden flooring and move the cases.

August 28, 1896.— REGULAR MEETING.

President Hammatt in the chair.

Benjamin R. Putnam was elected to life membership.

Mrs. M. L. D. Putnam was appointed a delegate to the American Association for the Advancement of Science about to meet at Buffalo, N. Y., and the Corresponding Secretary was instructed to forward her credentials, she being now in the East.

September 25, 1896.— REGULAR MEETING.

President Hammatt in the chair.

The donation from Capt. W. P. Hall of a large flint spear head — a very fine specimen — together with a number of arrow heads and two large stone axes, was reported.

October 30, 1896.— REGULAR MEETING.

President Hammatt in the chair; eleven members present.

The following resolutions on the death of Mr. William H. Holmes were presented and adopted:

WHEREAS, In the death of William H. Holmes, which occurred at his residence in this city on the morning of the 26th inst., the Academy loses one of its earliest and most honored members,

Resolved, That we hereby record our appreciation of his sterling worth as a man, of his life-long zeal in the search for truth, and of his valuable services as an officer of, and contributor to the work of the Academy.

Resolved, That we tender our deep sympathy to his sorrowing household and that copies of these resolutions be sent to them and to the city press.

W. H. BARRIS,
ARTHUR M. JUDY,
C. H. PRESTON,
Committee.

President Hammatt, Mrs. Putnam and others added warm personal tributes to the worth of the deceased.

After the business session the Academy adjourned to the Library

room, where a large audience was assembled to listen to a lecture by Mr. George R. Putnam on the Peary Expedition of the past summer, which expedition Mr. Putnam accompanied as a representative of the U. S. Geodetic and Coast Survey.

Preceding the lecture an interesting report of the last annual meeting of the British Association for the Advancement of Science, held at Liverpool, and attended by the writer, Mr. E. K. Putnam, was read.

THE GREENLAND EXPEDITION OF 1896 UNDER CHARGE OF PROF. A. E. BURTON.

SUMMARY OF LECTURE BEFORE THE DAVENPORT ACADEMY OF SCIENCES, BY G. R. PUTNAM, OCTOBER 30, 1896.

This expedition was organized by Prof. Burton of the Massachusetts Institute of Technology to carry on various investigations in Umanak Fiord, in the northern part of Danish Greenland. The party was to be carried to and from its destination by Lieut. Peary, the well-known arctic explorer. The voyage was but a summer trip to moderate latitudes, devoid of the conventional arctic hardships, and yet the peculiar advantage of such a trip to Greenland is that many of the grandest of arctic phenomena may here be seen in easily accessible regions. The steamer "Hope," a staunch Newfoundland sealing ship, under command of Capt. John Bartlett, carried Lieut. Peary and the various parties north from Sydney, Nova Scotia, sailing from there July 16, 1896. Passing through the straits of Belle Isle we were soon in the regions of icebergs and floe ice. Magnificent specimens of the former were encountered before we left the straits, and they were never lacking to the scene during the entire balance of the voyage. An unusual quantity of floe ice was met along the Labrador coast, which we followed closely to Hudson Strait. The ice sometimes became so thick as to seriously impede the progress of the ship. While in this ice we had some beautiful and fantastic effects of the mirage. A polar bear and cubs were seen on the ice off Cape Chudleigh, the latter being captured alive after the shooting of the mother.

Passing into Hudson Strait the "Hope" was soon clear of the ice. After steaming two hundred miles along the north shore we reached Ashe Inlet on July 24. Here, and on the mainland opposite, two days were spent by the various parties in exploration. At this point some years ago the Canadians had a station for investigating the climate and navigability of Hudson Strait. On the way out of Hudson Strait we had our first good view of the Eskimos. A few of them in their kayaks hailed the ship, and the entire settlement followed in a large skin boat, bringing many articles to trade. Notwithstanding the utterly bleak and forbidding appearance of this region, they appeared to be a happy people; their round, fat faces simply beamed with good nature. They were dressed in furs, men and women much alike, ex-

cept that the women's blouses had a long tail behind, and a large hood or sack on the back in which the baby was carried. An attempt to enter Cumberland Sound failed because of the heavy ice in the entrance. Crossing Davis Strait the Greenland coast was sighted on August 1, and the following day we reached Godhaven, the capital of the Danish Inspectorate of North Greenland, and were cordially received by the Danish officials. Passing through the remarkable passage east of the island of Disco, known as the Vaigat, we entered Umanak Fiord on the night of August 4. Here is to be seen some of the finest scenery on the Greenland coast, and it was particularly impressive on this calm arctic summer night when the sun only dipped below the horizon for an hour. The "Hope" left our party at the village of Umanak, the principal settlement of the district, which was to be our headquarters for several weeks, and where the vessel was again to return for us after its trip further north. The village consists of about 150 Eskimos and three Danish families. It was through the courtesy of Governor Knuhtsen at Umanak that I was enabled to purchase an Eskimo kayak which has been shipped to this institution.

In their management of their Greenland possessions the Danes have followed a unique plan. There are about 10,000 Eskimos in Danish Greenland. In each of the twelve districts there is usually a governor and assistant in charge of the commercial affairs, and a Lutheran pastor who cares for religious and educational matters. No other Danes or foreigners are allowed to settle in Greenland. The whole is under direction of the Royal Greenland Board of Trade, a government bureau in Copenhagen, which has a strict monopoly of the trade of Greenland. Ships each year bring out supplies from Europe which are sold to the Eskimos at but a slight advance over cost prices, and fixed amounts are paid to the natives for the furs, oil, ivory, etc., which products are shipped to Denmark. All other trade along this coast is prohibited. Every village has its church and school in which the children are taught their own language and not Danish. The great majority can read and write and are Christianized, nominally at least.

These Greenland Eskimos, although they have been in contact with civilization for 250 years, have retained many of their original modes of life. The more pure-blooded have smooth, round features and frank, open countenances, are short in stature and have straight, black hair. They live in flat-roofed houses built of rocks and turf, often but a single room with a sleeping bench at one end, and a long, low entrance for keeping out the cold in winter. In summer they often live in tents, moving from place to place. They hunt the seal, walrus, narwhal, reindeer, bear and smaller game. Much the most important to them is the hair seal, furnishing them clothing, boat covering, tents, oil and food. For the pursuit of this animal they have developed the kayak and its many appliances, perhaps the most ingenious ever invented by a primitive people. One of the feats of dexterity performed in these frail boats is to turn over and right themselves again

without getting out of the boat and without getting a drop of water into it. The language of the Eskimos is most peculiar and difficult for a stranger to master. It is composed almost entirely of nouns and verbs, and by suffixes and affixes to these the other parts of speech are added. It is possible to express a long sentence with a single word. The investigations of Rink have shown that all the Eskimos from eastern Siberia to eastern Greenland have words in common, proving the common origin of the race.

From Umanak several trips were made in small boats to the great glaciers at the head of the Fiord. The largest of these is the Karajak. The face of this glacier, from which the bergs break off into salt water, has a width of about four miles, a height above the water of over 250 feet, and in the center moves with a velocity of from 20 to 35 feet per day. A single iceberg breaking off from this glacier has been estimated to contain 24,000,000 cubic yards of ice. The breaking off of a berg is always a most interesting sight because of the great noise and commotion caused. The surface of a glacier near its front is a mass of jagged pinnacles with deep crevasses between. Further up the surface becomes smoother, and finally, back on the distant horizon, can be seen the smooth, white plain of the great ice-cap which covers Greenland. A climb to the summit of a 3,000-foot mountain near its edge gave a grand view of the inland ice and the glacial work along its border. That this ice sheet was once more extensive than it is now is proved by the rounded outlines and glacial scratches found even to the summit of the coast mountains. On the other hand the climate of Greenland must, at one time, have been very much warmer. In the vicinity of Umanak Fiord coal deposits and the fossils of semi-tropical trees are found. Notwithstanding the nearness of the ice-cap the present climate in Greenland is much milder than that on the opposite side of Davis Strait. In the fiords the summer is moderate and pleasant. Wherever there is soil there is an abundance of wild flowers and grasses, but no trees. A curious meteorological fact is that the Föhn wind which blows directly off the ice-cap, always brings the warmest weather, said to be due to its sudden descent from the elevated interior.

The "Hope" called for us at Umanak on September 9. Our homeward journey followed much the same course we had come over. We encountered the only storm of the voyage in crossing Davis Strait. Off Cape Mercy the "Hope" was caught in a heavy ice pack in which she was held for three days. Finally the ice loosened and the ship reached open water in Cumberland Sound. Two days were spent in the vicinity of Blacklead Island, a Scotch whaling station with a large Eskimo settlement. From here we brought to America an English missionary and the agent of an American whaling station, the latter bringing with him over a ton of bone taken from a single whale. The return from Cumberland sound was without incident save some beautiful auroral displays at night, and we landed at Sydney on September 26.

As to the special work on which I was engaged on this trip, only a few remarks will be added. At each of the stopping places where time permitted I made magnetic observations, determining the deviation of the compass needle from true north, the dip of the dipping needle, and the force of the earth's magnetism. Two of these stations were so near the magnetic north pole of the earth that the dipping needle stood within six degrees of the vertical. We were so far to the east of the magnetic pole that at Umanak the compass needle pointed nearly west. The horizontal magnetic force in these regions is very weak on account of the great dip, so that magnetic disturbances caused considerable changes in the needle, a change of four degrees being noted in a single day at one point. For the same reason the ship's compasses were very irregular. At some of these places magnetic observations have been made by earlier expeditions. A comparison of our results with theirs will aid in the study of the change in the earth's magnetism, which is continually in progress. At several points I also made pendulum observations for the measurement of the force of gravity. This force increases from the equator to the poles, and following the theorem of a French mathematician, Clairaut, we are able to compute the amount of flattening at the poles of the earth by comparing the force of gravity at different latitudes. The variations in this force also have an important bearing on various theories that have been advanced as to the condition of the earth's crust, and thus far may be said to point to the truth of the equilibrium theory, which supposes that the earth's crust is in a sort of floating condition, and that all general elevations on the surface are high because they are supported by ligter material beneath, and that depressed areas are low because they are heavy. By a well-known law the time of oscillation of a pendulum will be proportional to the square root of the force of gravity, so that if we compare the time of oscillation at different places we will obtain the relation of the force of gravity. For this purpose it is necessary to ascertain the time of a single swing within a few millionths of a second, and to accomplish this successfully an elaborate instrumental outfit is necessary. The chronometers used must also be rated by careful astronomical observations. The results of this work will be published in the *Technology Quarterly* at Boston, and also by the United States Coast and Geodetic Survey, which furnished the necessary instrumental outfit, and with which the writer is connected.

The lecture was fully illustrated by maps and charts, with many articles of Eskimo manufacture, raiment, etc.

November 27, 1896 — Regular Meeting.

President Hammatt in the chair; four members present.

The Curator reported the donation by Mr. George R. Putnam of an

Eskimo kayak, together with all the appliances used by the native Eskimo in hunting and fishing. On motion it was

Resolved, That a vote of thanks be extended to Mr. George R. Putnam for the recent interesting and instructive lecture delivered by him before the Academy, on his trip to Northern Greenland with the Peary Expedition of the past summer; and for the gift of an Eskimo kayak, procured by him at Umanak, Greenland, with equipments complete for the capture of seal, etc.

On motion, the matter of devising a better system for the preservation of the Academy archives was referred to the Publication Committee, to report at the next meeting.

December 26, 1896.—Regular Meeting.

(Adjourned from December 25.)

President Hammatt in the chair; five members present.

The Curator's report showed donations to the Musem as follows: From Mrs. C. C. Parry, a large miscellaneous collection of minerals, corals, curios, and Indian work listed under sixty different headings and numbering several hundred specimens; from Major G. P. McClelland, two corals from the Bermudas; from Capt. W. P. Hall, two stone axes, one celt, two small hematite axes and twenty-six flint implements, with one fine celt from Ray Willard.

A vote of thanks to the several donors was passed.

The following report on measures for the better preservation of the Academy archives was presented and adopted:

The Publication Committee, to whom was referred the consideration of means for the better preservation of official reports, etc., pertaining to the Academy Proceedings, would respectfully recommend —

First—That all reports, resolutions, and other proceedings to be preserved as original archives, should be *required in writing on uniform sheets* to be kept at hand by the Curator; and that its title, date and signature should accompany each document.

Second.—That the Curator's monthly report should include, together with all matters more directly pertaining to the museum, the enumeration not only of visitors and door receipts as at present, but the enumeration of correspondence and additions to the library as well, so that the Corresponding Secretary and Librarian need only report when matters of especial interest give occasion to do so.

Third.— That the Treasurer's annual report should include the balanced account of the publication fund for the year, as submitted by the Chairman of the Publication Committee.

Fourth.— That no original papers should at any time be entrusted to re-

porters or other unauthorized persons, to be taken from the building ; and that the Recording Secretary should be instructed to return all such documents, so soon as he shall have transcribed them, into the custody of the Curator, to be by him classified and kept in a desk provided for this especial purpose. Respectfully submitted,

MARY L. D. PUTNAM,
W. H. BARRIS,
C. H. PRESTON.
For the Committee.

The Secretary read a communication from Mrs. Margaret W. Holmes, under date December 8, 1896. Accompanying the letter was a check for twenty-five dollars from herself and daughter with the following note :

"Twenty-five dollars to be used in some practical way for the comfort and convenience of the frequenters of the Academy, to remind them of their friend and associate, William H. Holmes."

A vote of thanks was extended to the donor and President Hammatt, Dr. Barris and C. E. Harrison were appointed a committee to expend the money in accordance with the wishes expressed.

The Committee on Revision of the Membership List were, on request, granted further time to complete the work.

The following communication, embodying a report of the results of the Glazier expedition of 1891 to determine the true source of the Mississippi River, was presented by Mr. C. E. Harrison and referred to the Publication Committee :

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES.

On July 13, 1891, a letter was received from Capt. Willard Glazier expressing the desire that a member of this Academy join an expedition that he was organizing to go to the headwaters of the Mississippi during the month of August. At the solicitation of a number of officers and members of the Academy I accepted Capt. Glazier's invitation and accompanied him and his genial party. On my return I rendered a verbal report descriptive of the expedition. Now, however, as the PROCEEDINGS of the Academy from January, 1889, to the present time are to be published, it seems desirable and perhaps of historic importance, that some record of this expedition, of which the Librarian of the Academy was a member, should appear therein, and at the request of the President I herewith submit a brief statement in accordance with notes taken at the time. It will be remembered that in 1881 Capt. Glazier, with a small party, made a trip to the Lake Itasca region and discovered that the true source of the great river did not lie in Itasca. His party in meandering the shores of Itasca with the aid

of their Indian guide found a stream entering the south-west arm, through which they passed into a lake to the south, known to the Indians as Po-keg-a-mea. This lake the party, after a thorough exploration, determined to be the primal reservoir or true source of the great river, and in honor of Capt. Glazier named it Lake Glazier. The Captain does not pretend to have discovered this lake (neither did Schoolcraft discover Itasca) but was the first to publish to the world that the magnificent body of water, having a surface of 255 acres, and a perennial stream of good depth and width flowing from it into Itasca, is without doubt the true head of the river. It was to settle this much mooted question that the second expedition — by far the largest ever assembled for a like purpose — was organized.

Fourteen gentlemen responded to the invitation, assembling at Minneapolis, and on Monday, August 17th, commenced our journey by rail to Park Rapids, stopping at all important towns *en route*. To give a detailed description of our journey, which was full of pleasant surprises and enjoyment, would consume much time and be unimportant in this report. At Park Rapids three days were consumed in preparation for the journey through the wilderness. Teams being provided, and canoes, tents, provisions and other necessary camp equipage loaded, the start was made on Saturday morning, August 22. The road, or trail, from here to the head waters winds among the pine, and was as bad as could be imagined, up and down steep inclines, over boulders and fallen trees, through marshes and bogs, requiring the combined strength of horses and men to pull through the mire or up the steep inclines, and at all times the watchful care and utmost exertion of all the party to save our caravan from destruction. All the difficulties, however, were compensated for by the beauty of the forests and picturesqueness of our train. On arriving at the shores of Itasca we embarked in our canoes to Schoolcraft's Island, in the midst of Lake Itasca, where we camped for the night. All of next day was occupied in moving and preparing a permanent camp on the high land separating Lakes Itasca and Glazier. One incident of our camp-life was the delivery of a sermon in front of the tents on Sunday afternoon by Mr. John C. Crane, who was a licensed preacher of the Baptist faith. It was without doubt the first religious service held at the headwaters. During our stay we assisted the surveyors in measuring all the affluents flowing into the south-west arm of Lake Itasca, and all those emptying into Lake Glazier. In order to give details of the explorations as briefly as possible I will copy the following report, which was made upon our return to Park Rapids and signed by all of the party who were engaged in the actual surveys and measurements:

PARK RAPIDS, MINNESOTA, September 2, 1891.

"*To Whom it May Concern:*

"The undersigned were among the members of a party who visited the region around Lake Itasca with Captain Willard Glazier for the purpose of investigating it and ascertaining the facts concerning the head-waters of the Mississippi River. The party, while invited by Capt. Glazier, were under no obligations to him, directly or indirectly, and their purpose was (and

it was in accordance with Capt. Glazier's wish) to see for themselves and report impartially upon the facts ascertained by personal observation. This statement has been formulated and is hereby presented without Capt. Glazier's knowledge.

"Two streams were found entering the south-west arm of Lake Itasca, one to the south-west, known as Nicollet Creek; the other to the south-east, flowing from the Glazier Lake.

"Nicollet Creek was traversed from its mouth up to Nicollet's first and second lakes. The creek was still further traced until its source was found in a number of springs, to the south-east of which is a ridge varying in height from 25 to 40 feet. The distance from Lake Itasca to these springs was chained and found to be 7,307 feet, this being the remotest distance, in that direction, of running water. The ridge was ascended and crossed to Nicollet's Third Lake, so called, and the region beyond traversed for several miles. The stream flowing from the Glazier Lake to Lake Itasca was chained, also the Glazier Lake and its tributaries were followed up and chained. There are five tributaries to this lake, which is 1,100 feet from Lake Itasca, as follows: On the east side, 50 feet from the bank, a spring flows in a cascade to the lake. Deer Creek is 6,864 feet long. Excelsior Creek is 8,778 feet long, making the distance from its source through the Glazier Lake 14,106 feet. Horton Creek is 1,188 feet long, flowing from a lake two acres in area. Eagle Creek is 4,356 feet long, flowing from Lake Alice (924 feet long), and Lake Alice has a tributary 1,518 feet long. The distance of the most remote running water from Lake Itasca, flowing through the Glazier Lake to Itasca (the source of Excelsior Creek) is 6,779 feet more than the distance from Lake Itasca of the most remote running water flowing into Itasca through Nicollet Creek. The Glazier Lake has an area of 255 acres. It is a clearly defined body of water, many times larger and more imposing than any or all of the bodies of water emptying into Lake Itasca through Nicollet Creek. Investigation and observation lead us to the conclusion that the basin drained by the feeders to the Glazier Lake and emptying into Itasca at the south-east corner of the south-east arm is larger than that drained by the stream emptying into the south side of the south-west arm, and that running water can be traced at a much greater distance from the outlet of the Glazier Lake into Lake Itasca than from the other outlet referred to. Signed,

JOHN C. CRANE. DANIEL S. KNOWLTON.
C. E. HARRISON. FRED J. TROST.
A. MUNSELL. W. S. SHURE.
A. W. WHITNEY."

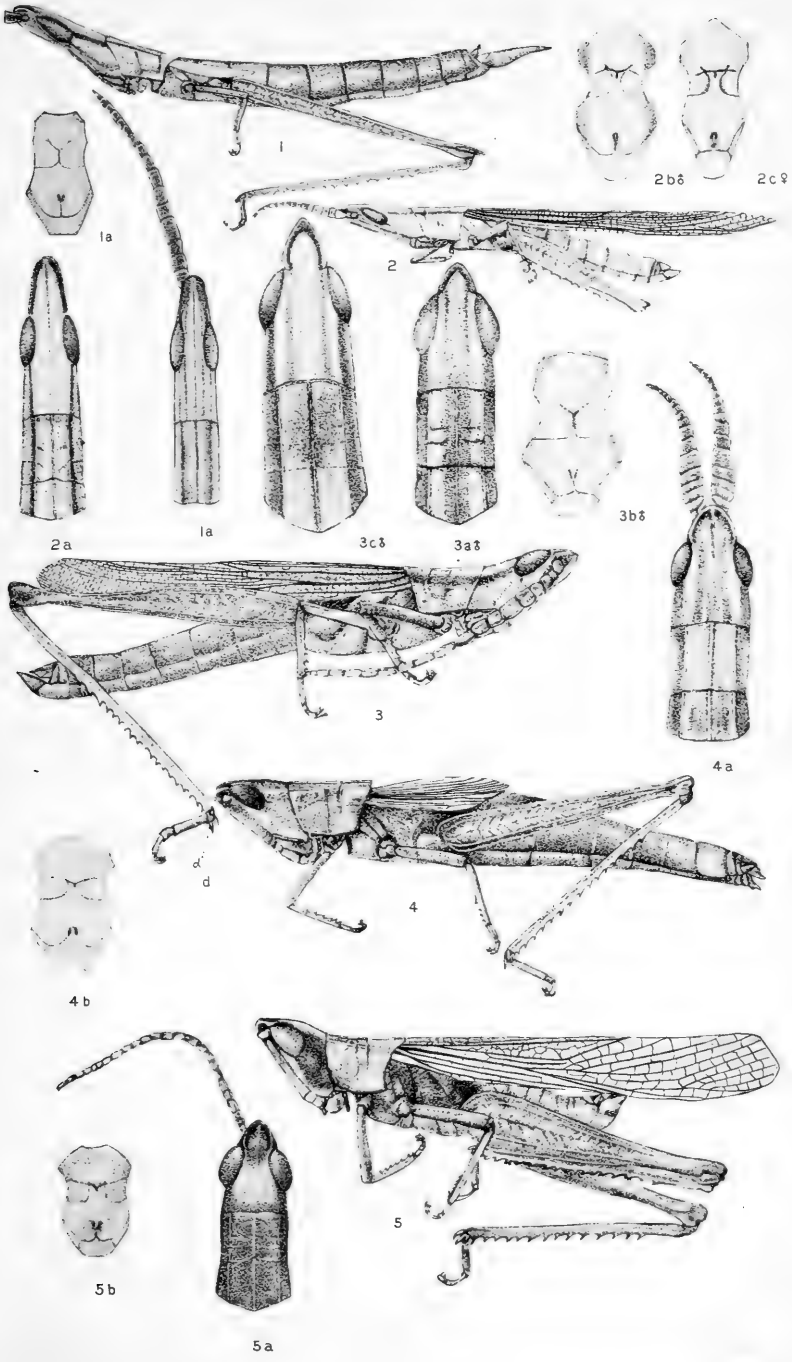
The above presentation gives an idea of the work done and results accomplished. Each member of the expedition has placed in the hands of Capt. Glazier a letter fully endorsing his claims as the discoverer of the source of the great river.

C. E. HARRISON.

Davenport, December 25, 1896.

PLATE I.

1. *Radinotaton brevipenne*, Thos., n. gen. Male; a — upper view of head and pronotum; b — sternum.
2. *Achurum sumichrasti*, Sauss. Male; a — upper view of head and pronotum; b — sternum; c — sternum, female.
3. *Mermiria alacris*, Scud. Male; a — upper view of head and pronotum; b — sternum; c — *Mermiria rostrata*, n. sp., upper view of head and pronotum; d — inner apical spurs of the posterior tibiæ.
4. *Pseudopomala bracyptera*, Scud. Female; a — upper view of head and pronotum; b — sternum.
5. *Truxalis brevicornis*, Linn. Male; a — upper view of head and pronotum; b — sternum.



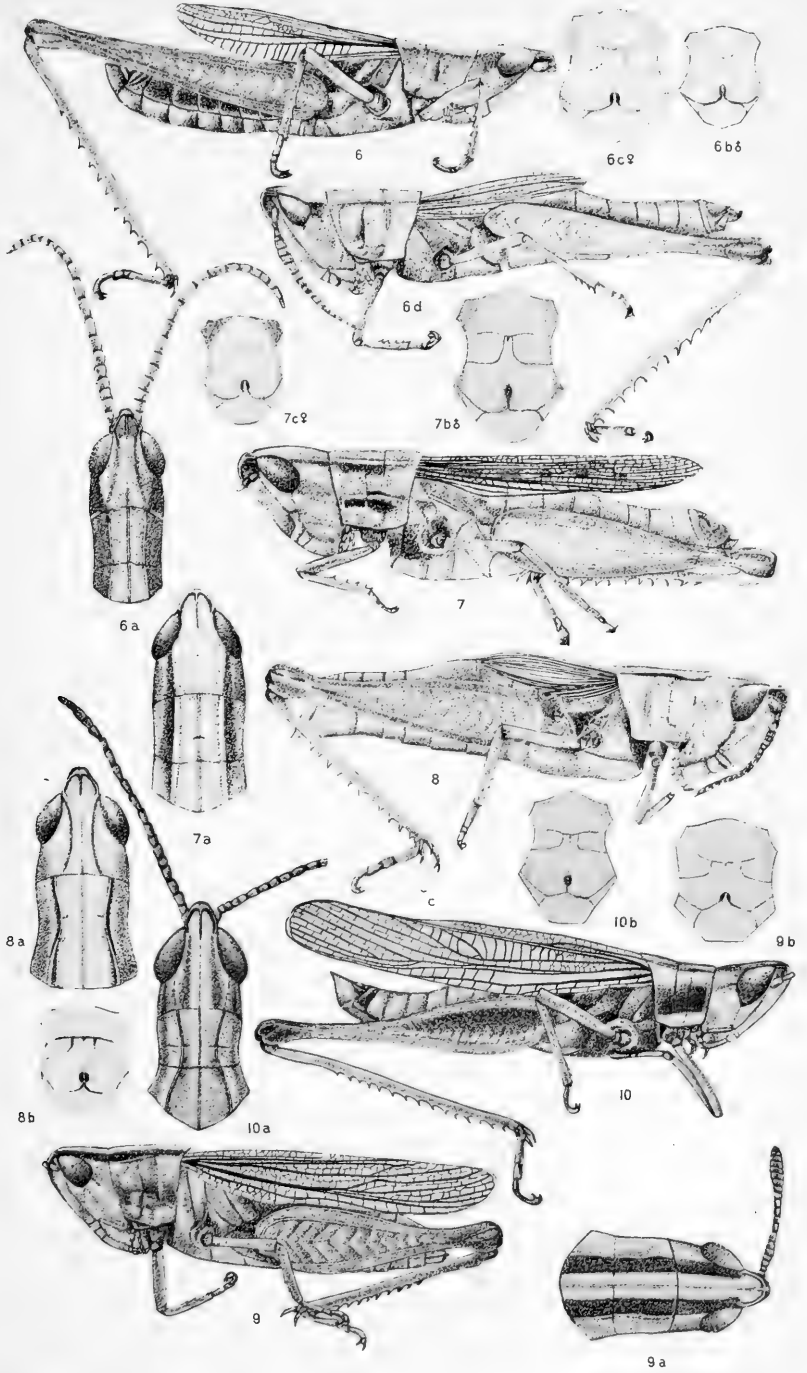
Miss A. Symonds, cam. luc. et del.

Miss A. Laverett, del.

Heliotype Printing Co., Boston.

PLATE II.

6. *Napaia gracilis*, n. sp. and gen. Male; a—upper view of head and pronotum; b—sternum; c—sternum, female; d—lateral view of female.
7. *Opeia obscura*, Thos., n. gen. Female; a—upper view of head and pronotum; b—sternum; c—sternum, male.
8. *Pedeticum obscurum*, Scud., n. gen. Female; a—upper view of head and pronotum; b—sternum; c—unequal inner apical spurs of the posterior tibiæ.
9. *Eritettix virgatus*, Scud. Female; a—upper view of head and pronotum; b—sternum.
10. *Syrbula acuticornis*, Bruner. Male; a—upper view of head and pronotum; b—sternum.

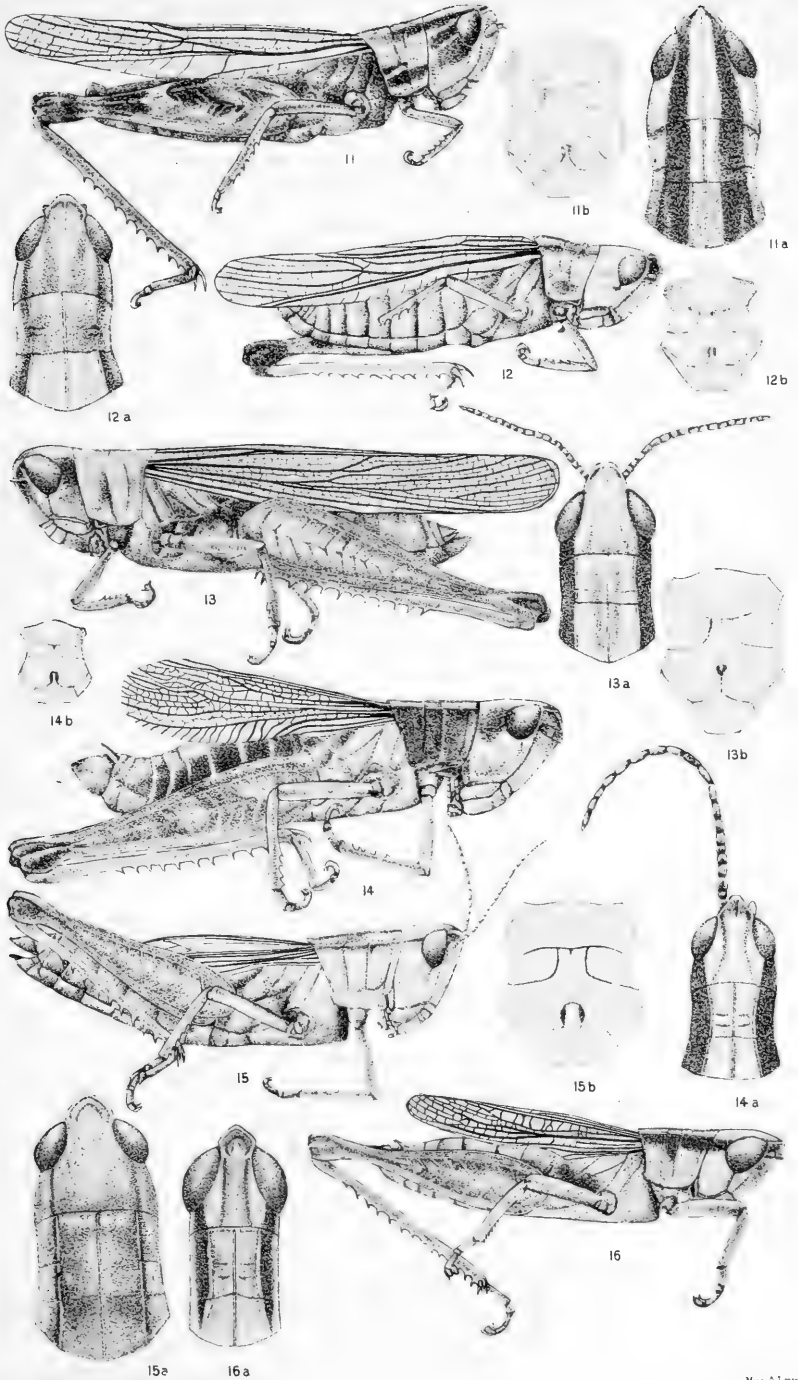


Miss A. Simonds, cam. luc. et del.

Miss A. Leverett, del.

PLATE III.

11. *Amphitornus bicolor*, Thos., n. gen. Male; a—upper view of head and pronotum; b—sternum.
12. *Akentetes unicolor*, n. sp. and gen. Male; a—upper view of head and pronotum; b—sternum.
13. *Amblytropidia occidentalis*, Sauss. Male; a—upper view of head and pronotum; b—sternum.
14. *Chlocaltis conspersa*, Harr. Male; a—upper view of head and pronotum; b—sternum.
15. *Dichromorpha brunnea*, Scud. Female; a—upper view of head and pronotum; b—sternum.
16. *Chlinocephalus elegans*, Morse. Male; a—upper view of head and pronotum.



Miss A. Summers, com. hac et del.

Miss A. Lawrence, del.

Heliotype Printing Co, Boston.

PLATE IV.

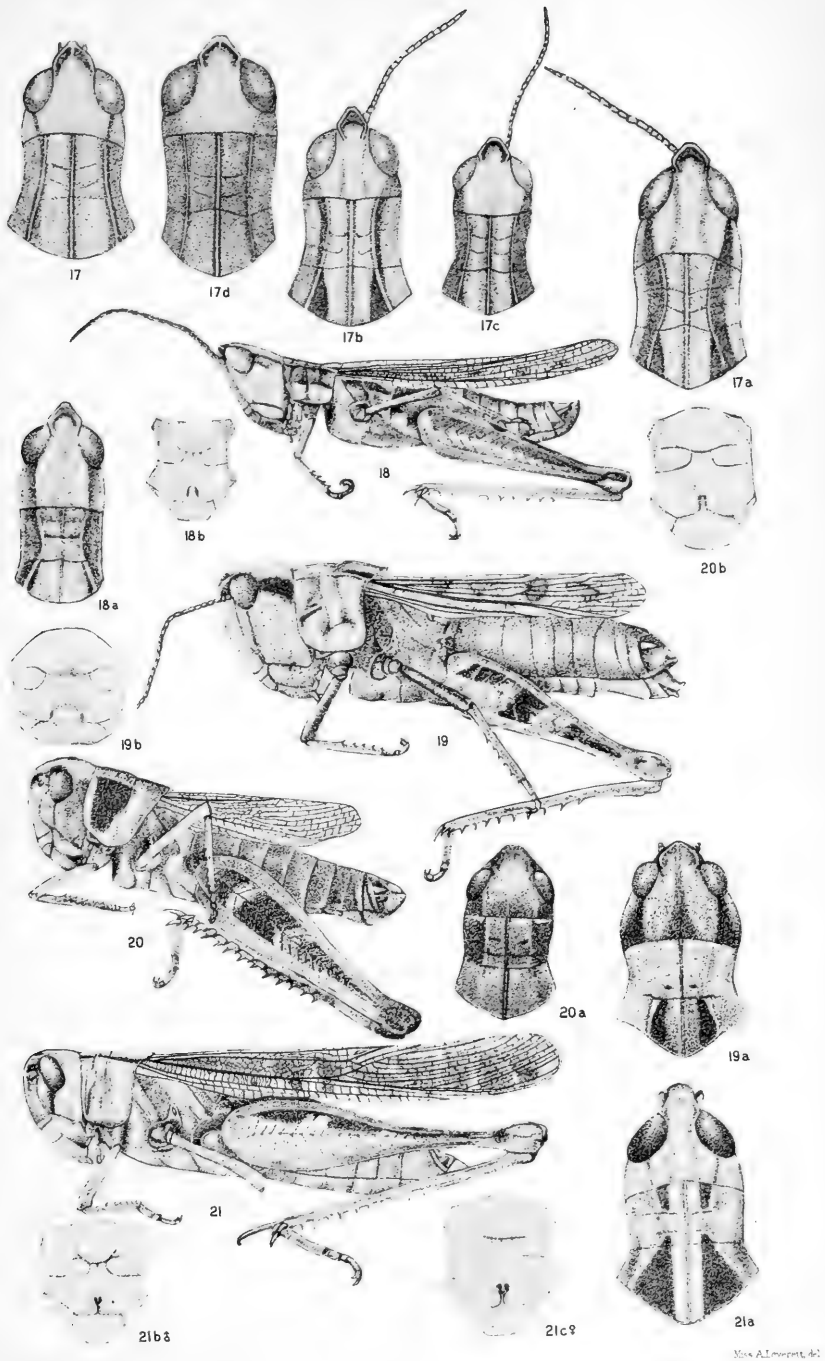
17. *Orphula orizabæ*, n. sp. Female — upper view of head and pronotum ; a — *Orphula tepanicas*, Sauss. Female, upper view of head and pronotum ; b — *Orphula olivacea*, Morse. Female, upper view of head and pronotum ; c — *Orphula speciosas*, Scud. Female, upper view of head and pronotum ; d — *Orphula decora*, n. sp., upper view of head and pronotum.

18. *Alpha occipitalis*, Thos. Male ; a — upper view of head and pronotum ; b — sternum.

19. *Phlibostroma quadrimaculata*, Thos. Female ; a — upper view of head and pronotum ; b — sternum.

20. *Boöpedon nubilum*, Say. Male ; a — upper view of head and pronotum; b — sternum.

21. *Plectrophorus viatorius*, Sauss., n. gen. Male ; a — upper view of head and pronotum ; b — sternum ; c — sternum, female.



Mintern Printing Co. Boston

PLATE V.

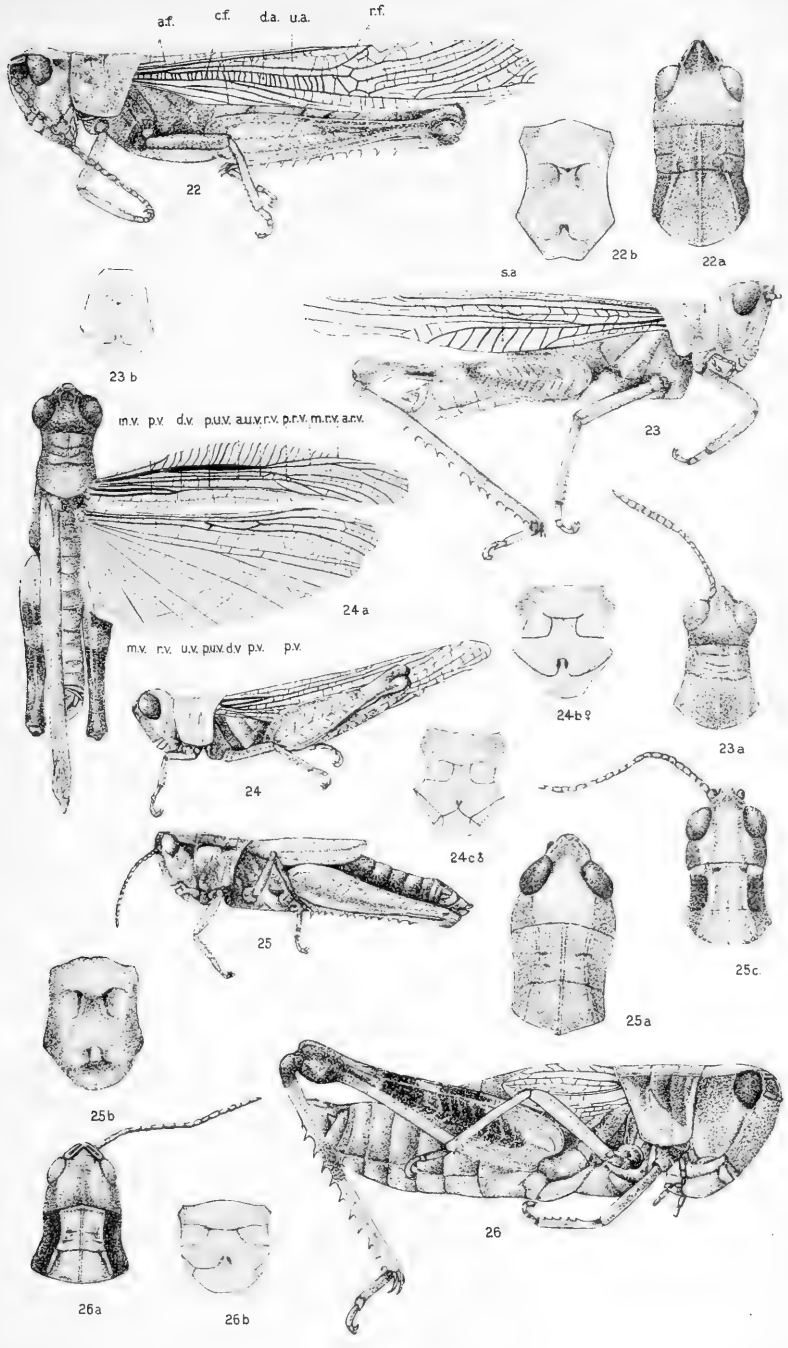
22. *Mecostethus lineatus*, Scud. Male; a—upper view of head and pronotum; b—sternum; a. f., anal field; r. f., radial field; c. f., costal field; d. a., discoidal area; u. a., ulnar area.

23. *Boötettix argentatus*, Bruner. Male; a—upper view of head and pronotum; b—sternum; s. a., scapular area.

24. *Ligurotettix coquilletti*, n. sp. and gen. Female; a—upper view of male, showing tegmina and expanded wings; b—sternum, female; c sternum, male; m. v., mediastine vein; r. v., radial vein; a. r. v., m. r. v., p. r. v., anterior, median, and posterior radial vein; i. v., intercalary vein; a. u. v., anterior ulnar vein; p. u. v., posterior ulnar vein; d. v., dividing vein; p. v., plicate veins.

25. *Stenobothrus coloradensis*, n. sp. Female; a—upper view of head and pronotum; b—sternum; c—*Stenobothrus sordidus*, n. sp. Male, upper view of head and pronotum.

26. *Brunneria shastana*, Scud., n. gen. Male; a—upper view of head and pronotum; b—sternum.



Miss A. Sprunde, com. hue et del.

Miss A. Laverett, del

Heliotype Printing Co., Boston

PLATE VI.

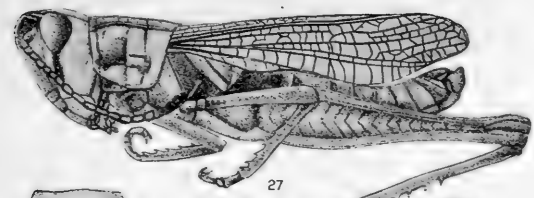
27. *Gomphocerus clepsydrus*, Scud. Male ; a — upper view of head and pronotum ; b — sternum.

28. *Pnigodes megocephala*, n. sp. and gen. Male ; a — upper view of head and pronotum ; b — sternum.

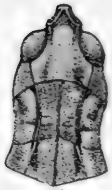
29. *Eremnus deorum*, Scud., n. gen. Male ; a — upper view of head and pronotum ; b — sternum.

30. *Stirapleura decussata*, Scud. Female ; a — upper view of head and pronotum ; b — sternum ; c — *Stirapleura texana*, Scud. Side view.

31. *Psoločssa maculipennis*, Scud. Male, upper view of head and pronotum; a — *Psoločssa ferruginea*, Scud. Female, upper view of head and pronotum ; b — sternum, male.

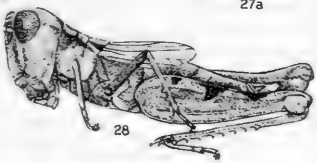


27



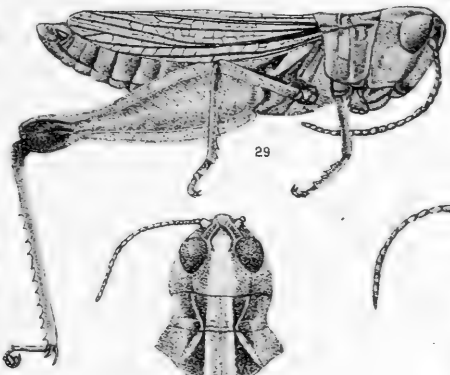
27a

27b



28

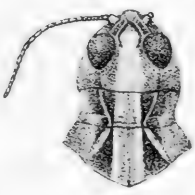
28b



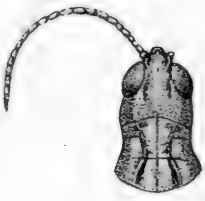
29

29b

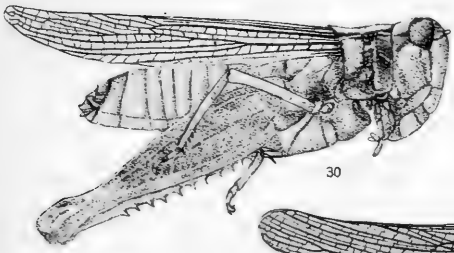
28a



30a

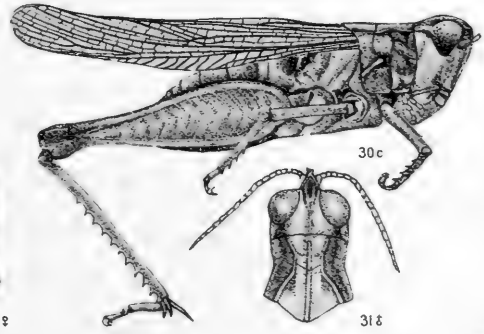


29a



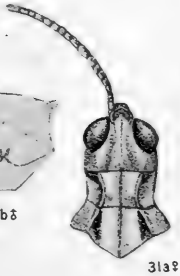
30

30b



30c

31b♂



31a♀

31♂

Miss A. Sprunds. cam. lux. et del.

Miss A. Lovett, del.

INDEX.

BY C. H. PRESTON.