SUGGESTIONS FOR THE STUDY OF THE KASKASKIA VALLEY

The main theme is the working out of the physical history of the region, including the flat of the Kaskaskia and a belt say 6 or 8 miles on either side of it, and the formulation of this history in simple, readable, and accurate language, so that it can be understood by the untechnical reader of intelligence.

Many subordinate topics under the general topic are to be especially considered. Among these are the following:

1. The river flat: How made, and why marshy?

a. Is the marshiness due to obstructions of drainage because of blocking at the lower end of the river, for example, the filling of the Mississippi valley?

b. Or is it due to excess of sediment brought in by tributaries, there being partial blocking at many points? If so, the marshiness should show itself especially above the lower ends of the tributaries. If the drainage has been obstructed by sediment brought in by tributaries, is the marshiness of recent origin? Has it come about since cultivation? (Perhaps some of the old settlers of the region might have some data as to whether the marshiness in the flat has increased or decreased.)

c. Is the marshiness due to the sinking of the valley?

In pursuance of the general theme of the flat, the depth of alluvium and its character should be studied, wherever exposed, and data should be got wherever wells afford it. (Farmers may know something. Villages will give more. Well diggers in villages should be seen. Railway wells, village water-works, etc.)

Make a comparison of the erosion of the slopes that are wooded and those that are unwooded; also cultivated, versus uncultivated.

These studies might be carried up the lower courses of the tributaries.

I think it not impossible that some interesting results may come out of this study of erosion on the wooded and unwooded slopes. Have in mind always, in this connection, suggestions which may be of value in the region, as to ways of stopping erosion, sedimentation in the valleys, etc.

The study of the topography of the flat.

2. Present work of stream: I think it not unlikely that a careful study of the way in which the stream is now working may be of value; also the study of recent changes. Some of the farmers who live along the stream may be able to give you valuable data. Historical data of this sort, from men who can be relied upon, may prove valuable.

3. Peat: If you have an opportunity, ascertain the depth of peat in the marshes, and whether it is good enough and abundant enough to be of value.

4. Terrace materials: Their kind; the conditions of their origin; the times of their origin. Their connection with glacial formations and periods, is of interest.

5. Dunes: If there are dunes, they should be studied and their relations made out.

6. The loess: This should be a topic of study both from the point of view of its origin, and from the point of view of its general economic value.

7. The drift: The drift should be studied. Is there more than one drift? Is there evidence of an interval between the drift and the loess? Thickness of the drift?

8. Drift and valleys: Were the present valleys as deep as they now are when the drift of the region was deposited?

9. Topographic features due to the drift.

10. Changes of drainage: Did the drift change the courses of streams by blocking valleys?

11. General rock structure: The general rock structure of the region should be studied, incidentally at least, though this is not the main theme. The relation between the structure of the rocks and the topography should be made clear.

In working out the above, it will probably be necessary to reconnoiter the valley from Shelbyville to the Mississippi flat; but your special studies will be in the section for which you have maps.

12. As to mapping: It is not quite clear at the present moment just what should be done in the way of making a map. It would be well to outline flood-plain versus terrace areas. This will be easy with the topographic base. It may be worth while to outline the wooded slopes as distinct from the cultivated slopes. This need not be carried back far from the streams--not beyond the immediate slopes. Perhaps dune areas should be outlined. I think also that rock outcrops in the bluffs should be shown. I do not just now think of other things which ought to get onto a map, but keep the matter in mind and add such things as seem desirable.

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Illustrations.

Chap. I. Introduction:

Index map — Illinois south of 40° 45'. Should show (1) area studied and its geographic location with respect to St. Louis and larger towns of S. Illinois. (2) areas topographically mapped (a) quadrangles (b) drainage maps. and (3) Kaskaskia river system with outline of basin. (?)

((3) as separate illustration (?))

Frontispiece (?)

Chap-II. Physiographic Features.

Fig. 1.

Folding map showing general distribution of: (1) Main Stream (2) flood plain (3) Sand mound areas (4) Terraces (5) Upland (6) Moraine ridges on upland.

Should show ff. towns by letters in ff order.

Co - Cowden
V - Vandalia
K - Keyesport.
C - Carlyle
B - Bartelso
G - Germantown
N.M. - New Memphis
M - Mascoutah
O - O'Fallon
F - Fayetteville
N.A. - New Athens
E - Evansville.
Ka - Kaskaskia.

Chap II

~~drainage map.~~

Fig. 2. Reproduction of area in vicinity of Carlyle from (K as drainage (7) maps) to show (1) narrows (2) rock outcrops (3) stream meanders (4) Lakes & marshes (5) lateral planation (6) Sand mounds (7) Terraces (8) Fans & alluvial slopes. (9) Island Hill (10) small tributary valleys (11) Drift hills on upland. (12) Section along line A - A.

Would it be better to use Carlyle sheet here? If so: fans, slope wash, sand mounds, trib valleys, and section would have to be shown elsewhere.

Fig 3.

Profiles of valley floor & upland show shallowing of valley in vicinity of Carlyle.

Fig. 4.

Profile of river.

Fig 5.

Chap II

Fig. 5.

Sections of channel at Wrm Bridge, Vandalia, Carlyle. Greens Lake, ~~Evansville~~. New Athens. (~~From~~ Harmon's Report.)

Plate II

Fig. ~~*~~ 6

Photo showing sand bar, caving bank, island, and snags.

Fig. B.

Photo showing tilted bedding in discovered bar.

Fig. 6.

Diagram showing delta building along river channel during low water.

Fig. 7.

Tracing, A, and diagram B. showing probable ~~gradual~~ origin of Pecan Island.

Fig. 8.

Graph showing rate of fluctuation of stream flood and rainfall curve.

(Harmon)

Chap II

Fig. 9.

Diagram showing Terracelike character of flood plain material.

Plate II *

A-Photo of N. levee

B- Undercutting & drift accumulation.
or alluvial slope A ——— B. on Terrace photo.

Fig. 10.

Diagram of fans on valley floor, showing marshiness up valley, ~~and~~ development of fan terraces, and effect of fan on position of main stream.

Fig 11.

Diagram in perspective showing sets of terraces, with varying elevations & their merging ~~junction~~ with the flood plain. See Davis.

Fig. 12.

Gullied Slope: section on line A – A.

Chap. II

Plate III

A- Terrace top S of Mascoutah

B- Kames S.W. of Keyesport.

Fig. 13.

Section along A - A. Carlyle Sheet.

Chap III Geological ~~Formations~~.

Plate 4 Folding structure sections.

A. across state, St. Louis — Vincennes.

B - Along River, mouth to Shelbyville.

Fig. 14.

Section of Mascoutah well with correlations.

Plate. 5.

A - Mississippian fossils.

B - Penn. " .

Plate. ~~6~~ 7.

A - Outcrop Shoal creek LS. A - Carlyle Riffle.

B " " ~~Kaskaskia LS.~~ B - Streambank. anticline.

Fig. 15.

Structure suitable for oil & gas accumulation. See Bull. 16, p. 144.

Plate ~~7~~ 6.

A - Stream outcrop Mo. Jct.

B - Outcrop at Riley.

Chap III
Plate. 8.

A- Till section

B- Brown loam in Cut E of Carlyle.

Plate 9

A- Stratified drift glacial stones?

B- Loess

Chap. IV Processes.

Fig 16.

Diagram of dune group.

Plate - 10

A - Falls in quarry creek.

B - Limestone sinks.

Fig. 17 -

Sections showing development of sinks.

Fig. 18.

Water table in area of normal relief.

Fig. 19.

Inequalities in stream bed causing up moving currents.

Fig. 20.

Tracing from map showing elimination of gullies.

Fig. 21.

Progression of meanders

Chap IV
Plate. 11.
A. Creep.
B. Mature valley. (?) Erosion on upland.

Chap. V. River History.
Plate 12.
Leverett, map of Ill.

Fig. 22 -
Map of Lake Kaskaskia.

Fig. 23.
Section at Evansville.

Chap. 1. Introduction.

1. The Area Studied.

A.-Location.

B.-Boundaries.

1-political.

2-physiographic.

C.-Extent.

D.-Geographical relations.

1-to Kaskaskia Basin.

2-to Mississippi Basin.

~~E.-Climate.~~ ?

~~F.-Vegetation.~~?

11. Purpose and scope of report.

111. Time and manner of field work.

1V. Acknowledgments.

Chap. 11. Topographic Features.

1. Physiographic divisions.

A. The valley.

B.-Upland plain.

11. The Kaskaskia Valley.

A.-Size and shape.

1.-length.

2.-width.

3.-depth.

B.-Subdivided into

1-valley floor.

2-valley walls.

3-special features

a-terraces.

b-fans.

c-dunes.

d-slope wash.

C.-The valley floor.

1-boundaries and extent.

2-topography.

3-subdivisions.

4-towns supplied from River.

a-Vandalia.

b-Carlyle.

c-New Athens.(?)

E.- The Flood Plain.

1-size and shape.

2-topography.

a-general flat.

b-elevations. (dunes. (levees.

c-depressions (lakes. (marshes. (flood scars.

3-materials.

a-constituents (muck. (clay. (sand. (gravel.

b-structure.

c-depth.

F.-Special features on valley floor.

1-sand mounds) (a-distribution.

2-alluvial fans) (b-shape & size. { position on V floor. Effect on main stream

3-deposits along base of valley walls)(c-materials.)(d-origin.

G.-The valley walls.

1-height.

2-angle of slope.

3-horizontal irregularities.

a-meander scars.

4-materials.

5-terraces.

a-distribution.

b-size & shape.

c-materials. (drift. (silt. (bed rock.

d-relations to flood plain.

e-origin in brief.

III. The Upland Plain.

A.- Topography.

1-general flatness.

2-tributary valleys.

a-distribution.

b-size and shape.

c-relations to main valley.

3-hills and ridges.

a-distribution.

x-geographical.

y-with relation to valleys.

b-size and shape.

c-trend.

B.- Materials.

1-Drift.

a-distribution.

b-thickness.

c-constitution.

x-physical (color.
(texture.
(shapes of stones.

y-lithological (kinds of stones.
(comparison with bed rock.

z-stratification.(

2-Brown loam.

a-distribution (outside of region.
(within region. (vertical.
(horizontal.

b-description.

color.

texture.

chemical nature.

thickness.

c-relations to drift.

d-economic.

brick clay.

fertility.

3. Loess.

a-stratigraphic relations.

b-distribution.

c-thickness.

d-description.

color.

texture,"feel."

stands in steep faces.

constitution.

character of particles.

concretions.

fossils.

chemical character.

e-economic.

fertility.

4-Soils.

a-character. (color.
(texture.
(chemical.

b-depth.

c-derivation.

d-fertility.

Chap. lll. The Bed Rock.

1. General Statement.

A. Importance.

B. Distinction from mantle rock.

C. Few outcrops; hence chief knowledge from borings.

D. Chronological table.

Penn.

Miss. (Chester. (St.Louis, Salem, etc. (Oeage. (Kinderhook.

ll. Outcrops.

A. Distribution.

B. Description of rocks.

1-kind.

2-color.

3-texture.

4-mineral content.

5-changes on weathering.

6-fossil content.

C. Structure and Stratigraphy.

1-dips, stripes, etc.

2-manner of measurement.

3-joints.

4-contacts.

D. Influence on topography.

1-hills and ridges.

2-drainage lines.

3-special features.

a-falls and rapids.

b-narrows.

c-terraces.

d-hogbacks.

III. Rock penetrated by borings and excavations.

A. Distribution of sections.

B. Study of sections.

1-correlation.

2-structure.

a-relation to Illinois syricline.

b-minor flexures.

c-joints, fissures, etc.

C. Economic products.

1-coal.

2-oil.

3-gas.

4-building stone.

5-water.

D. Origin of the several rocks and products.

E. Structure as controlling accummulation of oil and gas.

1-in presence of much water.

2-in absence of much water.

Chap. 1V. Physiographic Processes.

1. Introduction.

A. Importance.

B. Main divisions or agents.

1-atmospheric.

2-ground water.

3-running water.

or

1-weathering.

2-transportation.

3-corrasion.

4-deposition.

11. The work of the atmosphere.

A. Direct.

1-mechanical.

a-erosion
picking up dust and sand.

b-corrasion.

c-transportation.

d-deposition.

dunes.

loess.

Brown loam (?)

2-chemical.

a-oxidation.)
b-carbonation.) examples.
c-hydration.)

B. Indirect.

1-changes in temperature.

2-influence on climate.

111. The work of Ground water.

Be careful of discussing general soil. Not to be used except as it finds application in very regions

A. Presence shown.

1-wells

2-springs.

B. Source.

C. The water table and movements.

1-relation to topography.

2-relation to porosity.

3-relation to moisture conditions.

D. Solution and chemical change.

~~1-rapidity.~~

2-topographic effect.

lV. Running water.

A. Chief agent bringing land low.

B. Getting a load.

C. Moves load.

suspension.

rolling.

D. Deposits load.

1-due to decrease in velocity.

a-less gradient.

b-less volume.

c-more load.

2-change in load.

a-coarse to fine.

3-position of deposit.

a-where velocity checked.

where gradient decreases

at point of overflow

empties into stiller water.

E. Sheet wash.

F. Concentration of run off.

1-causes

a. inequality of slope.

b. inequality of resistance to wear.

2-effects.

a-concentration of wear.

G. Growth of gullies.

1-length.

2-width.

3-depth.

4-survival and elimination.

H. Stages in valley growth.

1-gets permanent stream.

2-development of tributaries.

3-side cutting becomes dominant.

4-gets floodplain.

5-meandering developed.

a-cause.

b-effect of meander belt.

c-progression of meanders.

V. Less obvious agents.

A. Gravity.

1-creep.

2-slump.

B. Plants.

1-wedgework of roots.

2-chemical action of organic acids.

3-protection by covering of vegetation.

a-forests.

b-grass lands.

c-tilling steep slopes disastrous.

C. Animals.

1-boring animals.

2-cattle etc. on hillsides.

3-man. (tilling.
(cutting timber.
(draining. etc.

CHAP. V. Geologic History.

I. Mississippian.

A. Muddy shallow seas- (Kinderhook)

Marine life.

Chiefly shale soruebs.

B. Clearing of shallow seas. (Oseage)

1-advance of shore.)
)
2-lowering of land.)
) possible causes.
3-dryer land.)
)
4-more animal life.)

C. Clear, shallow seas (St. Louis)

D. Uplift and Erosion.

shown by unconformity.

E. Advance of shore (Cypress S.S.)

(Higher land
(
(nearer shore.
(
(more sediment.

F. Shifting conditions (Chester)

G. Time involved.

II. Uplift and Erosion.

Time involved.

III. Return of Sea. Pennsylvanian.

A. Formation of coal.

1. plant remains.

2. conditions for preservation.

3. a-land and water.

b-climate.

3. alternation of coal and clastic oscillation.

IV. Prolonged erosion interval.

1-movements-Illinois syncline.

2-base leveling.

3-time involved.

4-Pre Ill. Kaskaskia.

V. The Glacial Period-Pleistocene.

A. The Illinoisan ice sheet.

1. Evidence.

a-drift.

constitution.

physical.

lithological.

relations to bed rock.

structure.

topography.

b-bed rock.

clearing off.

smoothing.

2. maximum extent.

3. Stages in retreat (?)

4. Effects upon Kas. Valley.

a-advance.

b-retreat.

5. Climatic effects.

B. Interglacial epoch.

1. Erosion period.

2. climatic changes.

C. Iowan stage.

1-loess (?) Brown loam.

D. Interglacial stage.

E. Wisconsin stages.

1. Maximum extent.

2-effect on Kas. Valley.

a-change at Shelbyville.

b-valley train.

c-remove vegetation { dunes.
{ brown loam.

3-Filling in Miss. Valley.

a-effect on Kas. Valley

ponding at lower end.

silt filling.

lamination.

fossils.

gypsum.

age ?

F. Post Glacial.

1-cutting down by Miss.

2-development of terraces.

3-continued erosion of upland.

4-filling in upper valley.

5-influence of man.

a-deforestation - jams in R.

b-tillage.

c-leveeing.

d-straightening channel.

Chap.

Chap. VI. Settlement & Development.

I. Discovery and Early History.

A. The French.

B. The English.

C. Pioneers from Kentucky.

II. The early Settlers.

A. From the South.

B. From the North.

C. Foreigh immigration.

D. Conditions of pioneer life.

a-forest vs. prairie.

b-communication.

c-transportation.

d-Indians.

III. Rivers as avenues of trade and transportation.

A. Advent of steamboats.

B. Location of townsites.

IV. Development of roads.

V. Condition affecting locations of capital.

VI. Railroads.

VII. Political sectionalism.

A-slavery.

B-Republican vs. Democrat.

C- States rights.

VIII. ~~Manufactures~~. (History of) Industries.

1- Farming
2- manufacturing { woods & what
paper
Brick & Tile.

IX. Future of the Valley.

1- what it needs
2- Conservation vs { soil
Forests.

CHAPTER I.

INTRODUCTION .

The area studied.- The Kaskaskia river is the principal traversing southern Illinois. I t rises just west of Champaign in the east central part of the state, flows in a general southwesterly direction with the slope of the surrounding areas, and finally empties into the Mississippi river 50 miles south east of St. Louis, Mo. 8 miles upstream from Chester, Ill. The index map, Figure I., shows the course of the

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Figure I. Index map showing quadrangles, the area discussed in this report, and the principal tows referred to in the text.

Kaskaskia riverand the region drained by the main stream and its tributaries, the ~~Kaskaskia~~ basin. The area covered in this bulletin extends along the river from the northern edge of Fayette county to the Mississippi. It comprises a strip of valley and adjoining upland 110 miles long and from 2 to 20 miles wide, and includes parts of Fayette, Bond, Clinton, Washington, St. Clair, Monroe, and Randolph counties, the core of the Kaskaskia basin.

Purpose and scope of the report.- This report is based upon field studies by the writer during the Summer of 1909 and the Autumn of 1911, under the direction of the State Geological Survey. It is designed to serve as a guide to a study of the physiographic features of the region under discussion, and to point out the ~~relation~~ influence of the geographic conditions upon ~~the~~ its settlement and development ~~of the~~ The several topographic sheets of the Kaskaskia River Survey were used as bases for the field work. In addition , thenCarlyle, Breese, Okawville, and New Athens topographic maps were used in the study of the upland thru those quadrangles.

These maps may be obtained from the Director, U. S. Geol. Survey, Washington, D. C. They cost five cents each.

Chap. I. Introduction

1- The area Studied: The area discussed in this bulletin ~~lies in south-central Illinois~~, extends along the Kaskaskia river from the Northern edge of ~~Fayette~~ County to the Mississippi river. It consists of a strip of valley and adjoining upland 110 miles long and from 3 to 20 miles wide, including parts of ~~Fayette~~, Bond, Clinton, Washington, St. Clair, Monroe, and Randolph Counties. This (elongate) strip {forms} the core of the Kaskaskia drainage basin which is, in turn, a part of that great interior plain drained by the Mississippi river.

{Early Mandalia, Shawneetown, New Athens, Evansville.}

This report is based upon field studies by the writer during the summer of 1909 and the autumn of 1911, made under the direction of the State Geological Survey. It is {proposed} {designed} to serve as {a guide to the citizens of the area in the study of the geologic features and processes of their home region.} {one of a series of Educational Bulletins prepared and published for distribution by the State Geological Survey.} ~~It will deal with the geologic and geographic factors. Its purpose is to~~ The author endeavors to present the {essential} {main} facts of the Geology and Geography

See Geol. Survey.

of the region as outlined above with special emphasis upon the Kaskaskia Valley, where overflow and drainage are live problems. The ~~first five chapters will discuss the geologic and physiographic~~ last phenomena. Chapter ~~II~~ will treat briefly of the settlement ~~of~~ and development of the area as influenced by geographic conditions.

~~The maps~~ used as bases for the field work were the several topographic sheets of the Kaskia River Survey.[1] In addition, the Carlyle, Breese, New Athens, and Okawville topographic maps were used in a study of the Upland thru those quadrangles.

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[1] These topographic sheets may be secured from the Director, U.S. Geological Survey, Washington, D.C. at a cost of five cents each or $3.00 per hundred.

3- Acknowledgements.

Earlier reports and maps have been used freely in the preparation of this report, especially of the last chapter. Detailed acknowledgements and references will appear in the footnotes. The writer is indebted to ~~the~~ members of the State Geological Survey for counsel and assistance, especially to

Professor
~~Hon~~. R. D. Salisbury in charge of educational bulletins. Valuable maps, drawings, ~~and~~, data were received from the ~~Harmon~~ Engineering Co. of Peoria, Ill. (Internal Improvement Commission)

To the farmers, well drillers, quarrymen, etc. ~~people~~ of the region aided in the work by their unfailing courtesy and assistance in furnishing data otherwise unobtainable.

Shaw on terraces & oil records
Beatchley on oil.

And to Dr. Weller of the University of Chicago for advice and assistance with the nomenclature and fossils ~~description~~ of the bed rock in Chap. III.

I

CHAPTER I.

THE TOPOGRAPHIC FEATURES OF THE REGION

The area studied. This report is concerned with that area lying within and along the valley of the Kaskaskia River between the northern edge of Fayette County and the eastern border of St. Clair County. The first four chapters seek to explain the principal geographic features of the area and to outline its physical history. Chapter V. discusses the historical development of the region as influenced by the geographic conditions. Figure I., the index map, shows the location of the principal places referred to in the text. Earlier reports and maps have been used freely in the preparation of this bulletin, especially of the last chapter. Acknowledgements and references will appear in the footnotes. The maps used as a basis for the field work were the Loudon Bridge, Wren Bridge, Vandalia, Soper Lake, Carlyle, Santa Fe, and Queen's Lake topographic sheets of the Kaskaskia River Survey; and the topographic maps of the Carlyle, Breese and Okawville quadrangles.[1]

The Kaskaskia Basin. The Kaskaskia River is the principal stream traversing southern Illinois. It rises just west of Champaign in the east central part of the state, flows in a general southwesterly direction with the slope of the surrounding areas, and finally empties into the Mississippi River about 50 miles below St. Louis and eight miles above Chester, Illinois. Figure 1. shows the course of the river and the the area drained by the main stream and its tributaries, the basin. The Kaskaskia basin is nearly 6000

(1) These maps may be secured from the Director, U. S. Geol. Surv., Washington, D. C. The maps co st five cents each in lots of less than 100 copies, or three cents each in lots of 100 copies or more.

sqare miles in extent, not quite 1/9 the area of the entire state. It is 180 miles long and over 60 miles wide in the widest place. A ridge of stony clay known as the Shelbyville Moraine crosses the basin at Shelbyville, dividing it naturally into two sections, the Upper and Lower Kaskaskia basins. The area which is treated in this report lies wholly within the Lower Kaskaskia basin. The relative size and shape of the two divisions is shown in Figure I.

The valley of the Kaskaskia River. The Kaskaskia Valley is the dominating physiographic feature of the region. Less than a mile across at the northern end of the area, it widens to over two miles within the first fifteen miles. Between Vandalia and Carlyle two and one half miles is the average width with a variation of a half mile either way. At and a few miles below Carlyle, however, the valley narrows suddenly to less than one third mile. Such notable constrictions in a valley, narrows, are unusual. Most river valleys widen regularly downstream. Below the lower narrows the valley broadens out again and averages over three and one half miles in width to the the lower end of the region. Figure II. shows a cross section of the valley at Vandalia. The valley will be presented in detail under the headings 1) the valley floor and 2) the valley walls or bluffs.

The valley floor. The broad flat bottom of the valley, valley floor, lies thirty to one hundred feet or more below the general level og the upland plain, and is bordered by more or less steep slopes, the valley walls or bluffs. The river flows across this flat, winding here and there in long sweeping curves called meanders. After a long dry spell, the water is low and the stream flows in a comparitively narrow channel. In times of flood, however, there is a great deal more water than the channel can contain, and the excess

spreads out over the lower portions of the valley floor. The part of the valley bottom subject to overflow is known as the flood plain. Some parts of the valley floor have been built up by material washed in and deposited, alluvium. Around the fronts of most of the tributary valleys, these deposits of alluvial material are semi-circular or fan-shaped in ground plan, and are called alluvial fans. Along the bases of many of the bluffs, also, there are alluvial deposits ill-defined washed down from the steeper slopes above.

The river and its flood plain.

The river and its flood plain . Within the area studied, the Kas. river has a fall that is not unusual in a stream of its size. For the first five and one half miles, between Cowden Bridge abd Louden Bridge The fallis 19 inches to the mile, above Vandalia the average is about 13 inches to the mile, between Vandalia and Carlyle 10 and 2/5 inches to the mile, and the last 12 miles of the river 7 2/3 inches to the mile. In all there is a fall of 123 feet in a distance of a little over 138 miles by river or an average of 10½ inches to the mile. Below the area studied the fall gradually decreases until the fallis only about 3 inches to the mile for the last 20 miles to the Miss.R. Figure (1). shows the stream profile.

The vlume of the ~~srteam~~ Kaskaskia R. varies greatly thruout the year. During the low water stage, the river becomes a mere streamlet. In flood time , however, when excessive rainsor the rapid melting of heavy snows pour their waters into the valley, the stream spreads out over its flood plain.

Although this grade is not at all uncommon for a strean of this size, still it is not enough to allow the Kaskaskia River to carry off all the sediment brought to it by its swifter flowing tributaries. Wherever these tributaries drain land that is under cultivation they get a great deal more sediment, which they dump upon the flood plain if the main stream is not able to carry it away as fast as brought. Hickory Creek , a few miles south of Vandalia is such a tributary, and the area about the place where it meets the main valley is built wellabove the general level of the valley floor around it.

The clays are usually ~~sandy~~ and blue with brownish iron oxide stains along cracks. The tendency to break into irregular chunks at the brown cracks has led to the local name "joint clay". The ~~Vandalia~~ Hickory Creek drainage ditch ~~shows~~ south east of Vandalia shows logs, stumps, leaves and other vegetable matter imbedded in this stiff "joint clays" These were buried ~~by~~ in marshes or as drifts in the channel and have been preserved from decay by their ~~tight~~ clay ~~cover~~ envelope. Vegetable material ~~is~~ makes up, but an ~~small~~ ~~fraction~~ insignificant part of the deposit. ~~and is nowhere free from other sediment~~. The accumulation of sediment has been too rapid to admit of ~~extensive~~ thick * ~~or~~ ~~vegetable~~ deposits of vegetable material, ~~which are~~ commonly ~~found~~ ~~in~~ to many marshy ~~areas~~ tracts.

muck in swamps.

~~The thickness of the flood plain~~

~~material varies thruout with the locality. It is, in general, thickens down the valley.~~

the Records obtained do not give an adequate knowledge of the variations in the thickness of the flood plain material. At Bridge for piers at Cowden were sunk 35 feet ending in gravel. A boring at 110 feet failed to strike solid rock north of Vandalia

Better drivers this under river history

At Carlyle the river has a rock bottom but this is probably not the deepest part of the flood plain. An oil well boring south of Bartelso gives a depth of +— ft.

see Shaw.

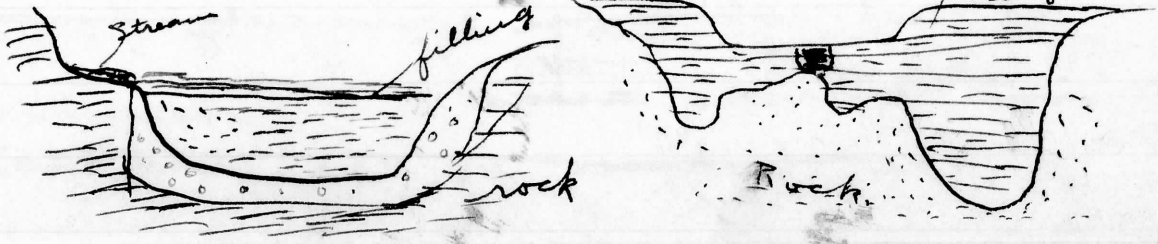
see letter from Mr. J.S. Clark

At Missouri Junctions test borings for the Illinois Southern Railroad bridge encountered rock at 100 ft. The Fig — shows the a profile of the top and bottom of the valley filling. It will be understood that the bottom of this filling is only approximate.

The river, in general, is flowing over sands, gravel, and clay. At certain places however the channel bottom is solid rock.

Carlyle, ^ Pelican Pouch(?), ? Ford, South & Bridge various points between Evansville & Missouri Junction.

These may represent places where the river has been shifted outside its former valley.



Before materials?

Topography

The general level of the floodplain is broken by low knob elevations and shallow depressions. Some of these depressions ~~represent~~ are the sites of less rapid filling than the surrounding areas. Such ~~tracts~~ are the marshy tracts between the natural levees and the flood plain ~~f~~ borders. ~~They are~~ These marshes are invariably immediately in valley from the debouchures ~~found on the downstream side~~ of actively depositing tributaries.

Other depressions ~~of~~ are of such shape and relation to the ~~main~~ river that it is obvious they ~~were~~ ~~once~~ a part of the ~~the~~ ~~represent~~ abandoned parts of the channel. ~~abandoned~~ parts of an abandoned channel. ~~Fig — shows.~~ ~~The ends of these~~ the ends of which have curved depressions become silted up and the basins filled with water. ~~they serve as lake basins, or flood lakes.~~ Fig. 2. shows ox bow lakes ~~In flood~~ During overflow, the swift flood waters are apt to cut across

~~sharp beads in the~~ to scour ~~the~~ shallow ~~narrow~~ troughs in the flood plain surface. and are the sites of sloughs in the low water stage. These are often adopted as the stream channel, and the ends of the abandoned portion of the ~~xx~~ former channel silted up, leaving ~~horseshoe~~ crescent shaped lakes, ox-bow lakes, whose shape and relations to the ~~channel~~ river proclaim their origion. Fig.—. These ~~depressions~~ lakes, (Refer to Round Pond Sheet) however, are short lived, as their basins ~~Special features~~. are rapidly filled by flood deposit, vegetation, and ~~wood~~ material ~~blown~~ blown in by the wind. Many of the present ponds and marshes occupy the sites of lakes which existed within the memory of the older residents. The lower portions of the flood-plain are at present unfit for cultivation. The two problems in their reclamation involve prevention of overflow and drainage. The Internal Improvement Commission

insert at X

(a)

of Illinois is at present considering plans for such improvement. The higher portions are in the main cultivable, and yield ample good crops when not destroyed by flood. ~~Uncertainty~~ liability of overflow, however, discourages agriculture ~~on the bottoms~~. Opposite Vandalia and South of Bartelso extensive tracts have been surrounded by artificial levees ~~which~~ with varying success.

~~Even during the~~ Parts of the valley floor remain {uncovered / unsubmerged / unflooded} even at the maximum flood stage. Most conspicuous of these are the "black-sand" mounds and ridges, especially numerous between Vandalia and Carlyle. The largest of these appear as islands during overflow, and serve as dwelling sites. ~~The soil~~ They are composed of rounded sand grains, yellowish white in color, except ~~at~~ the surface where a mixture with silt and humus has resulted in a black sandy loam. ~~The~~ Most of

these mounds ~~are~~ have been heaped up by the wind ~~out of~~ from the sand of the flood plain, dunes. Others are ~~remnants~~ remnants of former ~~rolling~~ ~~folding~~ flood plains. The present ~~mounds~~ dunes represent the ~~tops~~ crests of former higher ~~mounds~~ mounds the bases of which have been buried in ~~the material of the~~ flood-plain deposit. Fig. — ~~These~~ ~~features~~ Dunes ~~will be discussed~~ are discussed in greater detail in Chap. —, page —.

Groups of these ~~mounds~~ dunes present a characteristic hummocky appearance

Alluvial Fans:

Many of the tributary streams have built up semicircular deposits of alluvium, alluvial fans, upon the flood plain fronting their valley. Most of these fans are ~~insignificant in height and area~~. ~~That fronting Hickory Creek being~~ Fig. —. ~~the most important. They are caused~~ are the largest


flood plain deposit
dune
flood plain deposit.

Flood plain being built up.
Excess of deposit over removal.
~~erosion~~
Working over of upper part.

Shape & size of flood plain. (16)-(17)
Map showing flood plain.
Constricts with valley.
narrows in lower part.
Broken by mounds which rise above it. "Islands" in High water.

Topography of F. P.
Not perfectly flat.
Depressions as
Oxbow lakes { Shape relation to river } Map.
cut-off meanders.
Flood ~~scours~~ scars.
Marshes which have been hemmed in by deposits.

Alluvial Fans.

Around ends of tributaries.
Bring in much (coarse) material.
forced to build up rapidly to keep pace with river.
Shape - due to deposition in channel & overflow over sides. (Profile.)
(Ground plan)

Limit flood plain.
Force stream over.
Marshes on upstream side.
Thrown out of adjustment by migration
of main stream across flat.
1- from tributary - results.
———. more upbuilding
2- Toward bluff.
T——— Terraces.
Course of tributaries upon the
valley floor.
Materials of Fans.

~~Few of the~~ ~~The slopes of their~~ a surface ~~is very~~ so gentle ~~as to be~~ that it can scarcely be detected by the unaided eye. ~~Few of them are built above the level~~ by the absence of marshiness, however, is often established their presence. They are caused by deposit as a result of the checking of the velocity of the ~~tributary~~ streams ~~on~~ where they emerge from their steeper tributary valleys upon the gently sloping flood plain. Fig. — shows the ~~a section of~~ a stream and its alluvial fan. The ~~presence~~ position of the main stream ~~upon~~ upon the valley floor ~~with reference to the~~ is a determining factor in the development of fans. Fig.* shows the main stream close up to the ~~debouchure~~ * debouchure of the tributary valley. Under these conditions, the tributary stream ~~comes, but a~~ flows directly into the main with no marked decrease of gradient and hence little deposition. As the

The fan, in turn, serves to force the river closer against the opposite bank.

(20)

main stream shifts toward the opposite side of the valley, however, the tributary is forced to deposit actively to maintain its gradient across the valley flat. When the stream channel across the F-P. is choked it becomes channel is caught another which in turn is built up. A repetition of this process develops a gentle decreasing slope from the debouchure of the tributary valley across the flood plain, Fig. —. An advance back across the flood plain toward the tributary would quicken the flow of the latter as the gradient was increased and as a consequence, a channel would be sunk into that portion of the fan not undermined by the main stream. The growth of the flood-plain keeps pace with the development of fans, with the result few are built above the flood level.

Hickory Creek has in South of Vandalia built up the most extensive fan within the region studied in its attempt to keep pace with its main across the valley south of Van

Slope Wash

Less ~~well developed~~ distinctive alluvial deposits ~~occur~~ along border the valley flat at the bases of the valley walls. Their slope is not noticeable ~~to~~ ~~for~~ to the unaided eye for more than a few hundred feet from the bluff, but its effect is evident in raising the valley floor ~~for~~ a considerable width above the reach of all but the highest floods. This deposit is the result of material ~~washed and~~ rolled and slid from the steep slopes above, or ~~been~~ washed down by unconcentrated runoff. It is also, in part, a conjunction of miniature fans built by the wash of gullies. In general, this alluvial slope is best developed ~~at the base where the bluffs are highest and where~~ where the highest bluffs have not been recently undermined by the main river stream).

→ Fig. showing ~~slope~~ alluvial slope.

The ~~removal~~ of timber, from the subsequent tillage slopes, has ~~in many instances~~ resulted in ~~the~~ of sand exceptional deposits at the base of cultivated slopes, which have hindered ~~in a previously~~ fertile tract.

3.

The Upland.

Generally flat.

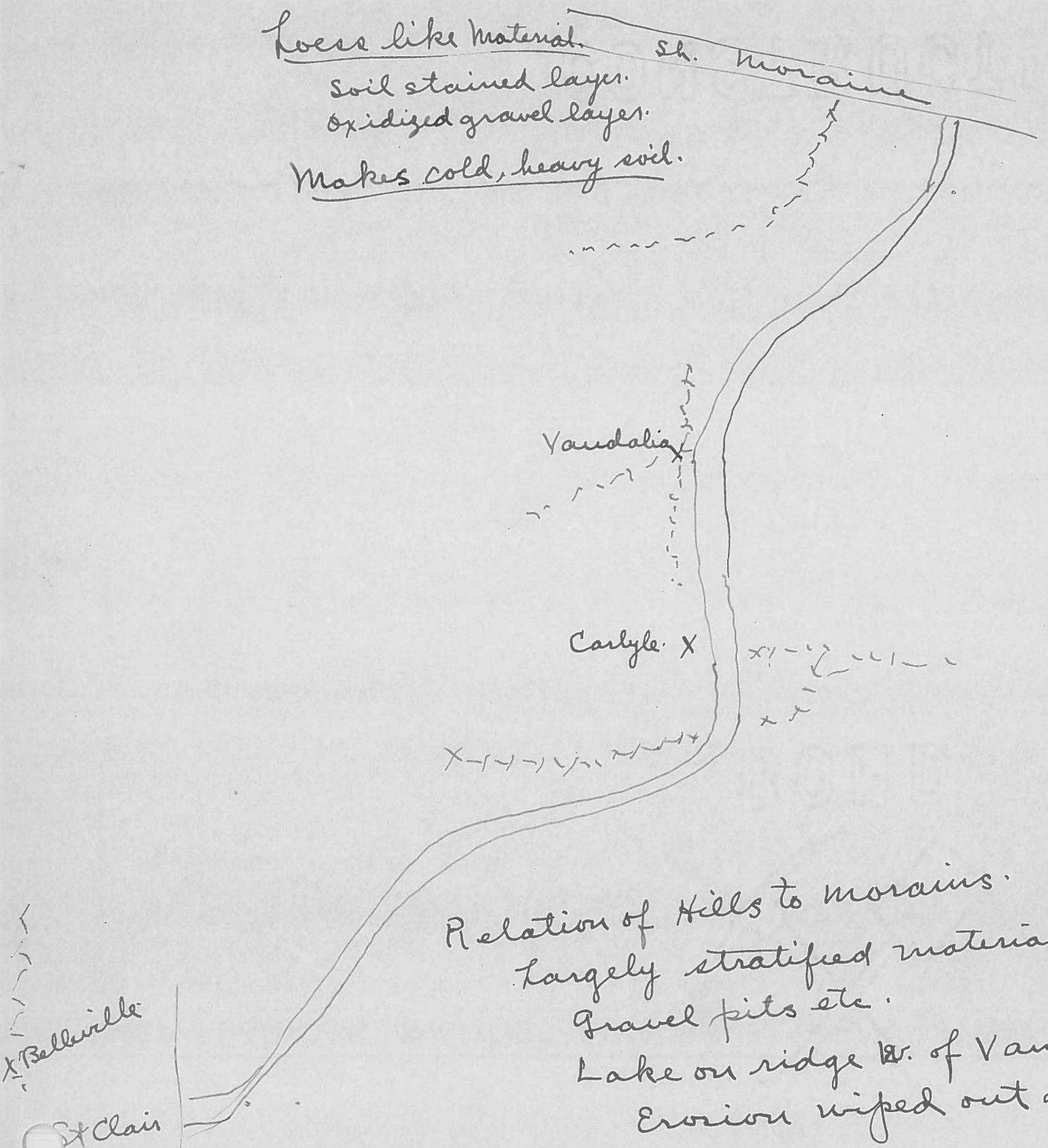
Lines of Hills.

Loess like material.

Soil stained layer.

Oxidized gravel layer.

Makes cold, heavy soil.



Relation of Hills to morains.

Largely stratified material.

Gravel pits etc.

Lake on ridge W. of Vandalia

Erosion wiped out glacial top.

g- The v alley walls
1- height
2- Angle of slope
3 - Horizontal irregularities
a- Meander scars
4- Materials.
5- Terraces
a- distribution
b. size + shape
c- materials { drift / silt / bed rock
d- relations to flood plain.
e- Origin in brief.

III- The Upland Plain.
A - Topography.
1- General features
2- Tributary v alleys
a- distribution
b- size and shape
c- relations to main valley.
3- Hills and ridges
a- distribution
x- Geographical
y- With relations to v alleys.
b- Size and shape.
c- Trend
~~d- Materials~~

Grades into uplands terrace in lower portion of area.

The Upland Plain.

Back from the crest of the valley walls stretches the broad, flattish upland plain. The boundaries of this plain are indefinite, ~~stretching~~ reaching beyond the rim of the area drained thru the Kaskaskia and making a part of that great interior plain of North America, hemmed in by the Appalachian and Cordilleran Mountains and stretching from the Gulf of Mexico to the Arctic Ocean.

Its general elevation (above sea level?) and above the ~~of~~ level of the flood plain floor is shown in Fig-. ~~Its elevation~~ within the area ~~region~~ with which this report is concerned

Its elevation above sea level decreases from about 600 ft at the north edge of the region to 450-475 feet south of Carlyle rising again to a maximum of nearly 700 ft at the rocky bluffs of the Mississippi river.

Its otherwise monotonous features

is relieved by (1) irregular belts ~~of~~ and patches of broad clay ridges and mounds, ~~and~~ (2) by the larger valleys tributary to the Kaskaskia (main valley) and the numerous smaller ~~tributary~~ valleys which border them and the ~~main~~ ~~Kaskaskia~~. and (3) small irregular shaped basin depressions, (of drainage) basin. sinks The map p. — . shows the general distribution (and outline) of the clay ridges bordering ~~the upland~~ of the Kas Basin valley. It will be noted that they bear no definite relation either to the main stream or its tributaries. They are usually broad and low when viewed from the upland flat but stand out conspicuously above the valley as Sturgess Hill, ~~&~~ and Pelican Pouch south of Vandalia & Carlyle respectively. Their proximity to the ~~valley~~ Kaskaskia has resulted in the short steep valleys and ravines which drain them. The surface of these ridges is gently undulatory. Locally as just west of Vandalia they

Those outside the region studied have been copied from Leverett.

are more hummocky, with at least one pond occupying an undrained depression near the crest of the ridge. The origin of these ridges (& other important features?) are (will be) considered in chap. III

The valleys.

~~The valleys and ravines~~

Streams tributary to the Kaskaskia river have ~~trenched~~ the upland with valleys & ravines of varying width. These are usually steep sided and vary in depth with ~~the height of the~~ depth of the main valley below the upland plain. ~~They are~~ Neighboring valleys are separated by flat topped tongues of upland which point ~~narrow~~ toward the main valley. Fig- (map showing reentrants opposite Vandalia. ~~Few of~~ Two of the smaller ~~ravines~~ scars extend back farther than one or two miles from the Kaskaskia leaving the more remote upland ~~woody~~ & poorly drained ~~or~~ unfurrowed, except in the vicinity of the larger ~~tributaries~~. Fig- shows a

sections along the road from A +C to B. in the region mapped on Plate -. It suggests why roads near the valley wall are ~~apt to be~~ more hilly, crooked than the "prairie" roads farther ~~removed from the valley~~ back from the bluffs. These ~~tributary valley~~ ravines often serve ~~furnish access~~ as roadways ~~from the flood plain~~ from the higher portions of the upland to the valley floor.

The materials, usually exposed ~~in the upland plain~~ in ravines and roadways sunk in the upland plain and encountered in borings & excavations is ~~usually~~ a compact ~~mixture of~~ clay ~~blue to gray to buff~~ clay sandy clay containing ~~rock~~ ~~stones up to several feet in circumference~~ in which are embedded pebbles & larger, subangular ~~stones~~ of varying different sizes.

The materials of the upland and their significance are discussed in Chapter III.

Chap. II. {Physiographic / Topographic} Features

I - Main Physiographic divisions:

The region studied divides itself into two main {physiographic / topographic} units. The first, a flat bottomed valley of varying width, is sunk below the second, a broad upland plain.

II - The Kaskaskia Valley:

1- Size + shape.

The Kaskaskia valley is the dominating physiographic feature of the Kaskaskia basin. ~~Starting as a mere ravine just west of Champaign it broadens down stream to 1/4 mile where it cuts the Mississippi ridge at Shelbyville, less than a mile wide at the southern edge of the area under consideration~~ Within the area discussed in this report, there are however striking variations in width. ~~These are notable~~ Constrictions, at narrows, occur

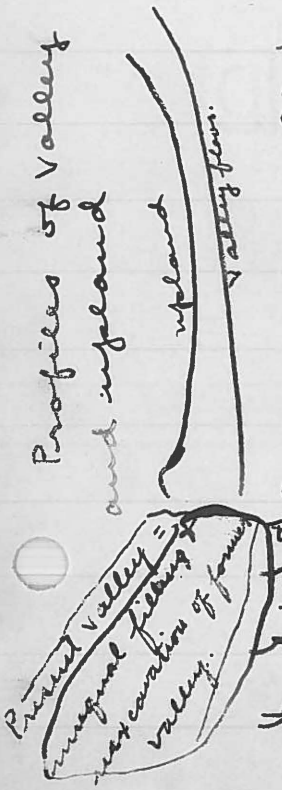
Leverett, p. 524 ~~Leverett in Monograph on Illinois says~~ one writer says that it Valley - "presents the appearance of a broad shallow basin rather than a river valley

It is a flat bottomed, steep sided valley, like the west of this, in the upland plain.

Shoal Creek. Between New Athens and the south end of the valley, the average width is 1½ miles.

~~Fig. — shows the profiles of the valley and upland with the vertical distance between~~ the depth of the valley below the general level of the (adjoining?) upland. Such variations in depth are unusual ~~in a second~~ *.

~~A second~~ The notable ~~shallowing~~ variation* in the depth of the valley ~~floor~~ flat. below the general level of the upland plain is a second peculiarity of this area. The profiles of the valley floor and upland shown in ~~Fig. —~~. illustrate the pronounced shallowing in the vicinity of Carlyle. This unusual condition ~~is due to~~ is due to the fact ~~that~~ the present valley is the ~~of~~. Successive stages in ~~the geological history of the~~ this process are ~~region which will be~~ considered later in ~~this report~~ Chap. V.



The characteristics of the valley will be discussed under the headings (1) Valley floor (2) Valley walls and ~~such and~~ (3) special features; as fans, dunes, terraces slope wash.

See Mr. Salisbury ? {

The Valley floor.

The valley floor lies between relatively steep bluffs. ~~North of Cadiz~~ In general, it varies in width with the width of the valley. South from the mouth of Shoal Creek, however, it ~~is~~ gradually narrows between ~~the~~ sets of benches along the valley walls. South of ~~Enon~~ New Athens it becomes little broader than the channel of the stream.

Cut this out and put data under valley and flood plains.

The features of the valley floor is broken by broad low elevations and shallow depressions. ~~The~~ depressions are often the sites of lakes and marshes, some of which ~~disappear~~ dry during ~~the dry~~ seasons of drought.

(Depth of valley) ~~floor~~ here.

?

? See Mr. Salisbury { The valley floor will be described under the headings (1) the river, (2) ~~the~~ flood plain, (3) ~~Slope~~ special features attached

~~(4) Terraces.~~

The Kaskaskia River

method of development of meanders.

The Kaskaskia river flows across (the this valley) flat, twisting? winding there and there in (intricate, tortuous long sweeping) curves, or meanders. ~~The accompanying table gives distances by~~ A comparison of distances by valley and by river as given in the accompanying table shows the amount of meandering between several certain various sections of the valley. Fig- is a portion of the Round Pond. New Athens. Sofer Lake. topographic sheet where crooks are exceptionally well developed. ~~The river is usually a profile~~ The slope of the channel, gradient, of the river is shown in (figure - (under depth of valley)

(Fig = map of New Athens)

use same figure for Oxbow Lake.

table under meanders.

The ~~accompanying~~ table page shows ~~that~~ the fall in inches per mile thru certain sections of the river's course. ~~The variations from~~ Note that there are local exceptions to the general decrease ~~downstream~~ in gradient

The significance of these variations in rate of fall will be explained later.

The channel grows gradually broader and deeper downstream. The cross sections* of the ~~valley~~ channel* ~~at certain spots~~ at Wren Bridge - Vandalia - Carlyle - New Memphis - New Athens.*

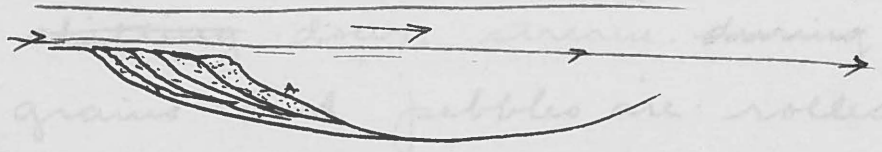
*Internal Improvement Commission of Illinois

Report of Jacob A. Harman, C. E.

Sand bars and other irregularities in the river channel are ~~frequent~~ numerous, especially area

shallows into the deeps ~~which are~~ gradually filled thus from the upper end with sand & gravel. The downstream side of the filling is very steep angles up to 35°(?).

Fig.



~~These deposits ga~~. The "step offs" known to the boy who uses the "Old swimming hole". the upper stream end. the

The flat of the Kaskaskia River has been developed by the lateral planation of a widely meandering stream and by active deposition by the main stream and its tributaries. Marshes are very common especially between Vandalia and New Athens. These marshes are formed by a deposit-around process in which the main stream and tributaries take part. They are found closer to the valley wall than to the stream and on the up valley sides of actively depositing trib. streams. According to the testimony of early settlers, in regions studied so far the marshy conditions are becoming less & less extensive. This I think is due to the clearing out of the timber and brush and the establishing of artificial drainage from the marshes, and to an increased slope wash from the cleared

-activated

valley wall. The marshiness occurs along too great a stretch of the valley and bears too close a relation to areas of rapid deposition to be due to sinking of the valley. The fact that the lower 13 miles of the valley contains few marshes would seem to eliminate the filling of the Mississippi ~~River~~ valley as a cause. The depth and character of the alluvium has varied greatly ~~as~~ at different points along the valley. At Shelbyville it is only 10-12 ft to rock thru a sandy loam, at Camden piles driven by the B&O R.R. went thru some 35 ft of ~~silt~~ sandy loam and vegetable matter bringing up in what was thought to be a layer of gravel. At Carlyle, a solid limestone is encountered ~~after~~ some 17 feet below the surface of the flat. At various points between Camden and Carlyle wells from 10 to 40

feet deep have failed to reach the bottom of the original bottom. Most of these wells are made by driving down ~~xxx~~ a pointed iron pipe and hence give little data as to character of material. A few of those dug show a preponderance of sandy silt mixed with vegetable matter logs, stumps etc. Occasionally a hard gray clay is encountered which is called "joint clay" because of iron oxide coating. This clay also contains logs, stumps, etc.

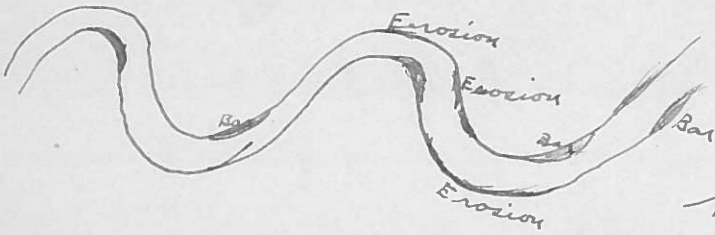
~~The rate of erosion on forested and treeless slopes is very manifest, but not so~~ The much more rapid erosion upon treeless than upon forested slopes is manifest, but the ~~difference~~ between the rate upon cultivated and uncultivated is much plainer. This ~~is~~ Sandy clay and loess lend themselves readily to gullymaking with a result that most

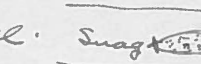
slopes which have been under cultivation for some time are so cutupby gullies & the soil so effectually removed that they become totally worthlessand when abandoned are so barren that they can not grow a thick enough crop of weeds to check further wash. At the ~~bad~~ bases of these slopes ~~loadms~~ and at the debouchures of tributaries ~~loading out from~~ draining these areas great quantities of sand are heaped up or spread out over an otherwise fertile area. Some farmers, however, either by putting these hillsides in orchard, ~~and checking~~ get good returns from them and still save their land.

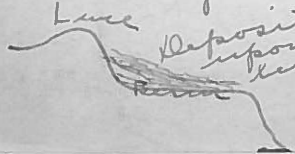
Present work of Streams.

According to testimony of early settlers the river itself is ~~not~~ more choked with bars than it used to be and gets lower during the dry season. While destructive

overflows are becoming more & more common
The river often becomes choked by logs
brush. etc. ~~Sac~~ The cutting of the banks
along the immediate banks of the main
stream has resulted in a much more
rapid undercutting of the banks at these
points. Opposite these sites of excessive
planation sand bars are usually formed.



Snags and drift
have been able to check
the current sufficiently to cause deposits to
be made in their lee.  This is especially
common in the upper courses of the rivers.
During flood time the river is apt to
establish lines of rapid flow across the
valley flat, especially across meander
necks, scouring shallow troughs. During
flood time, also, a great deal of material
is deposited along the berms of the banks
This is espicially noticable near Vandalia
along the leveed side of the stream where
this deposit of ~~sandy~~ stratified sandy
silt is sometimes 3 ft in thickness



The levee has been built 4 years. A 13 mi stretch near Vandalia was surveyed ~~for~~ in 1903 for the purpose of ~~pattern~~ reclamation & ~~Upon comparing~~ I thought I might get some data upon the change of the stream course ~~from that~~ by comparing the state maps with those. The difference between the two however were so great that I became. Upon investigation I found that the rivers course upon the blue prints was only approximate. I have learned of several places where the river has changed its course within recent times. The change has always come about in the nature of a shortening of the flow. Some of these former stream courses are entirely silted up, others are silted up at the ends next the river leaving ox bow lakes, ponds, or marshes.

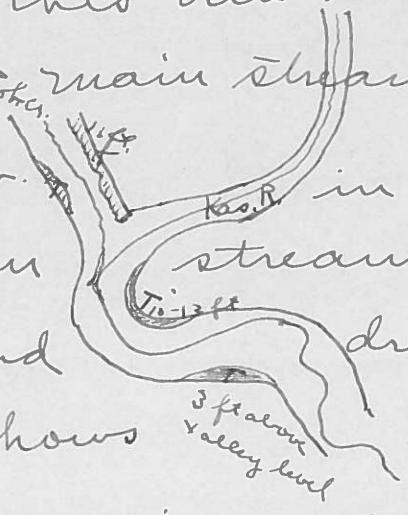
Not only have I been unable to find any peat myself but have seen no one who has found any. This apparent absence may be due to my lack of familiarity with peat

or to frequent deposits of sediment in the marshes due to overflow. I have not yet studied the Queen's Lake district which from the map would ~~seem to be +~~ contain peat if it was to be found in the area.

Terraces

The Terraces, remnants which seemed so plentiful and well defined ~~could~~ on close examination not bear examination. Part of them proved to be stratified drift, some were dunes and others slope wash. How I came to mistake them for terraces at first, I am still unable to understand. Down to this point the mapped portion of the main Stream shows no terraces whatever. Of the unmapped region north of Fayette Co. the Kas. valley contains no terraces above Robinson Creek. The flatter ~~streams~~ valley stream, however, contains a well developed set of terraces running out from the Shelbyville Moraine and extending past the Stream debouchure some 4 miles down the Kas Valley

Finally sinking to the level of the flood plain. The valley of this trib stream is wider than the valley of the main stream above its junction with the trib. in spite of the fact that the main stream caries many times more water and drains a much larger area. This shows I believe that the Kaskaskia ~~valley~~ river above Rob. Cr. debouches flows in a valley formed during ~~the~~ since the Shelbyville moraine stage of the Early Wis. Iceshect. If these terraces did extend on down the river they have since been ~~coo~~ buried by flood plain deposit.



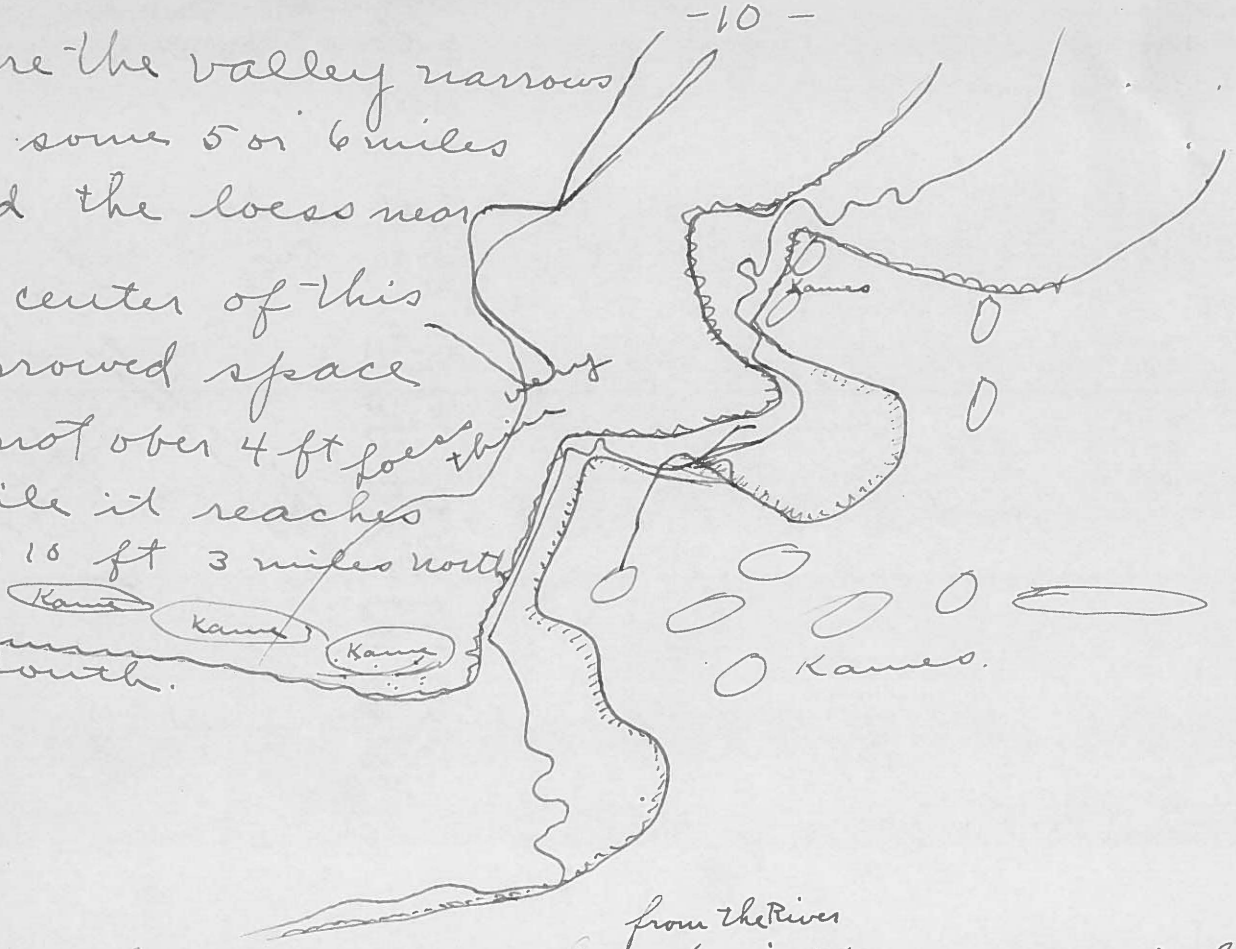
Dunes.

Dunes are common between Carlyle and Vandalia, especially along the ~~west~~ east side of the river. They range up to 20 ft in height above the flood plain where not under cultivation they are covered with a dense vegetation. The top 4 or 5 ft is usually a black sandy loam due probably to decaying vegetation. The Black Sand Hills they are called by the natives. Well

sections are hard to obtain 9/10 ths of such sections report sand as deep as they go. usually from 10 to 25 ft. One or two well sections however show, the sand underlain by yellow clay. ~~At one or two~~ The Sand has encroached upon the bluffs in several places. Near Cowden a railroad cut shows some 4 ft of sand overlying the loess, thus establishing the age of that.

The loess is a tan colored material separated from the underlying ~~drift~~ drift of about the same color by either ~~a thickness~~ ½ to 3 ft of reddish brown, iron-oxide coated gravelly drift, or by a soil stained layer of drift The loess ranges from a few inches to ten or ~~twelve~~ feet in thickness. It being thicker ~~near~~ near the valley, and thicker on ridges than in ~~the~~ depressions (except small depressions upon the ridges. Its thickness increases down valley. Its dependence upon the width of the valley may be shown by the study in the vicinity of Carlyle.

Here the valley narrows for some 5 or 6 miles and the loess near the center of this narrowed space is not over 4 ft deep while it reaches 8. to 10 ft 3 miles north or South.



The loess grades back into a grayish soil from the River stained layer known as post-oak soil. It is not very productive. The loess covered bluffs even 'tho subject to wash and hence harder to keep up are worth nearly twice as much per acre as these so called "Post Oak prairies" where the "hard pan" is but six inches below the surface. The loess, gradually loses its characteristic color and feel, as well as its ability to stand in steep faces back from the valley walls. The loess is used in making rough brick and tile for local use. Opinions vary as to the quality of these products.

Iron oxide concretions in post oak.

The drift so far as studied covers the underlying rock to depths between 10 and 200 ft in Shelby Co. ~~His~~ South of the Shelbyville moraine the underlying rock comes to within 20-30 ft of the surface. South of here the drift becomes thicker until in the region about Vandalia it is from 50-80 ft thick. It thins again to the south being but 10-20 feet thick around Carlyle. The ~~to~~ surface of the drift is monotonously flat except where the Kame hills rise from its surface. There is one ~~belte~~ of these Kames running S.W. from near Tower Hill to ~~Keyesport~~ Carlyle. Another belt ~~starts~~ starting farther west meets this one near Keyesport. ~~Thse belts~~ A few miles South of Carlyle another belt of these Kames ~~extends~~ crosses the river extending nearly due East & west. These Hills are made up very largely of assorted roughly stratified materials, some being in the hands of railroad companies to be used as road ballast. The interval between the drift & loess has already been mentioned

I have as yet discovered no evidence of more than one drift. There is a forest bed just south of the bridge which crosses the river 2½ miles S of carlyle which seems to be of almost the exact thickness and composition of the forest bed between the two drift sheets at Shelbyville It is overlain, however, by some four feet of flood plain deposit and is underlain by a yellow clay which contains small pebbles. This clay outcrops under the surface of the water and made any accurate determination of its character impossible. A half hours collection of pebbles from it showed more ~~not~~ of igneous origin. very few of these pebbles are larger than peas. This forest bed is probably a swamp deposit, but whether Post or Pre-Illinoian I haven't been able to decide.

8- Drift Valleys.

From Coulden down to a point just above ~~the mouth of~~ Robinson Carlyle the present valleys of the Kaskaskia is not so deep as ~~they~~ it ~~were~~ was before the Illinoisan

Joh A. Udden

Shoal Creek L.S.

Section

5- L. Stone 4 ft.

Coarse-grained, chocolate colored containing quartz sand & flakes of mica.

4- Gray Shales 15'

Sometimes contain ~~locally~~ bituminous partings

3- Shoal creek L.S. 7'

Bluish gray, compact, close textured. Rusty when weathered, a blotchy appearance; fossils.

2- Gray shales 1'→4' fossiliferous

1- Black slate 6" → 4'

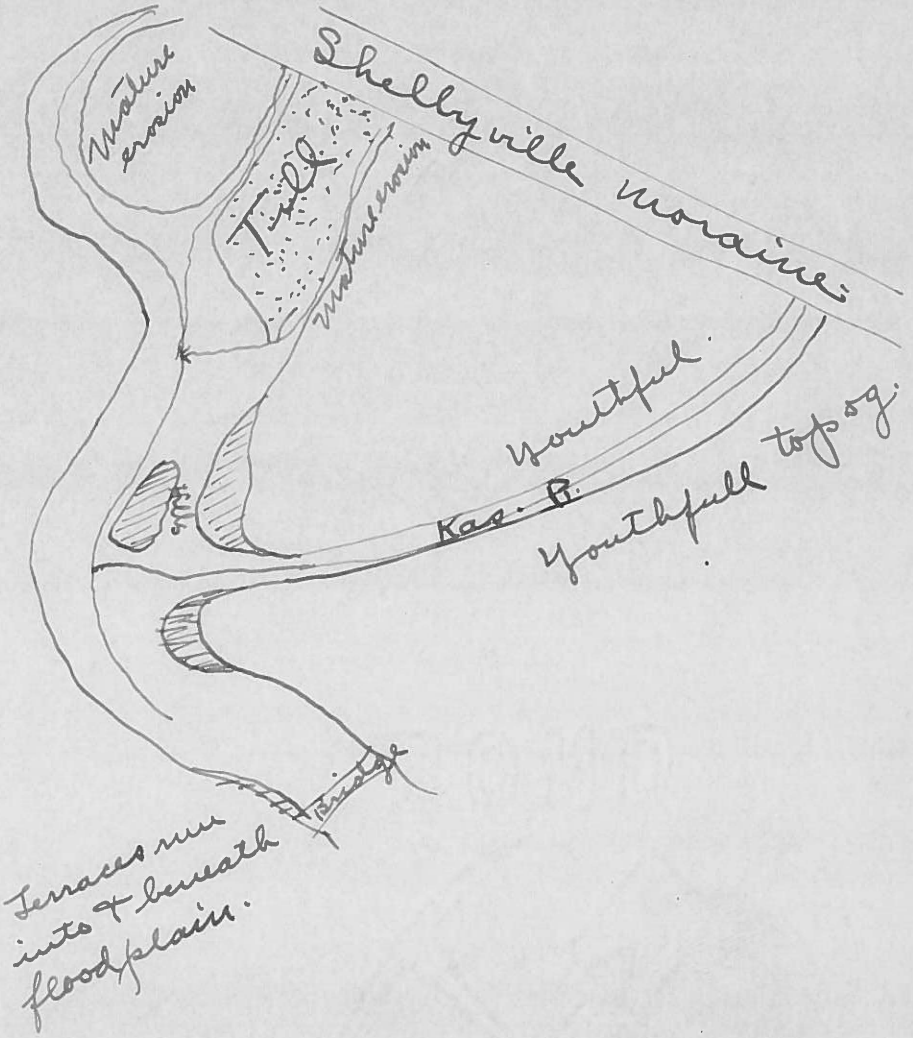
Jointed black slate.

Terraces.

B-3-a

2 ~~areas~~ Systems.

1- associated w. Shelbyville moraine.



2- Southern end of area.

Well 16 miles north of New ~~Athens~~ Memphis struck laminated clays, at ~~50~~ 5 ft. Height of surface 410 ft.

Begins to rise above flood plain at New Memphis.

Section in St clair Co.

Top 409.

6 ft Brownish black unstratified.

1½ weathered ~~gypsum~~ vegetation stained layer.

6 ft ~~fluffy~~ Loess like containing shells.

20 ft sandy layer laminated clays concretionary

6 ft. Vegetation stained top to blue muds.

gypsum → 40 ft

Soil stained layer at Shelbyville.

Comparison of E. W. & Illinoisan till.

Underlying rock.

Varying depth.

Penn.

Upper barren
Lower Coals. < Shoal creek Ls.

Exposures near Shelbyville.

North of Vandalia.

Carlyle.

Economic.

Soils.

Brick & tile materials

Coal.

Oil.

Drainage Changes.

1. Shelbyville & below.

2. Carlyle.

①

II D

The Kaskaskia River:

Position on the valley float. ②

(?) Fed by tributaries of various sizes(?)

Volume. ②

relatively insignificant except in high water.

Table showing Volume at different points during {min. low. max.} stages. } velocities.

Velocity. ⑤

~~Depends upon~~

not swift except in flood time.

extreme

low becomes ~~stream~~ string of

quiet pools

(stagnant) ~~pools~~ connected by

shallows.

Shape of Channel.

meandering upon float. ②

Profile as shown by Fig. ③

slope decreases down stream.

" " " " table.

decrease not regular.

Cross sections of Channel showing

width

increases down stream.

depth.

little change. some increase?

These islands are not permanent ~~but~~ appearing and disappearing with each flood

these fillings has a is very steep (slope?), the "step-offs" of the swimming pools. These bars protrude above the water surface appear as islands during the lowest water stages. Other islands are formed from accumulations of ~~drift~~ trees, logs, and smaller drift wood, chinked covered with sand & mud. ~~The lee of such drifts is invariably~~ Sand bars invariably appear in the lee of these drifts. Pecan Island, south of Vandalia, is unusually large. It is probably due to the ~~capture of~~ main stream shifting Hickory creek channel some distance from the mouth of the latter.

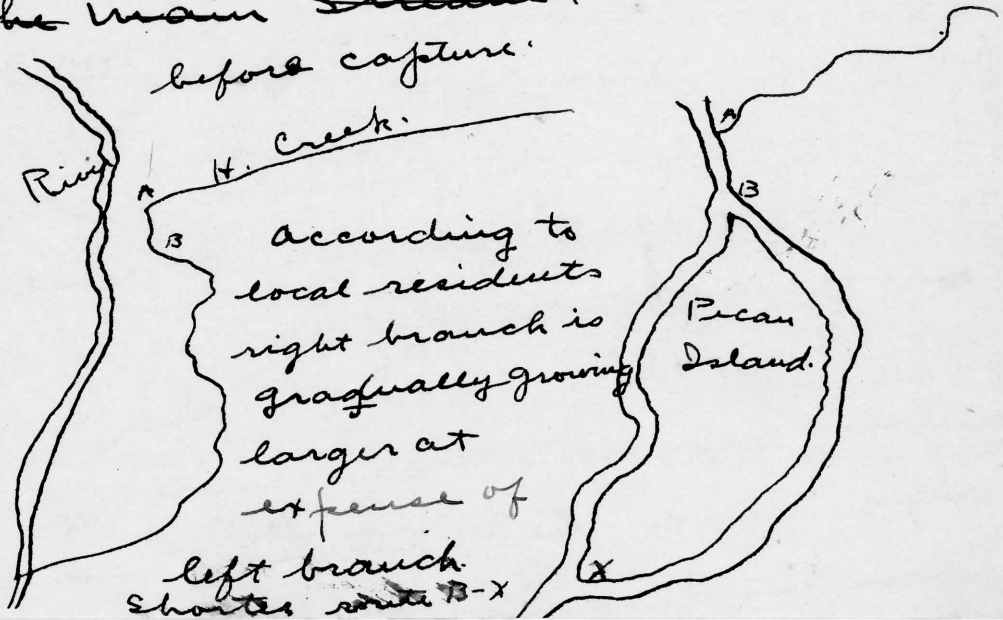
photo.

~~Velocity~~:

Volume:

~~Although the Kaskaskia drains an area~~ The Kaskaskia at the ordinarily ~~of insignificant volume~~ is subject to great variations in volume. Ordinarily an insignificant stream, entirely out of proportion with its broad

by the main Stream
before capture.



the main channel forcing it ~~to~~ out of its original course. Such an accumulation below Vandalia, known as the Big Drift had blocked the channel for several rods, hindering run off, and backing the water over the valley. Removed at considerable expense and labor.

~~Such~~ Drift gets into river by undermining and by ~~throwing~~ floating off ~~in~~ the flood plain.

Such Drift accumulations often ~~form~~ have sand bars & islands in their ~~rear~~ lee due to deposit in the slack water behind them.

J. W. Dapfert. Engineer estimated that "Big Drift" below Vandalia increased gradient 3 ft. per foot in a distance of 2000 ft. & took up

valley. The normal low water discharge at Carlyle is approximately 1,120 cu. ft. per. sec.

table showing volume & velocities at different places during diff. stages.

Personal Communication from A. H. Horton, District Hydrographer, Newport, Ky.
(See Harmais Report)

After a prolonged drought this discharge falls to 23 cu. ft. per sec. (ibid). and the river becomes a ~~string~~ plaid of ~~pools~~ rippling connected by shallows, ~~with no current apparent except at such times~~ After ~~excessive rainfall~~ or excessive runoff from the upland due to rain or melting snow more water enters the valley than the channel can contain. The remainder spreads over the bottom lands covering the valley floor from wall to wall. This strip of land subject to overflow, floodplain, ~~bordering the the river the length of the~~ varies in width from ~~1/6 to 3 3/4~~ one sixth to three and three quarters miles. ~~Straightaway through~~ the ~~minimum width narrowest place is~~

Obstructions.
Irregularities in the channel.

Bars. (4)
- chiefly of sand and gravel.
- form on inside of curves.
- opposite & downstream from cutting
- behind drift accumulations.
- ~~as~~ as miniature deltas ~~on~~ at upstream ~~side~~ end of pools.

Islands. (12)
- Bars become islands.
- Drift accumulations. (9)
- Pecan island probably due to capture of Hickory Creek.

Bars & islands keep filling up channel.

Shifting of channel.
gradual - cut on outcurve.
sudden - cut off meanders.
As at Pecan Island.

Volume in here.

Excessive runoff from upland fills channel to overflow. & water spreads over lower parts of valley floor (F. P.)
~~Overflows sudden~~

Overflows come & retreat rapidly. (13)
rate of (1) rise & (2) fall increasing
due to. (1) clearing upland.
tiling & ditching " .
leveeing (?)
(2) clearing F.P.
removing drifts.
making cutoffs.

River water need at Vandalia & Carlyle
muddy & clear.

within one and one half miles of the Mississippi valley.
~~lower end of the valley~~ This narrowing of the flood plain ~~in the vicinity of~~ at ~~near~~ downstream ~~the lower end of the valley is~~ puts the Kaskaskia in striking contrast with most rivers, whose flood plains widen somewhat regularly downstream.

The widest place is near the lower end of Shoal Creek. From this point south, the flood plain gradually narrows until it reaches the minimum near its ~~junction~~ junction with the flood plain of the Mississippi. ~~Such~~ This constriction of the flood plain, at the lower end of the valley puts the Kaskaskia in striking contrast with most rivers, ~~whose~~ the flood plains of which widen ~~somewhat~~ rather regularly downstream. The area of the flood plain between Cowden and New Athens is * *square miles.

Shall this go in?

awkward

Harman.

~~These variations in volume are apt to be sudden for it drains a region in which the substrata~~

The overflows are often sudden. ~~During~~ During the flood ~~The same~~ of early October, 1911 ~~flooded the valley floor. According to~~ residents north of the Vandalia levee report that the waters ~~were rising~~ rose at a rate of 3 inches per hour ~~when the~~ until the levee broke. The graph chart p. — illustrates the rainfall of May 1908 and the consequent height of the river. ~~and their effects upon the height of the river. The suddenness of the retreat of the flood waters is only too rapid.~~ The suddenness of these variations This rapidity of variation in volume is due largely to ~~a~~ substrata of compact clay underlying ~~throut~~ the drainage area, which ~~sheds the water~~ quickly into ~~the tributaries~~ promotes rapid runoff. ~~The clearing of forests, ditching and tiling are made~~ Man has assisted this natural rapidity by clearing forests

When flood Evansville about shows how the rivers widen its flood plains.

shows both rate of rise and fall.

That portion of the valley floor below New Athens subject to overflow from back waters from the Mississippi

Levees. (5)

Made by checking current during overflow.
① friction + ② loss of volume.

Shape & size

Material - coarser than back from channel.

Structure - irregularly bedded.

Destruction of - by river.

Rate of —

Best developed where river is more permanent.

High places during flood.

Materials of Flood plain: (6)

Coarser deposited in & near channel of main stream (and tribs?) (under fans). + up valleys. (11)

Finer in backwater & downstream. (12)

Causes.
Vegitable material (7)

Shifting of stream causes interbedding lense like structure.

Shown by diagram & well record.

Cross-bedding (10)

Cause - photo.

Thickness of F.P. material. { varies along length. Usually thicker down stream.

~~digging~~ ditching, and tiling.

During overflow the river deposits ~~actively~~ most rapidly immediately along its banks. The ~~deposition~~ active deposition is ~~due to a~~ caused by a checking of the velocity of the stream, due partly to sudden decrease in depth and partly to friction with the more ~~stagnant back~~-slowly moving backwaters. Successive floods have built up low marginal ~~indefinite~~ ridges, levees, ~~near the stream channel~~ with a gentle slope from the stream channel.

Photo – Fig. showing levees.

Where the ~~stream~~ channel has not ~~kept its~~ recently ~~had its~~ ~~position~~ changed its position ~~on the flood plain~~, natural levees have been built nearly up to the flood level. ~~Obviously~~ as they ~~cannot be~~ river cannot build them higher than the flood level, it is evident that natural levees will not protect the bottom land from overflow.

The levees, too, are constantly being

undermined as the stream shifts its channel so that they are destroyed about as rapidly as they are formed. ~~They are best developed these numerous gaps~~ ~~these~~ under them useless ~~their effectiveness~~ in preventing overflow ~~is destroyed by~~ frequent gaps

goes just with Fig. p. 10

Under Fig. 7 photo.

~~undercutting~~ undermines ~~on the outcurve of meanders often destroys these levees~~, causing numerous gaps in the levees cut by the shifting channel stream which render them useless in preventing overflow.

Where the ~~stream channel~~ channel has not recently changed its position on the ~~flood plain valley floor~~ valley floor, natural levees have been built nearly to the flood level. For the river, however, can (not) build them (no) higher than the flood level, it is evident, that, even here, these ridges ~~so~~ will not protect the bottom land from overflow.

The material of the levees is relatively coarse, consisting of chiefly sand and small pebbles; ~~for~~ The finer sandy silts

are ~~eroded~~ deposited farther back in the slack waters near the borders of the floodplain. ~~The~~ As the stream channel, however, shifts ~~back and forth~~ across the valley floor fine ~~deposits of~~ material ~~is~~ are covered with with coarser channel deposits. The coarse material of the former channel is in turn buried beneath fine. ~~This~~ Cuts ~~Such~~ thru ~~the~~ into the F. Plain shows ~~cross bedding gives~~ alternate layers ~~of~~

x When the river is undermining one bank, the opposite bank is receiving deposits of sand and gravel, the finer material being carried away. These sand banks have ~~dippin~~ sloping layers which show as cross bedding when finally exposed in cuts.

See photo.

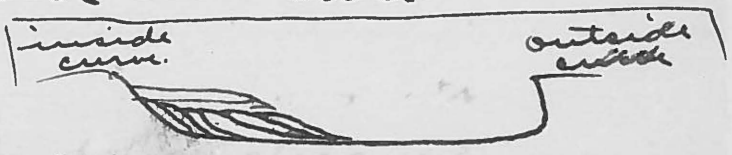


diagram.

The Valley Walls:

The bluffs which rise above the valley floor vary considerably in height, reaching a maximum of over 350 ft. at the south end of the region. As already stated, they average lowest in the vicinity of Carlyle, but notable elevations as the Pelican Pouch south of Carlyle give great local variation even here.

Their steepness varies from gentle slopes plate x to nearly vertical faces where the river is flowing at their base.

Their angle of slope at any place is therefore a fair measure of the time which has elapsed since the river undercut their base.

Every rain material is washed from their upper slopes and deposited at the base, tending constantly to reduce their steepness.

The bluffs valleys

The steeper portions of the bluffs are not tillable, and are left in forest, or pasture. The gentler slopes are under cultivation or left where ruined by gullies which gain [illegible] and [illegible] [illegible]

~~Numerous notches have been cut in the bluffs by tributary streams and gullies, as their~~ As the clay, sand, and gravel, ~~of which they are~~

The broadly rounded ~~reentrants~~ indentations, separated by projections of upland into the valley, are (another evidence) (a result) of the undercutting by the river. Fig- shows such reentrant (new) opposite Athens. Vandalia. locally Sometimes a ~~tributary~~ valley ~~has been~~ the cutting on the curves has proceeded ~~to such an extent~~ until the promontory of upland is cut thru leaving its tip as an island upon the valley floor. Other islands are formed by the ~~intersection~~ side cutting into tributary valleys above their source. Island Hill N.E. of Vandalia is a result of the latter process.

~~Notches~~ The valley walls are scarred with notches ranging in size from ~~occasional tributary~~ valleys ranging

The lee of the promontory is a favorite place for dune accumulation. See Fig- showing reentrant.

Promontories protected by rock ledge of former valley

Differences in elevation and character of material differentiates them from the mounds on the floodplain described on p.--.

from ~~tributary~~ broad tributary valleys (as noted above) to ravines and gullies. The latter, are particularly abundant upon deforested and cultivated slopes, ~~These where they develop rapidly in the clay~~ mixture ~~of clay, sand, and gravel of which the slopes are chiefly composed. which is readily furrowed {easily eroded.}~~

Terraces.

In the southern half of the valley, normal the slope of the ~~walls~~ is ~~marked~~ broken by ~~broad~~ flat topped benches, terraces, of varying width and at successive elevations above the flood plain. ~~paralleling the valley sides upon~~ The accompanying section across the valley near New Athens shows their relation to the f-p and the upland plain. ~~They are commonly~~ as their surface is practically more nearly horizontal than the gradient of the valley floor ~~they merge into the flood plain~~. Upstream they merge with the flood plain upstream. ~~They rise from the flood plain and continue downstream~~ One set appears ~~emerges~~ above the flood plain near New Memphis, with a surface elevation of 410 ft. another ~~rises from the flood~~ appears at Fayetteville with gently downstream at a lower angle an elevation of 400 feet. than the flood plain ~~gradient~~ and finally

(25)

~~flatt becoming almost level~~ a second set rises ~~from the flood~~ above the overflow level at Fayetteville and continues along the valley [sides] ~~wall~~ ~~emerging~~ [to] ~~at~~ the south end of the valley, where it is twenty feet above the high water level.

The topmost terrace is approximately 430 ft. above sea level or 75 feet above the [low water stage at Evansville.] ~~High water maximum flood stage at in the lower 20 miles of the river~~.

The terraces are composed of thin layers ~~of~~ laminae of clay ~~and sand in all color of~~ alternating with thicker layers of fine sand. The clays vary in color from light gray thru buffs to a brownish-purple. The upper part is more sandy and less noticeably stratified. ~~Concretions~~ Irregular[shaped], concretions ~~of~~ or ~~nodules~~ of calcium carbonate are abundant in the top ten feet.

A section ~~in the South~~ in the South

Stones up to 8" in diam. are scattered over portions of the surfaces of the terraces. These are ~~probably the result of deposition~~ ~~carried~~ [in places] too large to have been carried by stream.

east corner section 22 - 7 miles south ~~west~~ east ~~side~~ of ~~Section 5, that miles northeast of Evansville is as follows.~~ of MacCoutah is as follows:

38'

6 ft. Brownish black sandy clay unstratified

1 ½ feet weathered vegetation stained bedded layer

Contains ~~some~~ little lenses of small Gypsum crystals.

6 ft - Layers of "silky" grayish sandy clay. Loess.

Contain small snail & mussel shells.

6" — ~~Thin sand layer.~~

18 ~~24~~ ft → Laminated clays gray to buff containing numerous concretions of $CaCO_3$ + ~~F~~ hydrous iron oxide.

6 ft Vegetation stained top to layer of sticky blue mud.

River Surface

Other sections are exposed 4 miles N.E. of Evansville in S. side of Sec. 5, where the river undercuts the bluff ~~at~~ immediately S.E. of Fayetteville. Silver creek Bluff S.E. corner Sec 16, 2 miles north of New Athens. N.W. corner Sec 17 4-½ miles S.W. of New Athens.

Other ~~[illegible]~~ exposures may be noted wherever the river or ~~its~~ a tributary ~~has~~ is actively undercutting ~~exposed a steep face~~ a terrace.

As already ~~stated~~, p— . the river is degrading in this lower course, ~~and the terraces are the result of succession~~ ~~tend to destroy~~ tends to leave terraces as the remnants of abandoned flood plains. ~~The fig~~ Fig. illustrates how terraces are left at successive levels, as the stream shifts across its valley in the process of down cutting. All lower terraces ~~are low~~ are cut at the expense of higher ones. Fig. —. ~~Et~~ ~~Detached~~ several flat topped elevations ~~of terrace material~~ on the valley floor are detached remnants of terraces of the same ~~flood~~ height. In places the lower terraces have been ~~are completely removed and~~ cut away ~~and~~ by the main stream, which is now flowing against higher terraces

or the valley walls.

See Davis - for. Illustration.

~~For the~~ The terraces of the main valley have their equivalents in the larger tributary valleys. The Upper level stretches back for several miles grading imperceptibly into the upland. The back edge has been mapped at the 440 foot level, ~~It~~ as the nearest approximation possible. South of the New Athens quadrangle, accurate detailed mapping was impossible owing to the absence of ~~suitable~~ dependable base maps.

(Terrils)

These terraces are of exceptional significance in the geologically recent history of the river valley and will be discussed more fully there.

STATE GEOLOGICAL SURVEY

III

The Bed Rock.

I General Statement.

A- Importance:

Aside from the profit and enjoyment derived from a ~~the~~ knowledge of ~~the~~ one's surroundings, the

The character of the

A- Importance:

The character of the ~~geological formations~~ rocks + soils exposed in this region ~~are~~ is ~~that~~ a powerful ~~effect upon~~ factor in the industrial life of the people. It ~~is~~ manifests itself in the fertility of the soil, the well water supply, and the coal, oil, gas, and building materials ~~are simply products~~ mined in the region.

Even the minor surface features of the present are the result of events of the past ages.

They also furnish an opportunity for those of a region to become aquainted with their surroundings.

Come in under Chap II

under physiog. & processes.

-I-

Rock Formations in the Region.

I- General Statement.

The rocks underlying this area contain the only records of events in the changing geography of remote periods in the history of the region, which antedate by millions of years the presence of man by ~~millions of years~~. It is the purpose of this chapter to describe the different rock formations, and to outline briefly the successive events of the history of the region as interpreted from the records contained in the rocks themselves. For convenience of discussion the rocks of the area are divided into (1) a foundation of indurated layers of sandstone, shale, and limestone, bed rock upon which rests (2) a covering of unconsolidated rock fragments, mantle rock. The mantle rock makes up the surface layers of the region and its composition and character are shown in the bluffs, the steep bluffs, along tributary valleys and in various roadcuts

excavations, ~~and~~ The bed rock appears at the surface, outcrops, in, ~~but~~ a few small widely separated patches. It is known chiefly thru deep borings and mine shafts. ~~The accomp~~ The following represents the different rock groups and their position in the Geologic time scale. Beginning with the oldest rocks exposed ~~in~~ within ~~Bed rock~~. ~~the~~ the various formations exposed within the area will be taken up in chronological order.

Bed Rock:

Plate + shows the ~~character~~ different formations and their relations to each other.

Chap. III. Geological Formations Exposed in ~~Underlying~~ the Region

~~Importance~~

~~Formations~~ are divided for convenience of discussion into (1) indurated, (of sandstone, shale & limestone) ~~rock~~, foundation and (2) a covering of unconsolidated (with fragments) material, mantle rock. ~~Their importance in the industrial life of the area~~ Their character is a controlling factor in the industrial life of the region, manifesting itself in the ~~fertility~~ amount and character of agricultural products, ~~and~~ the ~~value~~ output of coal and oil, and the ~~kind~~ quality and value of such structural materials as ~~is~~ stone, ~~brick~~, clay, sand and gravel. The well water of the region is drawn from beneath their surface.

Their (character, structure + relations) furnish us to the skillfull reader a ~~history of the~~ (succession of events which have happened within the) region dating from ~~back~~ ~~to~~ remote periods in the history of the earth. Every conspicuous surface feature (as it exists today) is a result ~~of geologic agents~~ (under processes) successive events of the past. Each future change

put in under processes

in the topography of the region will ~~be brought~~ result from partial destruction of the present surface. It is the purpose of this chapter to ~~trace out the geologic history~~ describe the formations and translate their ~~story~~ record of the changing geography of the region as contained in the rocks themselves

For convenience of discussion, the formations are divided into (1) a foundation of ~~indurated sands, clays, and~~ sandstone, shale, and limestone bed rock, and (2) a covering of {more unconsolidated} rock fragments, mantle rock. ~~These will be taken up in order~~ Beginning with the oldest rocks exposed, ~~these~~ the formations will be taken up in chronological order.

The table below shows the position of rocks discussed

~~The structure sections - plate -~~

The sections Pl. — shows the relative positions of the beds ~~of~~ and

The Bed Rock

~~Outcrops~~:

The widespread distribution of the mantle rock thruout the region effectually masks the bed rock. ~~except at~~ At a few places, however, it appears at the surface in ~~there are exposures in~~ bluffs ~~or along valley~~ and stream bottoms. Such exposures are known as outcrops. In the northern part of the area, outcrops are rare. ~~One in the NE corner of Sec. 28~~ An 18 inch seam of coal, thick lies upon 4 ft of fire clay and overlain by 6 ft of gray calcareous ~~sandy~~ shale outcrops in the river bluff three miles south of Camden. Under fire clay is six ft. nodular ss. containing fossils, as (Collected)

Three miles north of Vandalia in the South east quarter ~~corner~~ of Sec. 28 a soft micaceous sandstone shows in the river bluff at low water. Various outcrops of Sandstone and thin carbonaceous ~~coal~~ seams of coal outcrop in the valley of Hickory Creek. In the vicinity

of Carlyle ~~outcrops are more~~ the mantle rock is thinner and the, outcrops correspondingly more abundant. ~~The riffle under the bridge in low waters is caused by a con-~~ ~~tinuation~~ A compact crystalline limestone is exposed at ~~the stone~~ Clabaugh's quarry. 2½ miles south of Carlyle, in the river bluffs nearby and at intervals along ~~the~~ Story quarry creek ravine to the west. At the quarry It is ~~overlain and underlain~~ by interlayered between softer beds ~~sandy stone~~ beds of sandstone and shale.

photo-

At Stone-Coal ford a layer of coal 16" thick outcrops between shale layers, near the waters edge.

Back from the upper terrace south of Okawville, sandstone outcrops are frequent along the tributaries of Plum, Elkhorn and Mud Creeks.

From New Athens south an ~~to~~ ~~fo~~ older limestone outcrops, culminating in the high ± limestone bluffs flanking the Mississippi at the

~~lower and highest~~, sometimes known as the Ozark Ridge. ~~Enclosed within~~ ~~those various~~ Some of these rocks ~~are~~ especially the limestones contain ~~great~~ numerous shells ~~of~~ and impressions of animals and plants (fossils) which were embedded in the deposits while they were unconsolidated. Thus it is clear that these ~~life forms~~ fossils represent life forms (which lived) in this region at the time of the formation of the rocks. ~~A comparison of fossils (forms) of one layer with those of a higher or lower layer do the lowest rocks were formed first~~

III

The Rock Formations.

All of the earth materials exposed in the region or encountered in the deepest borings are arranged in nearly horizontal layers laid one upon the other. Each distinct layer is known as a stratum or bed, and the sedimentary rocks so arranged are said to be stratified. Consecutive strata of the same sort of rock make up a formation.

It is the purpose of this chapter to describe the arrangement of position rock formations known to underly this region, and to outline the successive events of the geological history of the region as it interpreted from the records contained in the rocks themselves. For convenience of discussion, the rocks of the area are separated into (1) bed rock, a foundation of indurated beds layers of sandstone, shale, and limestone upon which rests (2) a covering of unconsolidated rock fragments, mantle rock. Both the bed rock and mantle rock of this area are of

sedimentary origin; ~~that~~ is, they were once either particles or dissolved in water and ~~have been~~ were deposited by water, ice, or wind. The ~~following table~~ various rock groups and their position in the geologic time scale ~~are~~ shown in the following table. Beginning with the oldest, the rocks of this region ~~will be~~ are taken up in ~~chronological~~ order of decreasing age.

(Should not sentence subdividing them come in here)

The Bed Rock.

~~To~~ The covering of mantle rock is of such persistence and thickness as to effectually hide the bed rock except in a few ~~small~~ scattered patches, outcrops, where it appears at the surface, outcrops. ~~Our chief knowledge of the deeper~~ Our knowledge of its character and position between outcrops and of ~~no other rocks~~ formations which fail to outcrop, is gained thru a study of the ~~strata~~ strata encountered in oil & water borings, mine shafts, and ~~other~~ similar excavations.

Eras	Rock systems	Rock series	Formations.
Cenozoic	Quaternary	Recent	Soils Alluvium. { F Plain deposits Terr. clays
		Pleistocene	Champlain. Glacio lacustrine. Wisconsin { Late Early Peorian Iowan ? Sangamon (inter) Illinoisan Yarmouth (inter) Kansan Aftonian (inter) Sub aftonian.
	Tertiary	Pliocene Miocene Oligocene Eocene	
Mesozoic	Cretaceous Comanche Jurassic Triassic		
Palaeozoic	Pennsyl.	U. ✱	McLeansboro.
		L. (?)	Carbondale Pottsville

STATE GEOLOGICAL SURVEY

Eras.	Rock Systems.	Rock series	Rock. Formations or Groups
		Upper.	Kaskaskia Ls. S.S. & Sh.
			Cypress S.S.
	Mississippian	Lower M.	Ste Genevieve Ls.
			St Louis Ls.
			Salem Ls.
			Warsaw Sh.
			Keokuk Ls
			Burlington Ls.
			Kinderhook Ls SS. Sh
	Dev.	U. Dev.	Chemung - Catskill
			Portage group
		M. Dev.	Hamilton Sh.
			Onondaga Ls.
			Oriskany beds
		L. Dev.	Helderberg Ls.
Palaeozoic.	Silurian	U. Cayugan (Salina)	Rondout Ls / Manlius waterlime
			Cobbleskill Ls.
			Salina beds
		M. Niagaran	Niagara Ls.
			Clinton beds.
		L. Oswegan	Onida cong.
			Medina SS
	Ordovician	U. Cincinnatian	Maquoketa Sh.
		M. Mohawkian	Trenton-Galena Ls.
		L. Canadian	St. Peters SS.
			L. Magnesian Ls. Dol. Prairie du Chien Dol.
	Cambrian	U. Potsdam SS.	
		M	
		L.	
		4 Keweenawan	
		3 U. Huronian	
Proterozoic		2 M Huronian	
		1 L. Huronian	
Archaeozoic	Archaean		

~~In so far as these~~

This study shows the bed rock to be composed chiefly of ~~sandstone~~, shale, sandstone and limestone with relatively thin seams ~~many portions of~~ of coal ~~near the~~. ~~The sandstone all these separate~~.

~~St. Peter's Sandstone~~

An examination of outcrops and ecavation records shows the underlying rock to be made up of shale, sandstone and limestone with relatively thin seams of coal. Rocks older than the Mississippian have not been identified with certainty. ~~The Ordovician System is reached in~~ the deep well at Mascoutah, section p. —, ~~ends in~~ brings up in a thick layer of sandstone believed to be ~~correspond to the St. Peters sandstone of~~ of Lower Ordovician age. It is correlated with the St. Peters SS, which ~~is 100 ft thick where~~ outcrops ~~exposed to the north~~ & west & south of ~~the area~~. St Louis. & at ~~Starved~~ Rock & Deer Park near La Salle Ill.

Graphic Sec.

pages come in here.

Overlying this lies several hundred feet of magnesian ~~[illegible]~~ limestone dolomite believed to be the equivalent

middle of p. 3.

3 (a)

The limestone was once a limy (calcareous) mud like that now collecting on many parts of the ocean bottom. ~~The limy~~ muds of the present are ~~found~~ most ~~abundant in warm~~ in warm clear waters ~~where~~ which are relatively shallow, but still deep enough that waves do not stir the bottom; ~~In~~ these conditions life ~~is~~ is not abundant, and ~~pieces of~~ animal remains ~~could~~ collect rapidly. It was derived principally from the hardparts of animals and plants which ~~were~~ had been more or less ground up and ~~broken~~ by the waves and currents. Careful search among the rocks reveals the imprints of the shells (fossils) of many of these animals. Similar types of animal live ~~in~~ in the ocean at present. They are most abundant.

These conditions ~~are found~~ exist in moderately low latitudes near the sea margin but still some miles from the land. Thus we assume that at the time these limestones were deposited ~~that~~

± ~~much of the~~ Southern Illinois ~~was a part of the covered by a shallow sea~~ a part of the ocean bottom ~~near its margin with~~ some distance from shore. ~~Shales~~

Shales are hardened muds and clays. They are formed from deposits made on land and in the sea. ~~Much~~ The finer of the Kas. flood plain ~~de~~ material, and the terrace clays would make shale if hardened, Similar muds and clays ~~are being deposited in~~ are collecting in lakes and, near the margins of, oceans ~~from~~ sediment ~~brought~~ washed in by streams and waves. ~~It is assorted at the bot on a basis of size~~ By the on reaching the standing water, the larger materials are dropped near shore and the finer carried farther out resulting in a more or less complete assortment. The finest portions are often carried far out from shore and deposited along with shell fragments. ~~This going making~~ On solidifying, this mixture becomes "shaley limestone" ~~or calc~~ varying amounts of this land derived sediment furnish all gradations from between ~~shale and~~ the

pure to
thru shaley limestone and calcareous sh. to shale. These varying amounts of shale may be due to shifting shoreline or ~~flooding~~ greater wash from the land. ~~These~~ shales formed in the sea, ~~marine~~, ~~are distinguished~~ contain the ~~fo~~sils of marine animals ~~which~~ as distinguished from the land plant ~~+~~animal remains of the shales formed in lakes ~~+~~or land.

Sandstone is ~~sed~~ cemented sand. ~~It may~~ The sand may have been collected ~~by~~ in the ocean or on land in lakes and stream beds or by the wind. Sandstones usually contain fewer fossils than muds and limestones because it is a poor material to receive and preserve impressions, Hence the origin of much of the sandstone is doubtful.

Coal consists almost entirely of slightly ~~dis~~-altered ~~integrated~~ plant {tissue matter}, which has been gradually changed thru partial ~~decay~~ decomposition

3/dl

and pressure. ~~It is~~ ~~The least~~ ~~matter necessary for the accum~~ The present coal seams are believed to represent marsh swamp areas ~~which were~~ ~~where an~~ much like the Everglades of Florida and Great Dismal swamp.

The remains of an abundant vegetation accumulated ~~in~~ the and was prevented from decay by the water. Its conversion is a into coal ~~resulted from~~ of gradual ~~long continued~~ loss of water and gases, and from the pressure of sediment laid down upon it. The alternating layers of coal and clastic rocks is thought to be due to shiftings of the shore of the sea, ~~which converted swamp areas into sea bottom drowning the vegetation, and~~ * As the sea encroached on the land, the swamp vegetation was drowned ~~killed~~ and the area of vegetable accumulation became the site of ~~mud accumul~~ deposits of mud and sand. Retreat of the sea and ~~or~~ building up of the ocean floor by such deposits, again ~~converted~~

renewed swamp conditions. ~~Sixteen~~ Sixteen coal seams are recognized within the state tho not all are widespread. ~~Coal no. 6 seems to have the widest distribution~~ and it by no means certain ~~that~~ the seams ~~of~~ thought to be the same are really continuous. Coal # 6 seams to have the widest distribution, covering much of the southern half of Illinois and possibly continuous with coal #7 of Indiana.

3-(f)

Origin and Accumulation of Gas and Oil.

~~The origin of gas & oil is a puzzling problem.~~

It is believed by some ~~that~~ the petroleum oils have originated in much the same way as the coal. ~~Various authorities, however, disagree so fundamentally from with generally excepted that the following theory as given below is presented as only a possible explanation and that it must not be taken as too seriously.~~

Although not universally accepted, the following theory seems to give a rational explanation of the origin and accumulation of ~~oil~~ petroleum and natural gas. This theory supposes that the oil and gas represent the ~~same extract~~ slow produced by the decomposition of animal and plant remains ~~buried by deposits~~ which accumulated upon the ocean bottom and were prevented from prompt decay by a covering of water ~~deposits~~ and sea deposits. Distillation ~~Chemical change~~ in the formations thru geologic time have

produced ~~oil and~~ the liquid petroleum ~~oil~~ and ~~its gaseous equivalent~~, natural gas which is merely the volatalized lighter portion of the oil. ~~What there~~ In the fluid state, these organic products ~~as~~ percolated penetrated upward thru the pore spaces in the rocks, until their progress was checked by an impervious layer such as a bed ~~layer~~ of shale or a finegrained limestone. If This bed were horizontal flat lying, the progress of the fluids was stopped. If, however, this bed ~~was not~~ had a dip, the ~~as~~ distillates ~~worked~~ was forced, by rock + water pressure, up the dip on the underside of the non-porous impervious ~~layer until trapped~~ until it appeared at the surface or was trapped in some minor flexure like the Carlyle anticline.

See fig 7 p. 144 Bul 16

Here the gas oil and ground water would arrange themselves in the order of their sp. gr. as in the acc. diagram. This theory has gained considerable credence thru ~~the fact~~

3 (h)

experiments showing that ~~the~~ organic remains do yield ~~a~~ gas and petroleum-like oils when ~~they~~ decomposed in the absence of air.

Bottom 3(g)

This hypothesis of accumulation explains ~~the almost universal~~ the fact that oil and gas ~~was~~ are to be found only in relatively porous beds beneath impervious beds ~~and in the~~ which cap an inverted basin or terrace.

Fig —.

The Cypress Sandstone, ~~an~~ Benoist sand of the oil well drillers, and a sandstone member of the Kaskia group, Carlyle sand, are the principal oil horizons thus far discovered within the region.

of the ~~Ks.~~ Galena dolomite ~~ls~~ of ~~northwestern~~ Illinois and the Trenton ls. of the east. (?) (400)

Cincinnatian

Fig- The graphic Section with accompanying log ~~and correlation is~~ shows the tentative correlation ~~of the~~ with Ordovician, Silurian and Devonian ~~strata~~ formations outcropping outside the region ~~found on the surrounding territory~~ under consideration.

The ~~system~~ Mississippian System of rocks is better known than the older divisions which underly this area, ~~part~~ both because of ~~frequent~~ several outcrops in and near the region and adjoining southern part of the region ~~and vicinity~~, and from numerous logs of borings and excavations. The rocks are separable ~~divided~~ into five distinct horizons, each of which have ~~been given formation~~ the name from the locality where it is typically developed. ~~This group~~ The lowest member, Kinderhook ~~formation~~, ~~does not~~ outcrops within region outside of area it ~~consists of local patches of~~ limestone, sandstone and shale, ~~some of~~

The rocks are separable into five members.

~~3C6 - 5~~

~~for the gradations~~ for the gradation from shale thru ~~limy~~ shale and ~~shaly~~ limestone to nearly pure limestone.

~~Those members below the Kas~~

Only the Kaskaskia formation is known to outcrop within the area considered in this report, but the other members have been studied and described from outcrops near the region.[1a]

(?) Come in 17 p 4.

[1a] Weller, Stuart. Bull. 6. Ill. Geol. Survey pp. 24-28

The lower Miss Series is dominantly limestone. It comprises

~~The formations are separated on a basis of color~~ Each of the 7 formations is recognized by ~~distinctive~~ characteristic fossils and ~~by Cambrian differences~~ such as by physical differences; ~~such as~~ involving peculiarities, color, texture, and mineral content. Total thickness 1000± feet.

The lowest formation, Kinderhook, does not outcrop within the region. Outside the area it consists of local patches of limestone, sandstone, and shale of variable thickness. This is overlain by ~~the Burlington~~ a 200 ft bed of a purer, white crinoidal limestone, Burlington, which is in turn ~~was~~ overlain by the Keokuk, distin-

separable
~~g~~uished by reason of its siliceous content. This member
~~is~~ is often overlain by 40 ft. of limestone and
shale ~~typically~~ as exposed at Warsaw, Illinois.
Next above the Warsaw beds, comes ~~the~~ a
~~layer of~~ fossiliferous layer of limestone known
as the Salem limestone. The ~~Warsaw beds~~ Salem limestone
~~are~~ is covered ~~with~~ by a darker blue or
gray limestone

The ~~upper~~ Mississippian Series is dominantly
sandstone in. This ~~upper~~ arenaceous series ~~group~~ constitutes

Weller, Stuart, p. 27 Bull. 6, Ill. Geol. Survey.

the "Chester ~~G~~roup" of some writers. It consists
of two members, The cypress sandstone
below and the Kaskaskia beds above.
The Cypress sandstone outcrops in the
Miss. R. bluffs forms the bluffs at Modoc.
Locally, an unconformity exists between
the lower series and the sandstone ~~overlying~~.
The Kaskaskia formation is the only
member of the Mississippian system of rocks
which is known to outcrop within the
region. It ~~comprises~~ consists of six layers

porous, loosely cemented - no fossils.

This member is believed to be Benoist sand →

p. 27 Weller Vol 6.

Of ~~alternating~~ limestone ~~and~~ separated by layers of sandstone & shale.

The steep bluffs along the Miss. ~~near~~ between Modoc and Chester, ~~are of this~~ exposures of this group. The quarry of the Southern Illinois Penitentiary at Chester ~~shows~~ is cut in the lowest limestone member. And it forms the core of ~~many of~~ the ~~high hills and ridges~~ Ozark Ridge at the southern end of the area and of many of the minor hills and ridges along the Kaskaskia in Randolph County. The narrowing of the Miss. Valley south of New Athens is due ~~to this~~ superior hardness of this member. Several outcrops within the lower part of the area show outcrops of this ~~rock~~ formation.

(Geologic History of Miss here?)

~~Permo~~.

~~The top of the~~ Kaskaskia group ~~series~~ is ~~overlain by the same~~

second largest Coal producing state in union.

Coal Measures cover 66.94% of States area.

~~The Pennsylvanian~~ All the coal bearing rocks of ~~the~~ Illinois are included in the Pennsylvanian system of rocks, sometimes known as Coal measures. This great system ~~of shales, sandstones~~ consists predominantly of shales ~~and sandstones, minor local~~ with minor ~~of~~ beds of sandstone and limestone and occasional relatively thin seams of coal; the aggregate thickness of the beds being 1~~8~~00 feet or more. The plane of contact between these beds ~~is an~~ and the subjacent ~~Mississippian System~~ Kaskaskia formation is an uneven surface cut ~~by~~ into hills, valleys, ~~sink holes, etc.~~ ~~where the contact is exposed~~ The contact is not exposed, but ~~some~~ the unconformity is noticeable in a few drill ~~holes~~ logs either by a layer of cemented gravel ~~or clay~~ as the lowermost member of the Penn. or by a soft, brown "sludge" resulting from the weathering of the Missis. This unconformity is the result of ~~an~~ ~~a long period of erosion resulting from~~ an emergence

above sea level of the Mississippian deposits, and their subjection to a long period of erosion before they were ~~too~~ covered with deposits of Pennsylvanian age due to a partial resubmergence.

The Pennsylvanian System is divided into three groups, (1) Pottsville sandstone, (2) Carbondale formation, and (3) McLeansboro formation. They are correlated with beds outside the region by ~~plant~~ means of fossils of various land plants which were abundant at ~~that~~ time; ~~There~~ and fossils of marine animals brought in ~~at successive sea encroachments~~ when the sea encroached upon the swamp areas.

Fig.-

The Pottsville sandstone is the lowest member extending from the top of the ~~the~~ subjacent Kaskaskia to the horizon of Coal No. 2. It is commonly known in the Carlyle oil field as the

"Salt sand" la because of the salt water
la Shaw — "Carlyle oil field"

~~encountered in~~ which floods the oil wells when this sand is tapped. It is 150 feet thick at Carlyle thinning to the west and probably thickening to the east and south, where it reaches a max of 300' plus drilled. It is made up of bands of sandstone interleaved with thinner shale lenses and local thin ~~beds~~ seams of coal. The base ~~is~~ often ~~composed~~ consists of massive layers of conglomerate, (cemented pebbles)

Carbondale formation ~~extends from~~ is that part of the Penn. system included between the base of Coal no. 2 and the top of Coal No. 6. which is the big bed of coal mined throughout the region at this. Shale constitutes the major portion of the formation, sandstone is common in the lower half and there are limestone layers near the top and the base.

~~Between~~ Midway between coal #2 and coal #6 is a rather persistent coal seam Coal #5. Other local coal lenses are abundant. Coal #6 is wonderfully persistent and uniform in thickness. "From the southern part of Sangamon, it may be readily traced as far south as Perry County without there being any doubt of its identity" [1] ~~It is believed~~ also

[1] A. Bennett Bull. 16 I.G.S. p. 185.

Has Atwell direction believes it

~~to~~ be continuous with Coal #7 of ~~Indiana~~ Eastern Ill. and Indiana. The output from this one vein equalled 59% of the total coal production of the ~~State~~ in 1909. 29,212,208 tons

All the mines from the region discussed in this report ~~are~~ mine are working in this vein. Coal no 6 is readily recognized from ~~its~~ ~~an underlying layer of~~ ~~limestone~~ association with an equally persistent layer of limestone containing

a characteristic fossil, Fig—, about the size and shape of a small grain of wheat. This ls. and #6 are important for purposes of identification of outcrops or under beds.

The McLeansboro formation is the top member of the Pennsylvanian System in Illinois extending from the top of Coal No. 6 to the Mantle rock, with a Maximum thickness of over 1400 feet. Its lowest member already referred to above is the persistent limestone to which reference has already been made. Traces of fossils in here

Above this occurs some 340 feet of shale and sandstone which is in turn overlain by the Shoal creek or Carlinville limestone. This member outcrops in several places near Carlyle and to the Northeast across Clinton County. A good outcrop is shown Clabaugh's quarry, 2½ miles South of Carlyle shows a section of this limestone which is also exposed in the Kaskaskia river bluff near by. Photo.

The riffle under the wagon bridge east of Carlyle is caused by an outcrop

of this relatively resistant layer.
Spare scattering ~~Other~~ outcrops of McLeansboro formation occur locally from ~~Shetty~~ the north edge of the region to ~~New Ha~~ Fayetteville. At ~~the river bluffs~~ Stone-Coal ford, 5½ mi. south w. of Bartelso and again ~~on the river Bluff~~ south of Lake of Egypt Br. 3 miles south of Cowden; ex posures show ~~layers of~~ thin coal beds underlain by fireclay and overlain by shale. The sandstones of McLeansboro so far as exposed ~~to be~~ are made up in large part of mica flakes. Ex posures of this ~~that~~ micaceous sandstone occurs at Sextons quarry 3 miles north of Vandalia ~~on the river bluff~~ at Carlyle, and again 3 miles ~~below~~ south of Carlyle.

Structure -:

~~Big~~ Structure ~~xx~~ means the position and arrangement of the beds. ~~The~~ The structure sections show the ~~xxx~~ structure of the bed rocks across the state ~~from~~ at in the latitude of Carlyle, and along the Kas. River from ~~Chester~~ R. 6 W. to Shelbyville. Nothing the region under discussion, the rocks have a general dip to the ~~to~~ east and north; that is, a monoclinal dip. This dip, however, meets a counter dip from ~~to~~ the eastward making a broad shallow syncline, known as the Illinois basin. Detailed examination shows that the general northeasterly dip of the beds is varied by, not uniform ~~is locally~~ but has local warped and wrinkles & resulting in occasional horizontality or even dips in the opposite direction. Exposures of the rock also show that it is much cracked and broken along more or less regular systems of cracks, joints.

Evidenced by depth to Coal #6

Careful study areas bordering
~~Detailed study~~ in ~~neighboring~~
the New Athens quadrangle that there
has been considerable ~~vertical movement~~
~~fault along~~ displacement along some joints
one side moving up with respect to the
other. It is probable ~~that~~ there has
also been considerable lateral movement,
but this is difficult of demonstration. Such
~~movements of~~ displacements ~~also~~ whether lateral or vertical
are termed faults. A fault ~~is~~ of ~~only~~
2 or 3 feet displacement is shown in
the River bank 3 ~~miles~~ S of Carlyle:
More detailed ~~examination~~ correlation within this
region will probably ~~be brought out~~ disclose more
extensive faulting:

Numerous and well distributed borings and
excavations in ~~that~~ part of the region
south of Keyesport show variations in
structure by giving the elevation of
recognizable ~~strata~~. Details of the
structure north of Keyesport are less well

known owing to a sparsity of outcrops and borings.

These minor flexures are extremely important in the economic industrial life products of certain areas thru their control over the location accumulation of gas and oil. ~~The~~ of gas & oil pools

come in p. 17.

In some places, surface features give a clue to ~~assist in working out~~ the structure of the underlying rocks, a conspicuous example being the Ozark ridge along the Miss Valley, which suggests a hard tilted bed resulting from an uplift). None of the minor features, however, can be ~~told~~ worked out in this way, because any features which might exist on the rock surface are obscured beneath the mantle rock.

~~Prominent structural features~~

Among the most prominent Structural features are several ~~anti~~ domes on the general monoclinal slope. ~~These are termed anticlines of~~

The Carlyle anticline is rather typical and the best known thru the development of the carlyle oil field. It is described by E. W. Shaw in ~~Bull~~ - a discussion of the Carlyle oil field. [Yearbook Ill.S.G.S. 1911.] ~~Oth less well known~~ Other ~~less well known~~ domes are believed to occur in the vicinity of ~~N.E. of~~ S.W. of Keyesport. Darmstadt, Bartelso ~~Marissa~~ Venedy, Marissa, etc. They are being prospected for oil. ~~It is one mile wide and one and one half miles long~~ It locates the carlyle oil pool which has been outlined by ~~is one wide long and~~ one and one ~~half~~ the producing wells as one mile east and west by one and one half miles long. The surface configuration in this area gives no ~~sign~~ hint of the presence of the upfold in the bed rock below.

See Structure section.

data ?

Chap IV Physiographic Processes

I- Introduction.

A- Importance

B- Main divisions or agents.

1- atmospheric

2- ground water.

3- Running water.

Glaciation(?)

or.

1- Weathering.
2- Transportation.
3- Corrasion.
4- Deposition.

II- The work of the atmosphere.

A- Direct

1- Mechanical

a- erosion
picking up dust + sand.
b corrasion.
c transportation
d. deposition
dunes
loess
Brown loam(?)

2- Chemical.

a- Oxidation
b- Carbonation } examples.
c- hydration.

B- Indirect

1- Changes in temp.
2- Influence on climate

III - The work of Ground water.

A - Presence shown

1 - wells
2 - Springs

B - Source.

C - The water table + movements.

1 - relation to topography.
2 - " " porosity.
3 " " moisture conditions.

D - Solution + Chemical change.

1 - Rapidity.
2 - Topographic effect.

IV - Running water.

A - Chief agent bringing land low.

B - Getting a load.

C - Moves load
Suspension
rolling.

D - Deposits load.

1 - due to decrease in velocity
a - less gradient
b - " volume.
c - more load.

2 - Change in load: fine
a - ~~coarse~~ to ~~fine~~ coarse.

3 - Position of deposit.

a - Where velocity checked
when gradient decreases
at point of overflow
Empties into still water

E - Sheet wash.

F - Concentration of run off.

1 - causes

a - inequality of slope.

b. " " resistance to wear.

2 - effects

a - concentration of wear.

G - Growth of gullies

1 - length
2 - width
3 - depth
4 - Survival and elimination

H - Stages in Valley growth.

1 - Gets permanent stream.

2 - Development of tributaries

3 - Side cutting becomes dominant.
Gets floodplain.

4 - Meandering developed

a - cause
b - Effect of meanderbelt.
c - progression of meanders.

V - Less obvious agents.

A - Gravity

1 - Creep
2 - Slumps.

B - Plants.

1 - wedgework of roots.
2 - Chemical action of organic acids
3 - Protection by covering of vegetation

a - Forests
b - Grass lands
c - Tilling steep slopes disastrous.

C - Animals

1 - Boring animals.

2 - Cattle etc on hillsides

3 - Man. {tilling, cutting timber, draining, etc.

(1)

Variations in Velocity.

~~When the~~ During the low water stage the river is sluggish, 327 ft. per hour at Vandalia as figured. In extreme low water no current is apparent except in the extremely shallow places. Series of ponds connected by shallows. ~~At such~~ At such times the river is unable to move much sediment and the water is clear. In times of high water much more sediment as shown by roily water is carried. Part of this material is brought in by tributary streams and ~~part~~ slope wash, part is picked up from the bottom & sides of the stream channel. These particles ~~would~~ are heavier than the water which they displace and would eventually settle to the bottom, but they are continually kept up by upward moving currents where the water is deflected from irregularities in the channel bottom. These deflection

Get data on velocities from Hannon

(12)

show at the surface by the so called "boiling" of the water. The increased velocity caused by increased volume scours ~~out depressions in~~ the channel bottom unequally. As the floods recede these ~~~~ depressions are partly filled because the water is unable to move off all its load. Low water, however, finds the channel alternately shallow & deep. Sand, or gravel? is rolled over the shallow places into the deeps gradually filling ~~building a steep fronted delta~~ them from the upper end. The lee of these fillings is very steep. The "step-off" of the boys who frequent the "old Swimming Hole" This deposit continues until the depression is filled unless rescoured by subsequent floods.

More being deposited than taken away by degrading stream.

These deposits are really deltas built along the stream.

V

Sheet 1

Art of prospecting (Importance)

Difficulties.

~~Value of~~ Surface features as guide

Geology.

Stratigraphy

Def. { description of layers with order & relative position.

(Earth materials) All sedimentary origin near surface

one either particles or dissolved in water.

deposited by water, (ice) wind.

Ls = time mud. as on pres. ocean bottom.

in them buried shells remains of living at time animals.

layers of Ls with marine fossils show S. Till under Sh.

Sh = mud. { ocean land.

delivered to sea by rivers & waves. (as at present)

settled forming layers. burying animals.

nearly all life, forms decayed some preserved as shell impints

Some remains, land ~~fossils~~. of land life.

S.S. = Sand.

Sea water, lakes, streams, wind.

poor material to receive & preserve impressions

hence some ss origin doubtful.

except laid down on even surface

Coal = ± disintegrated plant matter

Coal. formed in extensive marshes very near sea-level

Plants = Waters + carbohydrates, resins & waxes.

Coal = same with water & some decomposition products pressed out.

Rocks of earth = 12 systems. each = long time

Not all these systems represented here..

Oldest Ordovician { Marcountah. / Nashville?

This probably underlain by ℂ. Holder.

Sil & Dev. { thick elsewhere. / thin here. Sil may be absent.

~~Sil~~

Carb. over Dev. { everything from base of Miss to tops of hard rocks of region.

Carb dates back halfway in Geol time.

Gaps = 4 systems above Carb.

Quaternary. { sand - gravel - clay lying upon sh. ss & ls of Carb. & forms surface of region

layers described beginning at bottom.

Rocks older than Carboniferous.

Є not reached by deepest wells.

judging by char in out surrounding areas = Potsdam ss. 1000 ft thick

Ord. 4 divisions { Cincinn not ident w. certainty
Gal-Trenton · several hundred ft. Dolomite · name. (400?) reached in 2 wells.
St. Peters ss. 100 ft. where exposed to North.
L. mag does not outcrop not reached in wells. 400'.

(Not identified w. certainty)

Sil. Mag - thin if present at all.

Dev. Difficult to identify w. certainty.

Hard Blk shale - borings at Carlyle

older hs + sh underly - this as in Jackson County.

(logs of wells reaching below Miss.

not detailed
" accurate ?
} give only general idea of succession.

Carboniferous.

Miss. Better known than any of older rocks { outcrops many wells.

Nine distinct divisions · all but one of which can be recognized by fossils.

Below appears = miss limit of drillers

Lowest - Kinderhook. 200' variable.

Burlington white flinty hs. 200' ±.

Keokuk Ls. } 100 - 150'
Warsaw Sh }

Spergen (Salem) hs. Lt. colored 100 ±'

St Louis hs 200' { streaky cherty } not oolitic.

Ste. Genevieve hs - like St Louis but oolitic.

Quaternary System.

Surface sand clay + gravel { comparative age.

Much of this surface with glacial

Brought by ice sheet from Canada ~~which~~ hence stones unlike locals.

deposited directly - mass of stony clay (rock flour)

Beds of s + g depos at + in front of ice edge.

Over this a grit less clay upon prairie hills + valley sides. 0 - 20' Later deposits in valleys.

Geologic History

Recorded in rocks.

Many millions of years ago S. Illinois was part between land.
of sea floor. Covered with salt water sometimes clear + sometimes muddy. When free from ordinary mud had particles of lime which came from breaking up of shells. At all times solid material was + accumulating settling on bottom to form layers of ls, sh. and ss according to kind of sediment.

Such conditions - ord - Sil + Dev ~~vails~~ as at that

surface emerged, eroded at times by slow movements. such as seem to have affected ~~the~~ outer part of earth and may be in progress today. No violence

In periods of emergence there were

Times when mud & sand accumulated rapidly on land as today in favorable situations. At other times deposition ceased & rain + streams washed away some of the material that had just been deposited. After many such events. New deposits laid on uneven surface. Result unconformity in rocks.

The sea not deep like the middle of great oceans but shallow like sea margins at present, within a hundred miles of land. Ocean migrated widely. Sometimes area formerly land + again just off shore. Sometimes land nearer in one direction + sometimes in another. Sometimes inland sea.

Since Carb time has in all probability been continuously land area subject to wear + wash of water of + streams. any sediment since post Carb was small amount. + has since been entirely removed.

Quaternary period time of glaciation Several epochs of ice advance. Only once reach this region. Buried former surface so much Wooder, dirt + stone that after ice melted streams took new courses. often at rt. ∠s to old. ones

Weller.

In many parts of the area there are numerous well distributed borings ~~from~~ which ~~the structure may~~ show, ~~seeag~~ elevation depth of recognizable strata, in ~~many~~ much of ~~parts~~ sections ~~district~~ the region, especially ~~th~~ north of Kayesport out crops are few or wanting and ~~wells~~ deep wells, test holes and shafts are scarce. Information most abundant in carlyle region.

Affect of Rock surface (Structure) on present Surface.

~~Most con~~ In some places surface features can be used to certain extent to work ing out structure. Most conspicuous example is uplift ~~in sou~~ bordering the Miss. valley in Southern end of area, resulting in higher country near Miss than at some distance away.

Hardwork more than uplift

~~local~~ other ~~area~~ plain but, effect generally obscure because of mantle of clay, S & G deposited over this country by ice.

Prominent structural features are several more or less prominent domes. or anticlines when axis longer than other, with synclines troughs between.

Carlyle anticline example typical (well known. as oil pool. examined.

known from ~~depth~~ elevation at which recognized beds encountered in borings & outcrops.

Must be remembered that ~~a rock~~ doming up of the rocks ~~has not~~ is not shown in on the surface configuration upon which it has had ~~practically~~ no direct effect. due to fold slights & ~~surface~~ drift covering thick, surface changes rapid

Mr. E. W. Shaw describes other similar domes
Irishtown dome.
at In Irishtown township Clinton Co, 8 miles
~~south~~ N E of Carlyle

Bartelso dome 3 mi N.E. of Bartelso.

Highland "

Hoffman "

Nashville "

Kennedy "

Darmstadt anticline

Marissa Oakdale anticline

The Carlyle Oil Field.

History.

Early.
Carlyle pool discovered in April 1911, as a result of ~~wild cat~~ prospect borings wells around the producing wells in the Sandoval pool 15 miles east of Carlyle. The news spread so rapidly ~~that~~ within a week the hotel accomodations were entirely inadequate to provide for the drillers, leasers operators, contractors, and "floaters". The over flow camped out ~~in the vicinity~~ along the rivers & roadsides and many slept on the courthouse lawn.

During the first few weeks of the boom speculation in leases raged. Bonus prices bounded up to more than $100 ~~an~~ acre for land ~~that~~ could have been bought outright a few months before at not more than $50 an acre.

In spite of the inevitable reaction which followed ~~the boom~~, the production of the pool has increased without interruption. The oil is piped to the refineries at Alton via the pipe line at Sandoval.

The oil is obtained from a sandstone

layer known as the "Carlyle sand". Shaw describes it as "a soft, porous, medium-fine grained ss, of irregular thickness, has numerous shale partings and around the edges of the pool it is harder than in center and in one or two places pinches out entirely"[12] "above the Carlyle sand are about 30' feet of blueish shale - - - - - . In some places most of the rock 30 - 130' feet above the Carlyle sand is limestone."

[12] E. W. Shaw. The Carlyle Oil Field & Surrounding Territory. 1911 Yearbook Ill. Geol. Survey.

The structure of the rocks in the Carlyle oil field is ~~given by Mr. Shaw as follows:~~ based to considerable extent upon the ~~position~~ elevation of coal #6. The coal ~~is~~ surface slopes from the north side of the field to the south, west and west. To the east & southeast the coal dips gently for a mile or so, and beyond it drops off steeply.

The ~~so~~ initial production ranges up to 2,000 barrels ~~per~~ a day. The average initial production is 100 barrels ~~a day~~, and

"The yield of wells vary considerably ~ 300 bbls. but not enormously"

the average prod, after 2 months is about 50 barrels. In November 1911, about 100 wells were producing 6000 barrels ~~in~~ day. There is a strong flow of gas in most of the wells. Particularly those near the crest of the pool, strong enough, at times, to raise (lift, shoot) a column of oil & water 500 feet high.

Relation of oil to water not definitely determined:

Sand contains both oil & water

To north, sand saturated w. water.

Generally water in lower part of sand. + oil in upper.

In no good well has strong flow of water been found in sand above the oil.

Many wells = oil in several pay streaks separated by relatively non-porous sand or shale with some H2O

Many of best wells have from beginning yielded twice as much water as oil.

Seems that oil, H2O, gas are all three confined in the porous part of a layer of s s. + that the production of the field will be limited only by the pore space in that ss.

STATE GEOLOGICAL SURVEY

1

Dicovered ~~extinct~~ lakes in S. Illinois & W. Ky.

Shaw. Mss for State Survey

"Broad swampy bottom thickly forested & between trees is impenetrable tangle of weeds, brush & fallen timber."

"~~more~~ diversity in surface features of lowland. deep stream channels & gashes.

Char of valleys. Muddy R. in Illinois flows between mud banks, in a broad ~~shallow~~ valley with buried channel — feet below

Outlines of lakes obscure:

(1) Shore features but slightly developed. lakes fluctuating (rise & fall of rivers)

(2) Country not much dissected hence few exposures

(3) Did not entirely fill low parts hence no ~~contrast~~.

Phys. expression of lakes:

Upper surface = terrace broad & low.

Broad & swampy at head of fill (where fill & F.T. merge)

Description of river valley.

It Rises —— at altitude of — & flows ~~with~~ thru — counties, discharging into — in — co, at low water altitude of —. Total fall is — ' + mid stream length — . In first 20 miles fall is — ft or

— feet per mile; in next 28 miles fall is — ft or
— " " " "; in third division stream fall
— ft in — mi or less than — ft per mi.

Contrast between gradients. + with lowest gradient
+ miss gradient.

1st division valley normal.

2nd " " broader, swampy, floodplain

3rd " Stream above base of fill rock only where modern gradient low, banks mud + fine sand, f.P. narrow. Channel deep because range between high + low water very great, due to control by miss.

Shape of F.P.

1st ordinary width. (not affected by ponding)

2nd very broad. (built, up by ponding. hence widened.

3rd " narrow. (Cut into broad f.P. + made narrower)

If. fossils collected at — points (1) — — —
(2) — — —

Lime masses are probably secretions of blue green algae, though at present they show little organic structure. (points to shallow or intermittent water)

Give exact + satisfactory reference.
regarded as: (1) drift (2) lowland phase of loess,
(3) old normal f.p. deposit. (4) back water deposit
from glacial flood on larger streams (5) deposit
due to subsidence (6) deposit due to climatic change.
Not stratified loess (1) lies at lower elevations (2) fills
depressions up to level surface greenish + hard
when dry. (4) fossils aquatic.
Not gl. drift.

Cause of filling of Miss.
x tension of delta. { deposits extend up too far.
Miss. now depleting its channel
fragments of terraces
delivering more to Gulf than is brought to it?
Absence of sediment when
Miss has new channel.
Presence or tributaries of
def filling.
Size of deposit on main stream.

Occasional bits of terrace 40 ft. above Miss. flood plain
fall St. Louis — Cairo 7 in. per mile.

Age of Lakes:

Late Pleistocene { lies on, or cuts in Illinoian till & also loess.

Maybe recent (glacial deposits likely to be formed after melting of ice by tributaries bringing overload of gl. mtrl.

Miss. removed upper 60 ft of material.

Trib streams cut away less than ½ of surface of fill.

Two times of development:

2-distinct times of lake development separated by epoch in which first deposit was almost cut thru. Deposit in later lakes does not extend up so high as earlier, + 2 fillings are marked by terraces whose tops are vertically 10 ft. apart

Current of considerable strength from Miss into trib valley, thru Kas. narrows.

Vandalia Railroad Company,

Saint Louis Division,

Office of the Superintendent.

W. C. Downing.

Terre Haute, Ind.

July 12, 1909.

Mr. Leonard G. Donnelly,

Vandalia, Illinois.

Dear Sir:

In reply to your letter of the 9th inst., concerning certain information desired for the purpose of geological surveys in the vicinity of Kaskaskia River near Vandalia, I beg to advise that we have no records in our file or any information which would be of value to you in this study.

The masonry of the bridge over this river was constructed a great many years ago, and whatever records of the borings and excavations that may have been made cannot now be located, and we have nothing showing the character of the material encountered.

I regret that I am unable to be of any assistance to you in the matter.

Yours truly,

W. C. Downing.

Superintendent.

FORM 988

MOBILE AND OHIO RAILROAD COMPANY

File 1

Murphysboro, Ills., July 14th, 1909.

Mr.L.G.Donnelly,

Vandalia, Ills.

Dear Sir:-

Referring to your letter of July 9th in regard to geological Survey on Kaskaskia River Valley. I have taken this matter up with our Engineering Department and they advise me they have nothing on our files that would be of assistanee to you in the matter. I regret very much that we have nothing that we could give you that would be of ben efit to you in this work.

Yours Truly,

Superintendent.

CHICAGO, ROCK ISLAND AND PACIFIC RAILWAY COMPANY.
ST. LOUIS AND SAN FRANCISCO RAILROAD COMPANY.
CHICAGO AND EASTERN ILLINOIS RAILROAD COMPANY.

J. M. SCHULTER,
INDUSTRIAL COMMISSIONER.

ST. LOUIS, July 16, 1909.

IN YOUR REPLY PLEASE REFER TO FILE.....

Mr. Leonard G. Donnelly,
Vandalia, Ill.

Dear Sir:-

Absence from the city has prevented an earlier reply to your favor of the 9th instant relative to geological study to be made by you of the Kaskaskia River valley with a view to draining the swampy bottom lands.

I regret that I am unable to furnish you the data desired, but would suggest that you take the matter up with Mr. R. H. Howard, Engineer Maintenance of Way, C. & E. I. R., Chicago, Ill., and he might be able to furnish you some information.

Yours very truly,

J. M. Schulter

Industrial Commissioner.

JCM

All quotations are intended for immediate use and are subject to change without further notice than as required by law. FORM 18

Louisville & Nashville Railroad Company,

Office of the Contracting Freight Agent.

H. D. Timberlake,
Contracting Agent.

National Stock Yards, East St. Louis, Ill,

July 21st, 1909.

File 17

Mr. L. G. Donnelly,

Vandalia, Ill.

Dear Sir:-

Yours July 9th, regarding information about Kaskaskia River Valley.

I took this matter up with our Asst. Engineer, but he was unable to give me any information regarding same.

Yours very truly,

H. D. Timberlake

Contracting Agent.

818

The Missouri Pacific Railway Company,
St. Louis, Iron Mountain & Southern Railway Co.
—AND—
LEASED, OPERATED AND INDEPENDENT LINES.

St. Louis, Mo., August 5th, 1909.

Mr. Leonard G. Donnelly,
State Geological Survey,
c/o The Dieckmann,
Vandalia, Illinois.

Dear Sir:

I beg to acknowledge receipt of your favor August 4th regarding data concerning character and thickness of various soils, sands, etc. as developed by construction of the Iron Mountain Railway between Modoc and Menard, Ill. Would respectfully suggest that you write direct to Mr. E. F. Mitchell, Engineer of Construction, Missouri Pacific Railway, St. Louis, Mo., and also to Mr. M. L. Byers, Chief Engineer Maintenance of Way, Missouri Pacific Railway, St. Louis, Mo., in whose departments the information would be found if it is a matter of record.

Yours respectfully,

D E Ehrig

1-M

Industrial Commissioner

Form 3327

New York Central Lines.

THE LAKE SHORE & MICHIGAN SOUTHERN RY. CO.
CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS RY. CO.
LAKE ERIE & WESTERN R. R. CO.

CINCINNATI NORTHERN R. R. CO.
LAKE ERIE, ALLIANCE & WHEELING R. R. CO.
DUNKIRK, ALLEGHENY VALLEY & PITTSBURGH R. R. CO.

E. J. DOWIE,
INDUSTRIAL AGENT.

CLEVELAND, O. August 6th, 1909

Mr. Leonard P. Donnelly,
Care Illinois Geological Survey,
Vandalia, Ills.

Dear Sir:-

I have your letter of August 4th.

I have no data at hand which will be of interest to you in the work you have undertaken but have forwarded your letter to Mr. G. P. Smith, Chief Engineer, Big Four Railway and asked him if he can be of any service to you. I know he will be glad to do this, if he can.

Yours truly,

E J Dowie

Copy to Mr. G. P. Smith

CHICAGO & EASTERN ILLINOIS RAILROAD CO.

935 POSTAL TELEGRAPH BUILDING.

R. H. HOWARD,
ENGINEER MAINTENANCE OF WAY.

CHICAGO, ILL., August 7, 1909.

Mr. Leonard L. Donnelly,
c/o The Dieckmann,
Vandalia, Illinois.

Dear Sir:

I have your letter of August 4th, relative to data you would like to have concerning the territory along the C.& E.I. Railroad in southern Illinois.

I have referred your letter to Mr.R.S.Charles, Division Engineer of this Company, at Salem, Illinois, and if he has any data on this subject, he will probably send it to you within the next week or so. I am afraid, however, that we have little if anything which will be of much value to you.

Yours truly,

R H Howard

E.M.of W.

Dict.
RHH-S

25m.-2-15-08.

301 D. E.

THE BALTIMORE AND OHIO SOUTHWESTERN RAILROAD COMPANY.

OFFICE OF THE DIVISION ENGINEER.

Washington Ind., July 12th, 1909.

Mr. L. G. Donnelly,

Vandalia, Illinois.

Dear Sir:-

I have your letter of the 9th requesting information concerning the geological formation underlying the Kaskaskia valley at Cowden and Carlyle Illinois.

At Cowden we erected 9 spans of plate girder bridge in 1905. For our foundation we excavated about 15 to 18 feet below the surface and then drove piling about 17 feet deeper. The excavation was nearly all river bottom silt, containing vegitable matter, old logs etc. I think the piles brought up in a layer of gravel but we took no borings to determine absolutely this material.

At Carlyle we excavated about 16 or 17 feet below the present surface to solid lime stone rock for the foundation of three piers and one abuttment in 1907. The excavation as I recall was nearly all river bottom silt with vegitable matter in evidence down nearly to the rock with a little clay appearing on top the rock.

This is as complete information as I can give you having knowledge of no other construction in this valley where borings would be a necessity.

Yours truly,

W. L. Thayer

T

Division Engineer.

Form 152

Louisville & Nashville Railroad Company.
Office of the Traffic Manager.

C.B. Compton.
Traffic Manager.

Louisville, Ky., Aug. 9, 1909

Mr. Leonard G. Donnelly,
State Geological Survey
Care Hotel Diekmann,
Vandalia, Ill.

Dear Sir:-

Referring to yours of the 4th inst., in which you advise the Illinois Geological Survey has detailed you to make a geological study of the Kaskaskia River Valley, with a view to reclamation of marsh lands along the river. You ask that we send you data concerning the kinds, character and thickness of the various materials encountered incident to construction work between Venedy and New Memphis, Ill.

We regret very much indeed that we are not able to furnish you with the character of information required. We would gladly do so if it was available.

Yours truly,

C B Compton

C

Traffic Manager.

FRISCO

CHICAGO AND EASTERN ILLINOIS RAILROAD COMPANY.

R. S. CHARLES,
DIVISION ENGINEER.

SALEM, ILL., August 10th, 1909.

Mr. Leonard L. Donnelly,
c/o State Geological Survey,
Urbana, Illinois.

Dear Sir:

Your letter, addressed to Mr. Howard, Engineer Maintenance of Way, at Chicago, has been referred to me. Upon looking through our files I am unable to find any data relative to borings or soundings for foundation for the bridge over the Kaskaskia river. This bridge was constructed at the time the road was built and the work was handled throughout by contract, so that we have no data regarding the depth or characteristics of the strata at this point on file in this office.

I would be pleased to furnish you any information which we have available and which may be of value to you in your work.

Yours truly,

RSC-W

R S Charles

NEW YORK CENTRAL LINES

"BIG FOUR ROUTE."

The Cleveland, Cincinnati, Chicago & St. Louis R'y Co.
and
Peoria & Eastern Railway.

OFFICE OF CHIEF ENGINEER.

G. P. SMITH,
CHIEF ENGINEER.
C. A. PAQUETTE,
ASS'T CHIEF ENGINEER.

In your reply refer to my No.

CINCINNATI, O. Aug. 13, 1909

Mr. Leonard P. Donnelly,
c/o Illinois Geological Survey,
Vandalia, Ill.

Dear Sir:

Answering your letter of August 4th, addressed to Mr. E. J. Dowie, about the thickness and character and kinds of material on the Big Four line between Tower Hill and Windsor, Ill. We have no very good records of these materials.

At Shelbyville in the bed of the Oakalla River we found a shale, and we drilled into this shale for eight or ten feet, and did not get through it; our bridge piers are rested upon this shale. It is very hard, and had to be blasted in order to get a hole to start the work.

The character of the land along our cuts is mostly clay, as you can see in walking along the track.

I am sorry that we have no other data available.

Yours truly,

G. P. Smith

LSR/f

818

The Missouri Pacific Railway Company,
St. Louis, Iron Mountain & Southern Railway Co.
——AND——
LEASED, OPERATED AND INDEPENDENT LINES.

St. Louis, Mo., August 16th, 1909.

In your reply refer to
file WC/L.

Mr. L. G. Donnelly,

State Geological Survey,

Vandalia, Ill.

Dear Sir:

I beg to acknowledge receipt of your favor of the 7th instant, making inquiry for data on the character, composition and thickness of the various sands, clays, gravels, etc. along our line between Modoc, Ill., and Menard, Ill..

The only information I am able to furnish you at this time is a "log" of a well - print of which is attached hereto - which was driven in the vicinity of the track at Roots Station. However, I would suggest that you call upon our Division Engineer at Chester, Ill., Mr. P. Galvin, who will probably be in a position to give you some additional information.

Yours truly,

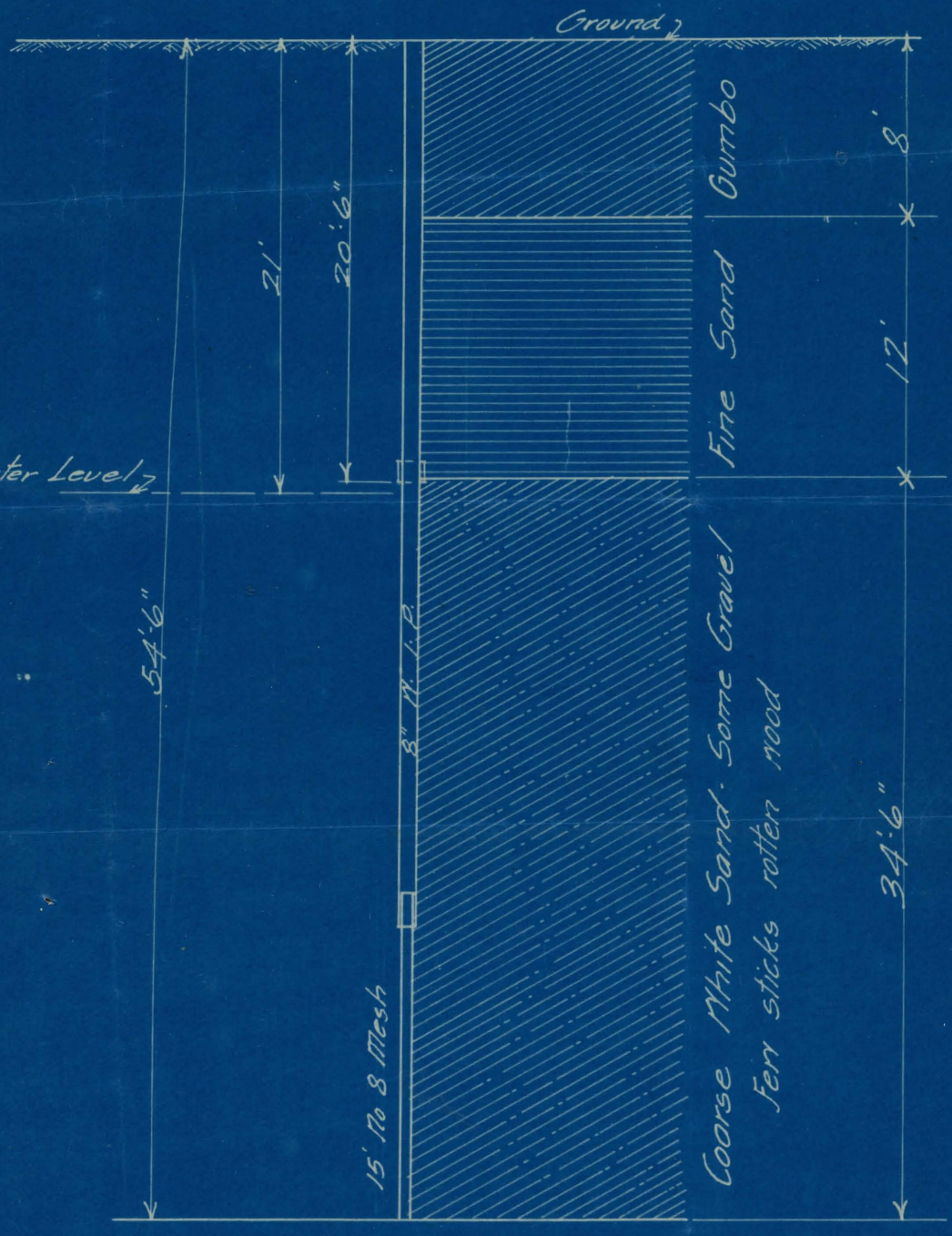
M S Byers

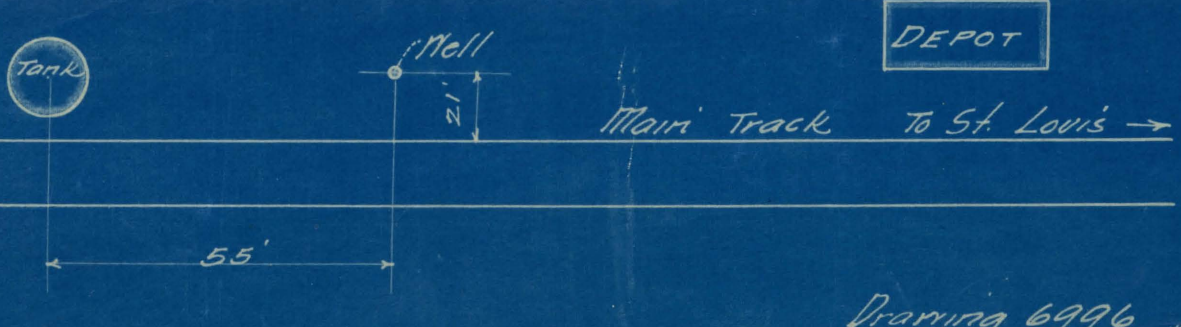
Chief Engineer M. of Way.

780

Office Eng. B. & B.
Pacific 12.31.03

LOG OF TEST WELL AT ROOTS ILL.
ST. LOUIS VALLEY RY.





Drawing 6996 JB

State Geological Survey
STATE OF ILLINOIS

COMMISSION
GOV. C. S. DENEEN, CHAIRMAN
PROF. T. C. CHAMBERLIN, VICE CHAIRMAN
PREST. E. J. JAMES, SECRETARY.

F. W. DE WOLF,
ACTING DIRECTOR

Urbana,

July 12,1910.

Mr. L. G. Donnely

Walker Museum,

University of Chicago,

Chicago, Ill.

Dear Sir :-

I am in receipt of your letter of July 11, inquiring about the rock structure of the central southern portion of the state. I have recently completed several cross sections across the state in which the dip is shown for the rocks down to and including the Chester formations of the Mississippian series. Three of the sections would cross the Kaskaskia. The one of particular value to you is from St.Louis to Vincennes . This passes through the Sandoval and Lawrence County oil fields.

I doubt very much if I am able to help you to any great extent but what I have I will be glad to let you usee. I will be free Saturday morning to help you with the sections if you come to Urbana. It will be impossible for me to see you Saturday afternoon or Sunday. If it is convenient for you to come Saturday morning I think that you can finish the work by noon.

Trusting that I can be of service to you, I am,

Yours very truly,

R. S. Blatchley.

R-RSB.

Ass't Geologist.

DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

WATER RESOURCES BRANCH

Newport, Kentucky, September 1, 1910.

Mr. L. G. Donnelly,
Walker Museum,
University of Chicago,
Chicago, Illinois.

Dear Sir:

Replying to your letter of July 19, 1910, which was forwarded to me at Nashville, Tennessee, and held there for some unknown reason. I trust this unavoidable delay will cause you no serious inconvenience.

We have no information relative to precipitation data. I would suggest that you write to Mr. Geo. M. Chappel, Des Moines, Iowa, who is in charge of the Weather Bureau work in the upper Mississippi Valley.

Our gaging stations on the Kaskaskia River have been maintained only since 1908 and we, of course, know nothing about the flow previous to that time. The gage at Vandalia, Illinois, was established February 26, 1908; low water flow is approximately 60 cu.ft. per sec; minimum flow is 12 cu.ft. per sec; maximum flow is 8,000 cu.ft. per second.

The gage at Carlyle was established March 2, 1908; low water flow is approximately 120 cu.ft. per sec; minimum flow is 23 cu.ft. per sec; maximum is 20,000 cu.ft. per second. Please note that this information is based on data that we have collected since 1908. The low water flow is a difficult matter to fix. The flood of 1908 was one of the highest, if not the highest on record. The highest stage recorded at Chester, Illinois, on the Mississippi (Chester is a short distance below the mouth of the Kaskaskia River) was 33.3 feet, June 13 and 14, 1903. The lowest water was -4.1 feet, June 3, 1900. The danger line is 30 feet. The elevation of the zero of the gage is 341.1 feet above sea level.

Trusting that the above covers what you wish, I am,

Yours very truly,

A.H. HORTON

District Engineer.

The University of Chicago

Chicago, Ill., Nov. 6, 1911.

Mr. L. G. Donnelly,
State Geological Survey,
Urbana, Ill.

My dear Donnelly:

I have looked over the outline which you sent me recently, and have one comment especially to make upon it. It looks as if you were in danger of making a general treatise on Geology rather than a report on the region which you are working. This may be a superfluous inference, since it is true that an outline may be worked up either way, but I want now to especially charge you that this must be a report on the region,--not a general treatise on Geology. So when you work up your outline, do it from this point of view.

A case in point is what you have in Chapter IV, under II A. These matters need not be discussed except as they find illustration in your region. Similarly in Chapter IV, II B should not be discussed except as it finds application in your region. The same might be said of Chapter IV, III D. The same again with reference to Chapter IV, IV H. It is very likely true that all these points may need mentioning, but not discussion.

In Chapter V, III seems to imply that coal is a marine formation. This of course is a slip.

When you are through with your discussion, it should be perfectly clear why the valley has such a wide flat as it has, and why it is so well drained. All through the history of the valley as it is, should be to the front.

Under Chapter VI, VIII does not seem to me very happy. Instead of manufactures, I should put down industries, chief of which is

agriculture. Manufacturing is very subordinate. This chapter should deal with the history of agriculture and the history of manufactures.

Under Chapter VI, I should add "IX, Future of the Valley." In this I should discuss what itneeds, with suggestions as to conservation of soil, forests, etc.

An outline does not show the relative emphasis to be put on various topics, and there is a great deal of choice in this matter. You can guide this as you write; an outline does not show relative proportions.

Very truly yours,

R. J. Salisbury

P.S. You ought to keep me posted as to your address. Mail is coming here all the time, and we do not know where to send it.

(265)

THE ILLINOIS SOUTHERN RAILWAY COMPANY,
SPARTA, ILLINOIS.

J. S. CLARK, Engineer Way and Structures.

December 29, 1911.

Mr. L. G. Donnelly,

Urbana, Illinois.

Dear Sir:-

Referring to yours of the 18th inst, beg to advise that I was not with the Illinois Southern Railway Company when the bridge was constructed across the Kaskaskia river, between Missouri Junction and Roots. After going through our files I failed to find any information which would meet your requirements.

Yours truly,

J. S. Clark

Engr. W. & S.

Dict
JSC

State Geological Survey
STATE OF ILLINOIS

Urbana,

April 17, 1914.

Mr. L. G. Donnelly,
c/o Juan E. Paris & Co.,
Maracaibo, Venezuela.

My dear Donnelly:

I had a talk recently with Professor Salisbury about your Kaskaskia report, and ~~the~~ your suggestion that it be finished up by someone else. We should like to consider this plan more carefully with a full knowledge of the condition of the report and the extra field work which you would recommend. Will you kindly arrange to send me the report, working maps, and notes, so the subject can be considered intelligently.

As I remember, the budget contained $100 payable to you on completion of the report. Proper adjustment of payment to you and to someone else who may be selected to finish the report of course must be arranged after I have a better knowledge of your progress. It would be far more desirable to have you finish the report yourself if these is any possibility of your doing so within the year.

Yours very truly,

F. W. DeWolf

DeW-BF