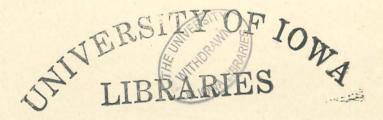


Geolog



IOWA

GEOLOGICAL SURVEY

VOLUME XIII

ANNUAL REPORT, 1902

=

WITH

ACCOMPANYING PAPERS

SAMUEL CALVIN, A. M., PH. D., STATE GEOLOGIST

A. G. LEONARD, ASSISTANT STATE GEOLOGIST



DES MOINES
PUBLISHED FOR IOWA GEOLOGICAL SURVEY
1903

AWOI

GEOLOGICAL SURVEY

MIX REGULATIVE

ANNUAL REPORT 1802

DES MOINES:

BERNARD MURPHY, STATE PRINTER.

1903.

ANTONIO DE L'ESTA DE L'ALLE CONTRA L'ANTONIO DE L'ALLE CONTRA L'ALLE CON



ARRON 680 Argus 1600 April 1604 si 1 demonstrat

Herbogy 557,77 I6.1 V.13 1902 Cop.5

GEOLOGICAL BOARD.

HIS EXCELLENCY, A. B. CUMMINS, - GOVERNOR OF IOWA
HON. B. F. CARROLL, - - - AUDITOR OF STATE
DR. GEO. E. MACLEAN, PRES. STATE UNIVERSITY OF IOWA
PROF. E. W. STANTON, ACTING PRES. IOWA STATE COLLEGE
PROF. B. FINK, - PRES. IOWA ACADEMY OF SCIENCES



GEOLOGICAL CORPS.

SAMUEL CALVIN	STATE GEOLOGIST
A. G. LEONARD	
J. B. WEEMS	
	SPECIAL ASSISTANT
J. A. Udden	SPECIAL ASSISTANT
I. H. MACBRIDE	SPECIAL ASSISTANT
l'nos. J. SAVAGE	SPECIAL ASSISTANT
IRA A. WILLIAMS	SPECIAL ASSISTANT
NELLIE E. NEWMAN	SECRETARY

CONTENTS.

P	AGE.
Members of Geological Board	3
GEOLOGICAL CORPS	4
Table of Contents	5
List of Illustrations	6
Administrative Reports	9
GEOLOGY OF HOWARD COUNTY	21
GEOLOGY OF KOSSUTH, HANCOCK AND WINNEBAGO COUNTIES	81
GEOLOGY OF MILLS AND FREMONT COUNTIES	123
GEOLOGY OF TAMA COUNTY	185
GEOLOGY OF CHICKASAW COUNTY	255
GEOLOGY OF MITCHELL COUNTY	
REPORT ON THE LITHOGRAPHIC STONE OF MITCHELL COUNTY	339
GEOLOGY OF MONROE COUNTY	353

LIST OF ILLUSTRATIONS.

PLATES.

- I. Map showing progress of detailed mapping.
- II. Plat of Township 98 N., Range 27 W.
- III. Deposit of mud after a flood on the Nishnabotna bottoms.
- IV. Deposit of mud and debris after a high flood on Keg creek.
- V. Mud deposited on bank of Keg creek after a flood.
- VI. Geological sections in Mills and Fremont counties.
- VII. Loess ridge and alluvial plain of Missouri river.
- VIII. Lithographic beds of the Lewis and Gable quarries.
 - IX. Unconformity between Coal Measures and Saint Louis limestone.
 - X. Section along Coal creek showing spheroidal weathering of sandstone.

FIGURES.

- 1. Erosionally developed and well rounded hills of loess-Kansan area.
- 2. View in the valley of the Upper Iowa or Oneota river.
- 3. The rock-wall gorge of the river.
- Hills of thickened loess like morainal ridges along the boarder of the Iowan plain.
- 5. Iowan plain in section 7, Oak Dale township.
- 6. Region of thin drift at Vernon Springs.
- 7. Cliffs of Trenton limestone.
- 8. Cliffs of Trenton limestone, Albion township.
- 9. Typical Galena phase of the Galena-Trenton.
- 10. Exposure of the Maquoketa shales in section 8.
- 11. Quarry in the heavy dolomitized Productella beds at Foreston.
- 12. Typical exposure of the coarse calcite-bearing beds (Acervularia horizon) below the mill dam at Vernon Springs.
- 13. The Salisbury quarry, near Vernon Springs.
- 14. Esker of Buchanan gravels in section 27.
- 15. Iowan bowlder in section 22.
- 16. Pilot Knob as seen from Forest City.
- 17. Dead Man's Lake.
- 18. Bowlders liable to assume fantastic shapes.
- 19. Margin of the loess-Kansan area in Carlton township.
- 20. View showing the topography of the Toledo lobe.
- 21. View showing the topography of the loess-Kausan area near the southern portion of Tama county.
- 22. View looking west across the valley of Deer creek, showing the western margin of the Toledo lobe.

FIGURES.

23. View from the bluff on the west side of the valley of Deer creek looking east over a portion of the Toledo lobe.

24. View of the Butlerville quarry.

- 25. View in the Steven's quarry, Indian Village township.
- 26. The Devil's Anvil. A tongue shaped lobe of Kinderhook limestone.

27. Exposures in an old quarry in section 8. Indian Village township.

28. Exposures in a cut along the Chicago & Northwestern railroad. Horizontal band representing old Aftonian soil horizon.

29. Typical marsh in the Iowan drift plain.

30. Exposure of fossiliferous loess in the clay pit of Mr. Bentley.

31. Typical view of the level of Iowan plain in the northern part of Tama county.

32. Level Iowan plain with characteristic bowlders.

33. Border of a small area of "rolling Iowan," Jacksonville township.

34. Quarry in section 30, Bradford township.

35. Quarry in cherty dolomitic beds a short distance above the bridge at Chickasaw.

36. The old Bishop quarry.

37. Exposure of the upland phase of the Buchanan gravels.

38. Typical field of Iowan bowlders.

- 39. Field showing an unusual number of small bowlders.
- 40. Saint Peter, the largest bowlder in Chickasaw county.

41. Glacial planing of an Iowan bowlder.

 An Iowan bowlder two and one-half miles northeast of Osage. Largest bowlder seen in Mitchell county.

43. Undulating surface in areas of thin Iowan drift near the streams.

44. Precipitous, rocky cliffs along the valley of the Cedar river, showing preglacial characteristics.

45. Rock creek, showing the usual type of stream in the Iowan drift.

- Loess-Kansan topography in the southern part of the Osage-Mitchell loess island.
- 47. The Lewis lime quarry, one and one half miles south of Osage.

48. Lithographic beds in the Gable quarry.

- 49. Cliff showing folded and brecciated beds at the base.
- 50. Near view of the crush breccia at the base of the cliff.

51. Precipitous, rocky cliffs at Mitchell.

- 52. Folded beds of the brecciated zone in the bank of Deer creek, Newburg township.
- 53. Pit of Buchanan gravel overlain by Iowan loess.
- 54. Sketch map showing the drainage of Monroe county.
- 55. Saint Louis limestone in Miller creek near Eddyville.
- 56. Gigantic Lepidodendrons weathered out of the shales and sandstones along Coal creek.
- Concretionary sandstone which appears conglomeratic on casual inspection.
- 58. Exposure of Carboniferous sandstone on Coal creek.
- Pleistocene conglomerate underlain with Coal Measure shales near Eddyville

FIGURES

- Approach and tipple of one of the mines of the Smoky Hollow Coal Company.
- 61. Horse gin used in sinking a shaft near Foster.
- 63. Tipple at shaft No. 3, Wapello Coal Company, Hite nan'
- 63. Tipple and screening plant at shaft No. 1, Hocking Coal Company.
- 64. Tipple of shaft No. 2, Hocking Coal Company, Hocking.
- 65. Steel tipple and surface plant of the Whitebreast Fuel Company. Hilton.
- 66. Steel tipple of Whitebreast Fuel Company in course of construction.
- Drainage showing the arrangement of tracks and switches in the Whitebreast tipple.
- 68. View of Buxton from the west.
- Steel tipple showing box car loader, shaft No. 10, Consolidation Coal Company, Buxton.
- 70. Diamond drill of the Wapello Coal Company.
- 71. Churn drill of the Consolidation Coal Company.
- 72. Burnt clay rallast machine used by the Davy Burnt Clay Ballast Company
- 73. Coaling machine used by the Davy Burnt Clay Ballast Company.

MAPS.

Geological map of Howard county.

Map of the Superficial Deposits of Howard county.

Map of the Superficial Deposits of Kossuth county.

Map of the Superficial Deposits of Hancock county.

Map of the Superficial Deposits of Winnebago county.

Map of the Superficial Deposits of Mills county.

Map of the Superficial Deposits of Fremont county.

Map of the Superficial Deposits of Tama county.

Geological map of Chickasaw county.

Geological map of Mitchell county.

Geological map of Monroe county.