TOPOGRAPHICAL GEOLOGICAL REPORT

OF THAT PORTION OF

KENTUCKY

INCLUDING

UNION AND PART OF CRITTENDEN COUNTIES,

SURVEYED DURING THE YEARS 1854 AND 1855,

BY

SIDNEY S. LYON,

TOPOGRAPHICAL ASSISTANT.

To DR. DAVID DALE OWEN,

Principal Geologist of Kentucky.

SIR:—In compliance with your instructions, bearing date September, 1854, I herewith submit my report of the detailed Geological Survey, made by my corps, of Union and part of Crittenden counties, Kentucky, with the maps, profiles, &c.

SIDNEY S. LYON.

TOPOGRAPHICAL REPORT.

Having received the appointment of assistant to the Geological Survey of Kentucky, approved June, 1854, and having qualified by the 8th of that month, it was not until the September following that I was ordered into active service, when having received instructions to take the field, I proceeded to make a reconnoisance of part of Union, Crittenden, and Livingston counties, mainly to ascertain the most effectual method of correcting the very imperfect and false plats of those counties, as they were exhibited on the best known and approved maps of Kentucky. An actual linear survey having been determined upon, it was proposed, if practicable, that a survey of the nature of the present coast survey made by the government of the United States should be adopted.

The features of the country were found, by examination, to be in many respects favorable to a survey of this character, there being a sufficient number of commanding ridges with many subordinate isolated knolls well situated for stations for a primary triangulation; but the expense necessary for the establishment of such stations, and especially the immense labor that would be required in removing the primative forest around and in the lines between stations, would involve the outlay of sums entirely beyond the control of this branch of the survey.

The rectilineal method of surveys was then considered. This method divides a territory into squares of one square mile each, by lines intersecting each other at right angles, supposed to be due north and south and east and west. Practically this method has been found to abound in errors, and requires corrections, both in course and quantity at the beginning of every township or square of thirty-six square miles. This method would require that there should be carefully surveyed, and marked eighty-four miles of line and a travel of at least as many additional miles, or one hundred and sixty-eight miles of travel for every thirty-six square miles, equal to four hundred and sixty-six miles of travel to every square mile of territory examined. This

method was therefore rejected as too expensive for the limited means appropriated for this branch of the work.

It was therefore determined that a traverse survey should be adopted as the only method within the reach of this branch of the service by which approximate results could be obtained.

This method having been determined upon, and the mode and manner of carrying the same into execution being left to my discretion, I proceeded to organize my corps for field duties.

Owing to the unusual duties required it was found exceedingly difficult to procure the necessary assistants, and it was not until the 4th day of December, 1854, that the field work was commenced in form, the topographical corps consisting of Sidney S. Lyon, Walter A. Nicholson, sub-assistant, Wm. Carr, James M. Price, and H. C. Sherman, this corps being provided with a van for carrying the camp from point to point as the progress of the work required.

From the facts obtained during the reconnoissance it was deemed advisable that the survey should commence at some one of the best established points on the Ohio river near the margin of the Great Western coal field; Caseyville, in Union connty, was selected as the point at which the work should commence.

Owing to the very unsystematic manner in which the early land surveys of Kentucky were made, there are few or no well established geographical points in the State; the boundary of the State formed by the Ohio river, having been established approximately by the surveyors of the United States lands lying in Ohio, Indiana, and Illinois, has been copied from those surveys and applied to the maps compiled for Kentucky.

The lines of Green, Kentucky, Licking, Big Sandy, and probably some of the smaller rivers surveyed under the direction of the State Board of Internal Improvement of Kentucky, are perhaps also approximately correct, but I have no accurate information as to the character and extent of these surveys. Indeed I am not aware that any surveys at all reliable have even been officially published of Kentucky geography.

With the exceptions above alluded to there are probably no surveys in Kentucky that have had any further object in view, than giving boundaries to land, and the surveys for this purpose have not generally

been returned for record in such form as to be of any practical utility in the construction of maps of the territory so surveyed.

On the 4th of December, the topographical corps took the field, starting at the shore of the Ohio river at low water mark, and extending the lines in various directions, making special note of such matters as were of topographical and geological interest met with on the lines, and when practicable observing angles from the lines to all inhabited houses. The lines were run with reference to the geological or topographical character of the country.

On the 21st of December it was deemed advisable to increase the force employed, and run lines of levels simultaneously with the compass lines. Mr. Sherman having fallen sick, was paid off, and Franklin Armstrong and John Cawthon were added to the corps, and compass and level put into active operation, and the work continued until the 21st day of January, 1855. The weather being now unfavorable, the corps were directed to report to you at head quarters, and were paid off and discharged for the season.

I then proceeded to make up the field work. The topographical corps again took the field on the 26th day of April, reduced, however, in force in consequence of our limited means, now consisting of myself and two chainmen.

With this force the work was continued until June 8th, 1855, when the assistants were paid off and discharged, after which the field work was continued until the 1st of July, when active field operations ceased.

In October the office work was resumed, and the entire field work laid down on a scale of 3.8 inches to the mile. This map has been reduced to a scale of $\frac{1}{50,000}$ or 1.2672 inches to the mile.

For convenience in referring to this map, as well as for a systematic division of the territory, it has been laid off into squares of one mile each, and the larger divisions into squares of thirty-six miles or townships. These townships are the result of the extension of the township lines from the neighboring States of Indiana and Illinois, eastwardly and southwardly, and have been marked eastwardly and westwardly from the meridian of Uniontown; and northwardly and southwardly from the township line, passing from Indiana into Union county, where it nearly intersects the mouth of Highland creek; the latter line, if reduced eastwardly into a *base* line, will run nearly centrally

through the State. This mode of dividing the map will greatly aid the eye in judging of distances, and will facilitate all references made to it, and is probably the best division of the State that can be adopted.

It will be seen that the territory covered by the map embraces an area of about five hundred square miles, of the counties of Union and Crittenden.

TOPOGRAPHY.

The principal and highest range of hills in Union county is known as the Bald Hill Range. It rises in Township 2 S., Range 2 W., and extends due four miles, to the flat lands known as the Scatters of Cypress.

This range again makes its appearance in section 11, T. 2 S., R. 1 W., extending eastwardly to that part of the range known as the Chalybeate Hills, having passed through sections 11, 12, 13, and 14, T. 2 S., R. 1 W., entering T. 2 S., R. 1 E., in section 18, passing through that section, and sections 17 and 16 of the same township; here the range inclines slightly to the south, passing into sections 21 and 22, which it crosses diagonally south-east and north-west into and through section 23, crossing the last section by the same course, forming what is known as the *Sulphur Spring* Hills. From this point the range branches, and throws off long spurs on the south; one spur encircles the head of Eagle (creek) fork of Cypress, and is connected by low undulating hills. On the south side of this creek, to the dividing ridges between Eagle and Wash creeks, another long spur is thrown off southwardly, which forms the dividing line between the waters of Dyson's and Ramsey's creeks; on the north, low spurs are thrown off, dividing the waters of Lost creek and the waters of Cypress, Lost creek and Big Mason, Big Mason and Casey's creek, Casey's and Anderson's creek, with a number of minor spurs dividing the smaller branches, near the head of Highland creek. Eagle, Dyson's, Anderson's and Casey's creeks have their sources in the Sulphur Spring hills. Lost creek rises on the north side of the same range near the Chalybeate Springs. From the Sulphur Spring hills the Bald hill range is broken into a number of nearly parallel ridges, which extend into Hopkins county by a course nearly east and west. The greatest elevation ascertained along this range being equal to 325 feet above low water of the Ohio river in 1854.

North of the Bald hill range there is an irregular range of hills rising in altitude in section 20, T. 1 S., R. 1 W., extending in a north-eastwardly direction through sections 21, 22, 23, and 13 of the same township, and into section 18, T. 1 S., R. 1 E.; here this range is separated by the valley of Lost creek, rising again in section 8, same township, the range is continued along the north side of Little Mason creek to and east of the Morganfield and Henderson road, on Highland creek, while the west end of this branch of the range runs from section 8 northwardly, and terminates in bold escarpments against the flat inundated river bottoms above Highland creek which meanders sluggishly at their base.

The "Anvil Rock" range of hills rise in section 10, T. 3 S., R. 2 W., where this range of hills attain their greatest height, (245 feet above high water,) running with a gradually decreasing elevation through sections 11, 11, 14, and 13, T. 3 S., R. 2 W., entering T. 3 S., R. 1 W., in section 18, which it crosses, and enters the rich flat lands at the head of Locust Lick creek, and is only indicated by symmetrical knolls of various sizes, sometimes rising sixty-five to seventy feet in height, having a base varying in area from five to seventy-five acres, terminating in a rounded irregular hill in section 21, same township; here it has a less elevation and passes through sections 22, 27, and 26, forming a sloping table, abrupt on the south, with a gradual inclination on the north, to Cypress creek. This range again appears on the east side of Cypress, where it occupies a greater base and is most favorably seen at "Poplar Ridge," and "Coal Hill," in sections 25 and 26, same township; continuing in the same course it extends through section 31, T. 3 S., R. 1 E.; sections 5, 9, 10 and 24, T. 4 S., R. 1 E; sections 19, 30, 29, and 32, T. 4 S., R. 2 E; passing into Hopkins county, the direction changes more to the east extending into section 33, and same township.

"*Bethel Hills*" form a bold and well defined range in sections 7 and 8 in T. 3 S., R. 1 W., extending eastwardly into sections 1 and 12, T. 3 S., R. 2 W., and is lost and obliterated by the Scatters of Cypress; it appears again in sections 27 and 21, T. 2 S., R. 2 W., where it attains an elevation of 255 feet.

In this township the masses forming the Anvil Rock, Bethel, and the Eagle creek, or Jerusalem school house range (?) are crowded to-

gether and form apparently a confused range of hills and ridges, which, however, are susceptible of separation.

The hills occupying section 15, N. E. corner of 24, S. W. of 14, and N. W. of 23, being formed by all the masses lying below the Anvil Rock range, and above the rocks of the millstone grit series, which form the southern slopes of Bald hill. There is also a well marked line of division between the masses forming the ranges of the Bethel hill and Jerusalem hill. This line enters section 24 on the east side, with the line of a nameless branch; then by a north-west course crosses section 24, and enters section 15; and down another nameless branch, a tributary of Cypress of the Ohio. Between the sources of these two streams the *hills* are reduced from two hundred and fifty-five feet to about thirty-five feet above high water, or seventy-five feet above low water of the Ohio river.

Eastwardly the Bethel hill range rises again in section 9, T. 3 S., R. 14, and extends in a course due east across the township, when it is lost in the low rich flats of the Pond fork of Crab Orchard creek; appearing again in section 30, T. 3 S., R. 1 E., when it attains an elevation to the same range in section 7, T. 3 S., R. 1 W., when it was found to be 247.84 feet above low water at Caseyville, 1854. Further eastwardly this range has not been satisfactorily determined.

On the Ohio river, at Caseyville, the millstone grist rises in a bold range of hills, having a course nearly north and south, capped in many places by the masses of the lowest workable coal beds. This range extends to Trade-water river, making a bold rocky bluff on either side of the gap through which this stream finds an outlet into the Ohio. On the south side of Trade-water these bold rough masses extend in a course varying to the east of south. In section 20, T. 4 S., R. 1 E., they attain an elevation of about four hundred feet. At this point the line of these hills changes its direction and runs parallel to the general direction of Trade-water, running boldly up to that stream in section 16, T. 5 S., R. 1 E., defining with a strongly marked outline the limit of the productive coal measures.

This range of hills having no general name, may be appropriately denominated the conglomerate range.

A very marked peculiarity of this district is that all of the ranges of hills enumerated are severed by low lands, crossing these lines

nearly at right angles with their direction. The subject will be noticed more in detail in the course of this report.

DRAINAGE.

The drainage of this district necessarily depends on the configuration of the hills and dividing ridges, therefore, the lines of the principal streams conform nearly to east and west courses, except when the dividing ridges have been severed by denudation, or when they have sunk so far below the general elevation of the range to which they belong that the water courses find their beds above the rocks which along other parts of the ranges form their summits.

Trade-water.—This river enters the Ohio two and a half miles below Caseyville, in T. 4 S., R. 2 W. The general direction of this stream is from south-east to north-west, but it is remarkably crooked; and the current very gentle, being in fact a succession of pools, separated by gentle ripples, having a fall of less than four inches to the mile.

Cypress Creek.—This creek takes its rise in the "Bald Hill" range, where it is known as Eagle creek, and for some distance of its course receives most of its tributaries from the north side, all rising in the Bald hill range. It runs southwardly about two miles over the upturned edges of the coal measures, which abut conformably on the western slopes of this range, the main body of the hills being formed by the tilted rocks of the millstone grit and sub-carboniferous limestone, which are protruded through the masses of the coal measures, and may be found in many places in this range dipping south, south-east, and south-west, at angles varying from 71° to 18°, the angle of dip gradually decreasing to the south of this range as the elevation becomes less. The upper part of this stream having had a course to the north-west for several miles, with a well formed bed in section 15, T. 2 S., R. 1 W., reaches a flat known as the Scatters of Cypress, where for several miles no regular defined bed can be traced; the waters of the stream, speading far and wide, make a great curve to the west, and pass around and through the gaps in the Eagle creek or Jerusalem School House hills and the Bethel hill range.

After being thus deflected they flow in a line nearly parallel to the latter range, along its south side, in a south-east course, until it reaches section 26, T. 3 S., R. 1 W., when it is turned to the south-west by a

sharp bend, when in contact with the Anvil Rock range, and by that course reaches Trade-water in section 33 of same township.

The levels carried along Cypress show a descent of only two-tenths of a foot per mile. It is worthy of remark that in the course of this stream, from the head of "the scatters" until it again finds an imperfect bed in section 12, T. 3 S., R. 2 W., there is abundant evidence of a general depression. From the lower end of "the Scatters" the creek evidently has its bed on the out-cropping shaly beds which form the base of Bethel hill.

Crab Orchard creek is formed by a number of confluents, the most northwardly of which—Dyson's creek—rises in the Sulphur Spring hills of the Bald hill range, runs south-west, enters and is lost in a succession of flats known as the Pond fork, which having received a number of minor tributaries from the hills south of Eagle or head of Cypress, passes off by a south-east course; receives Ramsey's creek from the north side, and having reached section 2, T. 3 S., R. 1 E., it takes a direction nearly south for about five miles, crossing in its course the members composing the Anvil Rock range. Its course is then nearly due west for four miles, when it enters Trade-water.

Cypress creek of the Ohio rises in the Grundy hills, the west end of the range north of the Bald hill range, having its course parallel with the Ohio river; running through a succession of ponds and flat swampy lands, being subject to overflow throughout its entire course, receiving from the east a considerable number of nameless creeks and drains, enters the Ohio river in section 8, T. 3 S., R. 2 W., having a length of about sixteen miles.

Lost creek rises in the Chalybeate hills of the Bald hill range, runs north through a rich flat county, but without a defined bed for eight miles, until within half mile of the Ohio river, where it is deflected westwardly, and runs six miles parallel with it, entering it opposite Wabash island.

Anderson's, Casey's, and Big Mason rise in the Blue hill range, and run off in courses diverging from each other, emptying into Highland creek.

Highland creek rises in the Bald hill range, and runs northwardly about fourteen miles, receiving Anderson's, Casey's, and a number of minor streams; it is then deflected to the west, and after a course of nine miles enters the Ohio river at Uniontown.

FLATS AND LOW LANDS.

The hill land approaches the Ohio river at Uniontown and Caseyville. With these two exceptions, the Ohio bottoms vary in width from one-half a mile to three miles, subject, in floods of the Ohio, to be covered by the waters of that river, the bottom being generally lowest at the base of the high land, abutting against the river bottom; the valley of Cypress creek varies in width from one-half a mile to four miles, generally of a rich black loam, requiring draining, by ditching, to bring it into cultivation.

The valley of the Pond fork is also very wide for a stream of that size, being from three to four miles wide in its greatest expansion. The same remark will apply to Lost and Casey's creeks. A portion of the rich flats of both Lost and Pond creeks have already been reclaimed and brought into cultivation, yielding an ample reward for the capital and industry bestowed on what has been, until recently, considered waste land; and the same remarks will apply to the wide, rich bottoms on the minor streams of this county, which are now in progress of reclamation. The soil of this county, except on the summits of the ridges, has been derived chiefly from the rich quartenary loams, and the lands having suffered but slightly from denudation are consequently of superior quality.

The primitive forest in the flat lands is cotton wood, swamp ash, box alder, pecan, red oak, white oak, sweet gum, black gum, red bud, and in swampy places crooked wood. On the upland and sloping lands, poplar, ash, white and black oak, with occasionally red oak, sweet and black gum, hickory, (several varieties.) There are a few localities where the sugar maple flourishes. Undergrowth: dogwood, hazel, spice-wood, sassafras, pawpaw, grape-vines, &c. The soil generally is loose and friable, and of a deep black or mulatto color.

There are two ranges of post oak flats, running eastwardly through the county, south of the Bethel hill range. One range occurs where the shaly beds between the third and fourth coals of the lower coal measures have been denuded of the loose loams of the quartenary deposits.

The other range occurs from the exposure of similar beds, which occupy a position between the first and seconds beds of the coal measures reposing on the "Anvil Rock." Wherever either of these

beds have been observed, they were invariable accompanied by a post oak flat, soil light colored, and nearly impalpable silicious earth. With the exception of the post oak glades, and the steeper hill sides and summits of the Bald hill range, and the hills of the millstone grit, seen in the south-west corner of the county, and one or two points where this range crosses to the north side of Trade-water, as at Longsport and Montezuma, the soil is of a superior quality, not difficult of cultivation, yielding abundant crops of corn, wheat, oats, rye, barley, clover, tobacco, potatoes; orchards thrive well; not much attention has yet been bestowed on the cultivation of fruits.

SPRINGS.

There are but few springs of water rising to the surface; those most worthy of note are the Sulphur Springs, rising in section 26, T. 2 S., R. 1 E. The Chalybeate Springs, rising on the Southern slope of the Bald hill range, where they come to the surface between the beds of the mill stone grit series, which at this point dip at the rate of 71° to the south. These springs are in section 21 of the same township. Another spring, remarkable for its boldness and constancy, and the character of its waters, rises in the black flats of the Pond fork, and after spreading eastwardly a distance of about seventy yards, is swallowed by the loose materials composing these flats. In section 12, T. 2 S., R. 1 W., a bold spring rises from a bed or vein of barytes or heavy spar; this mineral appears to be very abundant in this locality; very palatable water can generally be obtained in sufficient quantity by sinking wells, both for domestic uses and stock water, within fifty yards of the surface, or even at a much less depth in many places.

GEOLOGY.

The great distinguishing geological feature of this district consists in its coal measures, which are co-extensive with the county. The southern and western out-crop of the deepest seated coals conform to the line shown upon the map of this county, running through sections 20 and 19, T. 5 S., R. 2 E.; sections 24, 13, 12, 11, 2, 3, 4, 9, 8, 7 and 5 of T. 5 S., R. 1 E.; sections 32, 31, 30 and 19, 54 S., R. 1 E.; sections 24, 25, 26, 23, 22, 15, 14, 10, 9, 4 and 5, T. 4 S., R. 1. W.; sections 32, 29 and 31, T. 3 S., R. 1 W.; sections 36, 25, 26, 23, 22, 15, 16, 9, 4 and 5, when it enters the Ohio river and again appears on

the Saline creek in Illinois. From section 26, T. 3 S., R. 2 W., though the out-crop is covered by the alluvial bottoms of the Ohio, and is not seen, the out-crop line may be relied upon as approximately correct, the tops of the hills on the neighboring shore of the Ohio river in Illinois being covered by the wasted materials of the Bell and Cook coals of the lower measures, which are distinctly recognizable. Southwardly of the out-crop line the rocks are dipping much more rapidly than north of it; the rate of dip not being constant, seldom agreeing in any two localities; the direction of the greatest dip also varying with the constantly varying direction of the out-crop line.

The line runs through the sections 9, 3, 11, 5 and 6, 55 S., R. 2 E.; sections 31, 30 and 19, 34 S., R. 2 E.; sections 24, 23, 14, 15, 10, 9, 4, 5 and 6, T. 4 S., R. 1 E.; section 31, T. 3 S., R. 1 E.; sections 36, 35, 26, 27, 21, 20, 19 and 18, T. 3 S., R. 1 W.; sections 13, 14, 15, 10, 9 and 4, T. 3 S., R. 2 W.; sections 31 and 30, T. 2 S., R. 2 W., when it also passes into the Ohio river, and again appears on the Saline creek, marking the line of division between the upper and lower series of coals. The out-crop line of the deepest seated coals of the same coal measures may be distinguished along the foot of the Bald hill, in sections 9, 15 and 14, T. 2 S., R. 2 W., when they have been brought to the surface by the uplift, carrying with them the rocks of the mill-stone grit and sub-carboniferous limestone, which form the body of the hill. West of Cypress creek, no openings have been made into the coal beds. East of Cypress creek, along the southern face of the Bald hill range, coal has been worked in several places, which doubtless are the coals of the Lower Coal Measures. On the north side of these workings the body of the hills is based upon the sub-carboniferous limestone, which out-crops, near the foot of the hills, while the hills themselves are composed of the rocks of the mill-stone grit. In every locality observed, the rocks have in all parts of the hills uniformly a southern dip, evidently uplifting the deepest seated coal beds, which are on the south side of the range, dipping at high angles to the south, while on the north side of the Bald hill range the coal beds near the axis of the hills are also dipping south, and toward this range lying in great confusion, no beds being identified near the hills. These hills appear to have been raised from below, and thrust through the superincumbent coal beds, by a succession of dome-like waves. The centre of the Bald hill in section 11, T. 2 S., R. 1 W.,

being the anticlinal axis of the first wave; near the north-west corner of section 17, T. 1 S., R. 1 E., being the anticlinal axis of the second wave; near the south-west corner of section 26, T. 2 S., R. 1 E., being in like manner the point of greatest elevation of the third wave. It will be seen by an examination of the accompanying map that there is a very great difference in the length of the waves here alluded to—the distance between the first and second being equal to nine miles, while the distance between the second and third is equal only to about four miles. It is possible that the Coal Measures south of the Bald hill range may be connected by a neck or isthmus, lying in a line north and south, occupying the great valley of the Cypress, extending across sections 7, 8, 9 and 10, T. 2 S., R. 1 W. In case they are not connected through this valley, then the Coal Measures south of the Bald hill range form an out-lyer, being severed from the great body of the western coal field, by this remarkable and hitherto little known fault, which, from all the evidence observed, appears to be cotemporaneous with the disturbance producing the fractures, now the beds of the Ohio, Trade-water and Saline rivers. To the effective force producing this fault may also be traced certain waves of elevation and depression in the materials of the Coal Measures. The lines of these waves may be traced. One of the most remarkable begins at the head, or north-east end of the Scatters of Cypress, and continues down that stream to the west end of Bethel hill in section 12, T. 3 S., R. 1 W., when it is intersected by another synclinal fold, coming into the coal fields from the mouth of "Cypress of the Ohio," the line of apparent greatest depression running diagonally through sections 9, 5, 6 and 2, where the folds become one, running through the entire valley of Hine's creek. Another great fold of depression enters the productive coal field between Locust Lick creek and Trade-water river, having a course nearly north until it reaches section 9, T. 3 S., R. 1 W., when it appears to divide, one branch of the fold entering the line of Bethel hill and running up the valley of Pearson's branch until it reaches section 2, T. 3 S., R. 1 W., when it changes its direction to the east and south-east, passing down the valley of Pond fork until it reaches section 19, when it joins the other branch of the same fold or valley, which has passed down the valley of Cypress, having a width of nearly six miles; the two folds having united, they are continued as one valley, until it reaches section 11, T. 4 S., R. 1 E., when it is intersected

by another narrow valley of depression, one of which is parallel with the Bald hill range, about two miles south of it in T. 2 S., R. 1 W. Another enters the coal field at Half Moon Lick, on the Trade-water, and running nearly east enters the fold of Crab Orchard creek in section 15, T. 4 S., R. 1 E. Between each of these valleys are corresponding lines, wherein the measures are elevated, forming as it were a succession of waves, the rocks being alternately elevated and depressed.

It should have been noticed that there are patches of the lower measures lying outside or south of the line, making the out-crop of the lower measures south of Trade-water. That in sections 6 and 24 may be cited as one of these out-lyers, the precise boundary of which, not having been determined, it has not been laid down on the map.

At the head of Pond fork there is an extensive bed of the highest of the Coal Measures, embracing the south-west part of T. 2 S., R. 1 E., and the north part of T. 3 S., R. 1 E., being the beds associated with the Carthage rock in T. 1 S., R. 1 W., and equivalent to the Grundy ridge series.

From the mouth of Highland creek up the line of that stream, the rocks dip southwardly, and meet a northwardly dip on the Ohio river, in section 2, T. 1 S., R. 1 W. The synclinal axis of this fold has a direction of about 15° west of south, and if not severed by the Bald hill fault is connected with, and forms a part of the series lying in sight at the head of the Pond fork of the Crab Orchard creek. The fold that lies between the Bald hill range and the line of Highland creek is not so easily determined, the county being almost entirely covered by the loams of the quarternary deposits. The fact, however, that the measures on Highland creek dip southwardly and northwardly in section 8, T. 2 S., R. 1 W., involves the necessity of a synclinal fold, where the conflicting lines of dip encounter each other. Probably the fold will be found to occupy a middle distance between the lines of the roads from Uniontown to the Highland Licks, and the road from Raleigh through Morganfield to the same point. Where this last road crosses Anderson creek, the rocks were observed dipping north-west at the rate of 10°; on the line of Highland creek the rocks dip south and south-west and south-east at various angles between 2½° and 6°.

The coal beds and associated rocks on the north side of the Bald hill range wherever observed have uniformly the appearance of having

fallen southwardly or towards the line of the fault, and as far as ascertained the uppermost beds observed are not lower than the 6th coal of the upper series; all the coals of the lower series will probably be found too deep seated for profitable workings north of this range.

The coals numbered 6, 7, and 8 of the upper series will probably be the only coals that may be profitably worked in Union county, north of the Bald hill range.

South of the Bald hill range there is no difficulty of reaching each of the eight beds of both series at their out-crop. On the west side of Cypress of the Ohio this out-crop has been duplicated, the lower beds having been brought again to the surface by the Bald hill uplift.

North of the Bald hill range, in the line of most favorable out-croppings of the upper series, these coals have been reached in several places; at one hundred and fifty feet on Highland creek three of these beds have been penetrated by three several borings made by Dr. John T. Berry; two of the upper of these beds have been entered by boring on the farm of Mr. Wilson in section 27, T. 1 S., R. 1 W., at a depth of one hundred feet. The sixth coal of the upper series has been entered in natural out-crop in several places on sections 5 and 8, T. 2 S., R. 1 W., where it is known as the "Blue Coal."

The broken and disturbed beds of the upper measures have also been entered and worked, to a limited extent, near the Sulphur Springs on Casey's creek, in section 25, T. 2 S., R. 1 E.; another bed has been opened in the same section. The first of these beds is four feet thick, and dips south-eastwardly at an angle of 45°, while the second is but twenty-eight inches, dipping in the same direction at an angle of 15°. A coal four feet in thickness, standing vertically, has been worked to the depth of six feet, when it gave out, being a fragment of the beds disturbed and broken by the Bald hill dislocation or uplift. This bed lies in section 28, T. 2 S., R. 2 E. A bed of coal was observed on a branch of Highland creek in section 36, same township; this bed also dips rapidly toward the Bald hill range and has not been worked.

South of the Bald hill range the seventh bed of the lower series has been worked successfully by Col. John Bell, on section 5, T. 4 S., R 1 W.

An opening is now being made in section 10, same township, by Messrs. Wheatcroft and others, and, as I have been informed, successfully worked. This bed has also been opened in several places in sec-

tion 23, same township, first by Col. Bell and subsequently by Dr. Sneed and others.

It has also been penetrated by digging for water at several points on Trade-water, above Sneed's mines, but no regular workings have been made. It has been opened and regularly and successfully mined by the Messrs. Casey on section 31, T. 3 S., R. 1 W., and in section 25, T. 3 S., R. 2 W., near Caseyville; but being at this place too thin for profitable working the mine has been abandoned.

The eighth coal, as far as I have been able to ascertain, has been mined in only one place in this district, in section 9, T. 4 S., R. 1 W. This bed is of very variable quality and thickness, rising as high as six feet and sinking as low as twenty-eight inches.

The sixth or Ice House coal has, as far as ascertained, also been opened in only one point, in section 23, T. 3 S., R. 2 W.

The fifth or four-feet coal has been opened on section 14, same township, but has not been regularly mined. It is also to be found outcropping in the bed of Trade-water at the mouth of Cypress creek.

The fourth or little vein has been opened and regularly mined on section 14, T. 3 S, R. 2 W., also on section 34, T. 3 S., R. 1 W. It is worthy of note that these two beds, the fourth and fifth lying very close to each other and both being covered by a hard slowly weathering sandstone, may be traced without difficulty in nearly every part of their course through the county.

The third or "five-foot coal," or Mulford coal, has been successfully worked by James Mulford, Esq., on section 14, T. 3 S., R. 2 W.; also by Messrs. Smith, Matthias, and others, on section 15, same township; with these exceptions, no openings into this coal are known. The line of its out-crop is strongly marked throughout the entire breadth of the county.

The second, or middle coal, has been opened and worked in section 10, T. 4 S., R. 1 E., known at this point as the Thompson coal; also, in section 32, T. 4 S., R. 2 E., where it is known as the Llewellyn coal. It has also been opened, and a small amount of coal taken from it in section 13, T. 3 S., R. 1 W., and is probably the coal opened at Coal Ridge in section 36, T. 3 S., R. 1 W. It is worthy of remark, that this coal is rapidly increasing in thickness as we go eastwardly from the Ohio river, where it is scant three feet, associated with micaceous shales and shaly sandstones, while at the Thompson mine it has increased in

thickness to six feet, being there covered by six feet of black bituminous argillaceous shales, (in contact with the coal,) above which are found heavy masses of limestone.

At the Llewellyn mines, and at the opening into the same coal, on the land of John Watson, the shales above the coal have thinned out to six inches, while the limestone which comes within this distance of the coal has increased to a thickness of sixteen feet.

At this mine it is also to be observed that under a thin fire-clay, of one foot in thickness, is found a light grey colored limestone, nine feet in thickness.

The first coal under the "Anvil Rock," and the first in the series of the eight workable beds of the Lower Coal Measures, has been worked for neighborhood use on section 10, T. 3 S., R. 2 W., where it is three feet in thickness.

The same coal was entered on section 18, at thirty feet from the surface, in digging a well, where it was also three feet thick, and was again observed near the Thompson mine, where it has thinned to fifteen inches of imperfect coal and "coal rash."

Thus while the second coal of the lower series has doubled its thickness, the first has diminished by more than half the thickness which it has in section 10, T. 3 S., R. 2 W. The thickness of the rocks intervening between the base of the Anvil rock and this coal, has experienced a like diminution.

It was very desirable that the third coal should have been seen, but no openings having been made into it, it was not visible. Its place, however, is well defined in this neighborhood by the post oak flat before alluded to.

On the line of the Caseyville and Morganfield road, which runs nearly with the line of the dip of the masses forming the Coal Measures of the county at this point, the out-crop of the first coal of the upper series is passed over in section 18, T. 3 S., R. 1 W. Near the line of Cypress creek, the out-crop of the second appears. Neither this coal nor the first has been worked, and they are only known by the sinking of wells which have penetrated their beds, the second coal having been thus entered at Malone's mills. The third coal of this series has been opened and worked for neighborhood use and is known as the Davis coal. The fourth coal has not been opened but may be in the valley

of Cane creek; its thickness is not known but it is thought to be a coal of workable thickness.

The fifth coal or Chappel coal has been opened on section 31, T. 2 S., R. 1 W., where it is twenty-six inches thick and of good quality. The sixth or Blue coal has not been opened in this part of the county; its out-crop may be observed on the line of the road, on a tributary of Wash creek, and may be traced eastwardly until lost in the valley of Pierson's creek. No localities are known where the seventh and eighth coals have been opened south of the Bald hill range.

It has been thought proper to accompany this report with a reduced copy of map No. 1, Geological Survey, contrasted with a copy of the same territory taken from the best published map of the State. From this contrast it may be seen to what an extent error has crept into the maps of this highly favored country. Diagram No. 1 is a traced copy of Union county, as shown by the best map of Kentucky. Diagram No. 2 is a free hand reduction of map No. 1., Geological Survey, reduced to the same scale as Diagram No. 1. No stronger argument need be urged on the lamentable condition of the geography of the State than the comparison of these unpretending little figures.

Accompanying the maps are five sections showing imperfectly the great flexions of the stratification, and the effect of the Bald hill fault as now understood. The line of the first four Diagrams starts in section 20, T. 4 S., R. 1 W., and run severally north and east of north; the line of the fifth Diagram runs nearly centrally through the county. These Diagrams should be applied to the map by causing the darkest lines to coincide with the lines marking the out-crop of the productive Coal Measures.

Should the State continue this, to her very important work, I would recommend that a line be laid down as a base of operations.

By an examination of the map of Milne and Bruder, published at Louisville, it may be seen that a line running east from the mouth of Highland creek, Union county, would pass through Henderson, Daviess, Hancock, Breckinridge, Hardin, Nelson, Washington, Mercer, Jessamine, Madison, Estill; near the line dividing Powell, Estill, and Owsley; near the line dividing Breathitt and Montgomery; through Floyd and Pike, and intersecting the Virginia line near the arm of Logan.

The line thus laid down would divide the two coal fields of Kentucky into equal parts, and would give as long an east and west line as could

be obtained in the State. A line of this length properly surveyed, determined, and marked would be of incalculable advantage. It would intersect the State surveys on Green, Kentucky, and Licking rivers, and as far south as the base line extended into the State would connect with the Ohio river.

In connection with the survey of such a line, if possible, such astronomical observations should be made for latitude and longitude as would determine all important places touched by it.

One of the most important branches of these observations would include those for the determination of the true meridian.

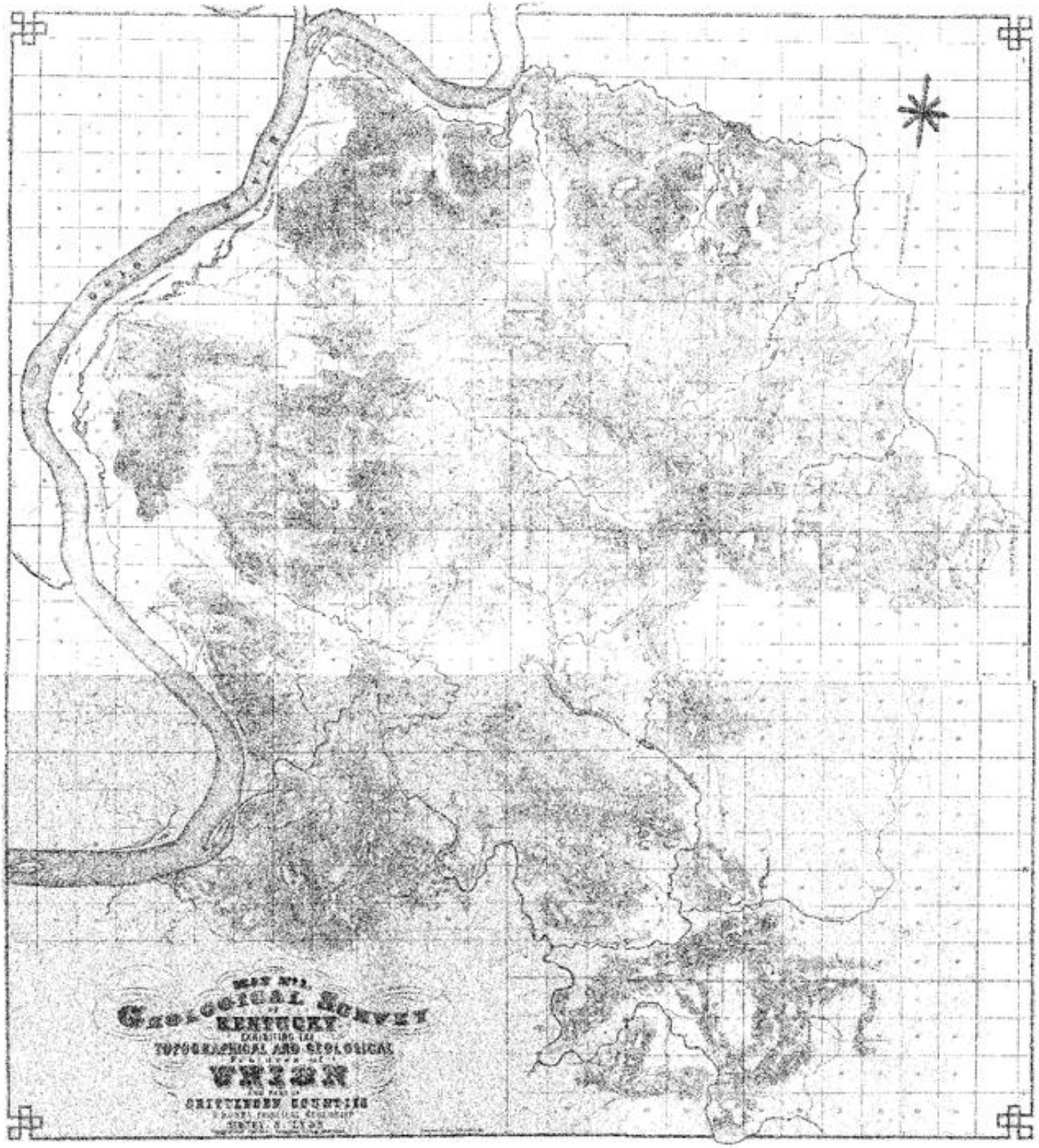
The changes of the magnetic meridian through a series of years, and its differing considerable in contiguous tracts of country, have been fruitful sources of those vexatious litigations about land lines which are so common.

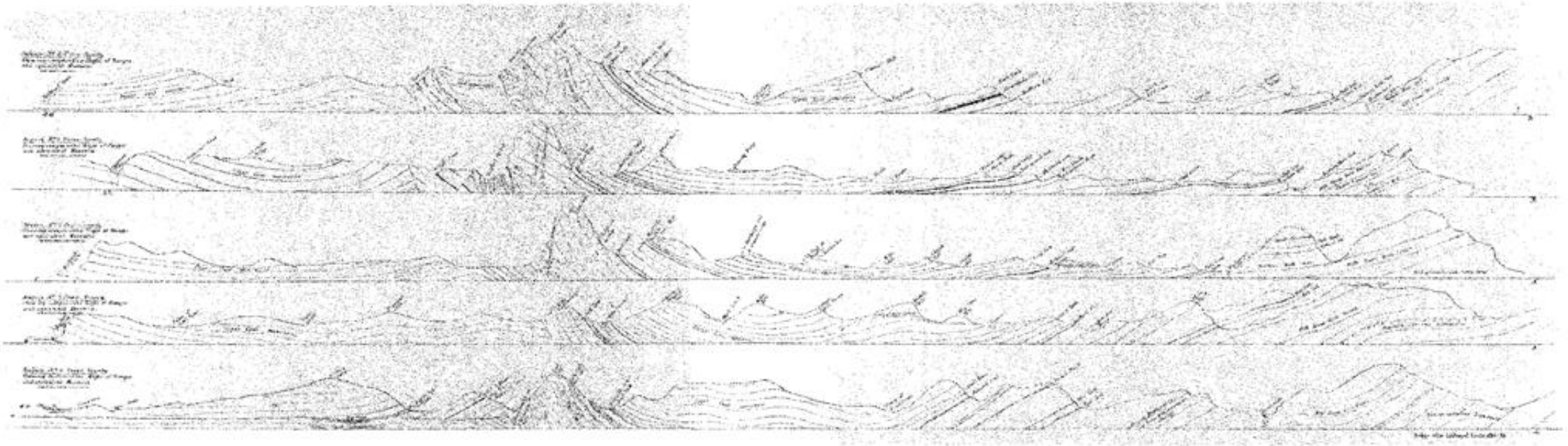
Lines run eighty years or more ago, and marked by blazing or hacking trees, can now rarely be identified, for few of our forest trees retain such marks for over three quarters of a century. Even where the initial point of such a survey is found it is difficult to trace the lines, for the direction of the magnetic meridian at that time can not now be ascertained without considerable trouble.

To obviate this in future, it is proposed to erect at convenient distances along the base line, such meridian marks as may enable the surveyor to obtain, without difficulty, the true north, and therefrom the variation of the needle at the time of his survey. By noting this always, we would have at once all surveys referable to a constant line—one subject neither to shift nor change.


N° 1


N° 2


MAP No. 1
GEOLOGICAL SURVEY
OF
KENTUCKY
EXHIBITING THE
TOPOGRAPHICAL AND GEOLOGICAL
FEATURES OF
GREEN
AND PART OF
CHRISTIAN COUNTIES



INDEX.

Aaron and Boggs' coal, (Big Sandy Coal and Mining company,) analysis of, - - - - - - - - - - - 70
Abbott's creek coal, Floyd county, - - - - - - 209
Agriculture, general remarks on, - - - - - - - 373
Airdrie coal, No. 156, and section, - - - - - - 143, 144
Aluminium in iron, &c., - - - - - - - - - 327
Amanda Furnace, section at, - - - - - - - - 188
Amanda Furnace ores, cinder, pig-iron, &c., - 189, 313, 314, 315, 316, 317
Anderson's, Casey's and Big Mason creeks, - - - - - 390
Anthracite, from Bocas del Torro, analysis of, - - - - 27
Anvil Rock, - - - - - - - - - - - 45
Anvil Rock coal, upper part of first coal, analysis of, - - - 51
Anvil Rock coal, lower part of first coal, - - - - - 52
Anvil Rock coal, main five-foot, third coal, remarks on, - - - 54
Anvil Rock coal, second coal, - - - - - - - 56
Anvil Rock, range of hills, - - - - - - - - 387
Appendix to Chemical report, - - - - - - - 373
Argentiferous galena, - - - - - - - - - 88
Ashland main coal, below clay parting, analysis of, - - - 69
Austin's coal, on Lewis creek, - - - - - - - 157
Bach's (Isaac,) coal, - - - - - - - - - 212
Bailey hill coal, - - - - - - - - - - 134
Bald hill range, - - - - - - - - - - 386
Barrens, remarks on, - - - - - - - - - 83
Barytes, or heavy spar, Union county, - - - - - - 392
Bellefonte Furnace, ores, &c., - - - - - - 188, 291, 292
Bell's coal, Crittenden county, analysis of, - - - - - 49
Bethel hills, - - - - - - - - - - - 387
Big Mason creek, - - - - - - - - - - 390
Big Sandy main coal, Lawrence county, analysis of, - - - 204
Bituminous limestone, like black band iron ore, Hopkins county, analysis of, - - - - - - - - - - - 337
Bituminous carbonate of lime, supposed black band iron ore, Muhlenburg county, - - - - - - - - - - 350
Black Band ores, remarks on, - - - - - - 60, 139, 254
Black Band iron ore, William's landing, Muhlenburg county, analysis of, - - - - - - - - - - - 347
Black Band iron ore, Battist creek, Muhlenburg county, analysis of, - 348
Black Band iron ore, Ford's well, Muhlenburg county, analysis of, - 348

Black Band iron ore, from east fork of Little Sandy, - - - 182
Black lingular shale, - - - - - - - - - - 91
Black lingular shale, forest growth on, - - - - - - 94
Blue grass soil, Fayette county, analysis of, - - - - - 276, 278
Blue limestone, composition of, - - - - - - - - 99
Blue shell limestone and marl, - - - - - - - 98
Blue shell limestone, forest growth on, - - - - - - 99
Bonharbor coal of Daviess county, analysis of, - - - - 43, 151
Box Mountain Spring Coal, Hopkins county, analysis of, - - - 53, 127
Box Mountain Sulphur Spring, - - - - - - - 131
Brashear's salt borings, mouth of Leatherwood creek, - - - 223
Breathitt county, section of hills near Jackson, - - - - 213
Breckinridge coal mine, - - - - - - - - - 174
Breckinridge coal, its yield of oil and paraffin, - - - - 12, 62
Breckinridge coal, analysis of, - - - - - - - 177
Buena Vista Furnace, coal and ores, - - - 187, 287, 288, 289, 290
Buffalo Furnace ores, limestones, &c., 194, 292, 293, 294, 295, 296, 297, 298, 299, 300
Burning Spring, Clay county, - - - - - - - 217
Butler county coal measures, - - - - - - - 125
Cannel coal, Barrett's creek, Carter county, - - - - - 270
Cannel coal, Carter county, - - - - - - - - 200
Cannel coal, Crawford's, - - - - - - - - 69
Cannel coal, head of Dorton's branch, - - - - - - 224
Cannel coal, opposite mouth of Troublesome creek, - - - - 211
Carburetted hydrogen, Crittenden spring, - - - - - 247
Caroline Furnace, coal and ores, - - - - - - - 191
Carter county cannel coal, - - - - - - - - 200
Casey's creek, - - - - - - - - - - 390
Cast iron—See pig-iron.
Caverns in sub-carboniferous limestone, - - - - - 81
Cerulean spring, Trigg county, - - - - - - - 248
Chain coral and magnesia limestone, - - - - - - 97
Chalybeate hills, - - - - - - - - - - 386
Chalybeate spring, Letcher Court-house, - - - - - 225
Chalybeate spring, Miller's, - - - - - - - - 219
Chalybeate springs, Perry county, - - - - - - - 229
Chalybeate springs, Pulaski county, - - - - - - 237
Chalybeate spring, Robb's, in McCracken county, - - - - 114
Chalybeate springs, Rockcastle river, - - - - - - 238
Chalybeate waters, Mr. Swinney's, - - - - - - 163
Chalybeate well, Mr. Wilson's, Lexington, Fayette county, analysis of, 371
Chamelian springs, tested, - - - - - - - - 162
Chappel coal, Union county, - - - - - - - - 399
Chemical report of Geological survey, - - - - - - 251

Cinder—See Iron Furnace Slag.
Clark's mill, section at, Pond river, - - - - - - - 136
Clay—See Fire Clay.
Clay, four miles south of Blandville, - - - - - - 22, 262
Clay from "Chalk Banks," - - - - - - - - - 22, 335
Clay of quartenary depo-its, - - - - - - - - - 124
Clays, table of composition of, - - - - - - - - 369
Clear fork coal, - - - - - - - - - - - 240
Clear creek sulphur spring, - - - - - - - - - 225
Clinton Furnace, coal and ores, - - - - - 187, 329, 330, 331
Clover fork of Cumberland river, - - - - - - - - 226
Coal and iron lands of Kentucky, value of, - - - - - 9, 48
Coal, no workable beds of, under Archimedes and Pentremital lime-
stones, - - - - - - - - - - - - 80
Coals, general remarks on composition and qualities, - - - 319
Coal, Aaron and Boggs' Big Sandy coal and mining co., analysis of, 70
Coals, Anvil Rock, - - - - - - - - 45, 51, 52, 54, 56
Coal, Airdrie, (orMcLean,) Muhlenburg county, - - - 143, 144, 352
Coals, Ashland main, analysis of, - - - - - - 69, 313
Coal with slate roof, Ashland, Greenup county, analysis of, - - 320
Coal, Atchison's, (Lacey's,) Christian county, - - - - 272
Coal, Isaac Bach's, - - - - - - - - - - 212
Coal, Bailey hill, - - - - - - - - - - - 134
Coal, cannel, Barrett's creek, Carter county, analysis of, - - - 270
Coal from Bath county, analysis of - - - - - - 263
Coal, Bell's, Crittenden county, analysis of, - - - - - 49
Coal, Col. John Bell's, Union county, - - - - - - 336
Coal, arrangement of coal beds, Big Sandy, - - - - - 208
Coal, bed of Big Sandy, at forks, Pike county, - - - - 231
Coal, Big Sandy, main, analysis of, - - - - - - 204
Coal, Bonharbor, - - - - - - - - - - - 43, 151
Coal, cannel-like, top of Bonharbor coal, analysis of, - - - 44
Coal, box mountain, - - - - - - - - - - 53, 127
Coal, Breckinridge, - - - - - - - - 12, 62, 174, 177
Coal, Buck creek, and Bear creek, and Beaver, - - - - 234
Coal, Buena Vista Furnace, - - - - - - - - - 187
Coal Measures, Butler county, - - - - - - - - 125
Coal, Messrs. Casey's, Union county, - - - - - - 361, 397
Coal, Chappel, Union county, - - - - - - - - 339
Coal, Clark's, Muhlenburg county, analysis of, - - - - 353
Coal, Clear fork, - - - - - - - - - - - 249
Coal, junction of Coon and Wolf creeks, &c., - - - - - 227
Coal, Croft's, - - - - - - - - - - - 130
Coal, cannel, Crawford's, near Grayson, analysis of, - - - 69
Coal, Cumberland river, analysis of, - - - - - - 234

Coal, Captain Davis', Jackfield and Pigeon Run, analysis of, - - 53, 128
Coal, Dorton's branch, cannel, analysis of, - - - - - 224
Coal, Dr. Dudley's, Kentucky river, - - - - - - 216
Coal, Eades', Muhlenburg county, analysis of, &c., - - - 138, 352
Coals of Eastern coal field, remarks on, - - - - - - 71
Coal, George Eaves', - - - - - - - - - 137
Coal drift, Estis', Hancock county, - - - - - - - 181
Coals of Edmonson county, analysis of, - - - - - - 167
Coal field, Eastern, approximative boundaries of, - - - - 64
Coal field, Eastern, thickness of carboniferous rocks, - - - 68
Coal field, boundaries of Southern, - - - - - - 30
Coal, Gallion's, Carter county, analysis of, - - - - - 270
Coal, Gamblin, Hopkins county, analysis of, - - - - - 53, 129
Coal, Gavit's main, Big Sandy, analysis of, - - - - - 70
Coal, Giger's hill, Greenup county, analysis of, - - - - 331
Coal, Goose creek, - - - - - - - - - 218
Coal, Greenup Furnace, - - - - - - - - 193
Coal, cannel, Haddock's mine, Owsley county, analysis of, - - 354
Coal beds in Harlan county, - - - - - - - - 225
Coal Haven factory coal, analysis of, - - - - - - 151
Coal, Hawes', Hancock county, analysis of, - - - - - 52
Coal, Hawesville main, analysis of, &c., - - - - - - 178
Coal one mile above Hazzard, Perry county, - - - - - 228
Coal, Head's, Daviess county, - - - - - - - 182
Coal, Henderson, two feet, analysis of, - - - - - - 44
Coal, Henderson, No. 206, analysis of, - - - - - - 150
Coal bed on Highland creek, Union county, - - - - - 396
Coal, Hine's, on Muddy creek, Ohio county, - - - - - 157
Coal, Hoskins', Short mountain, analysis of, - - - - - 244
Coal, Hunting-branch, main, Hopkins county, - - - - - 127
Coal on Indian creek, - - - - - - - - - 239
Coal, Jackfield, (or Jakefield,) Captain Davis', - - - - 53, 128
Coal, Jellico mountain, - - - - - - - - - 239
Coal, Keath's, Christian county, analysis of, - - - - - 271
Coals of Kentucky, table of composition of, - - - - - 366
Coal, Kentucky river, North fork, - - - - - - - 211
Coal, Kentucky river, three forks, - - - - - - - 214
Coal, Kilgore's, Carter county, analysis of, - - - - - 269
Coal, Kincheloe's Bluff, analysis of, - - - - - - 145
Coal, King's, - - - - - - - - - - 239
Coal, (Lacey's,) Atchison's, Christian county, analysis of, - - 272
Coal on Laurel and Sinking creeks, - - - - - - 240
Coal, Letcher Court-house, - - - - - - - - 225
Coal, Llewellyn mines, Union county, - - - - - - 398
Coal, Lewisport, - - - - - - - - - - 181

Coal, Lick, - - - - - - - - - - - - 132
Coal, Little Sandy river, - - - - - - - - - 185
Coal beds, Log mountain, - - - - - - - - - 222
Coal, Marcus, - - - - - - - - - - - 137
Coal, Col. Martin's, analysis of, - - - - - - - - 208
Coal, Martin, - - - - - - - - - - - 138
Coal, McHenry's, Big Sandy, analysis of, - - - - - - 70
Coal, McLean or Airdrie, - - - - - - - - - 143
Coal bank, McNairy's, Pond river, - - - - - - - 135
Coal ridge between Meadow and Sinking creeks, - - - - - 243
Coal measures, - - - - - - - - - - - 29
Coal measures, Eastern coal field, dip of, - - - - - - 65
Coal measures, an offset of, in Grayson county, - - - - - 170
Coal measures of Greenup, Carter, and Lewis counties, - - - - 182
Coal measures of Hopkins, Muhlenburg, McLean, and Butler counties, 125
Coal measures of Henderson, Daviess, Ohio, Butler, Edmonson, Grayson, Hancock and Breckinridge, and part of Warren counties, 150
Coal measures of Lawrence, Johnson, Floyd, Pike, Letcher, Perry, Breathitt, Harlan, Clay, Knox, Whitley, and part of Owsley, Laurel, Pulaski, Wayne and Clinton counties, - - - - 201
Coal measures, lower, order of superposition of, - - - - - 45
Coal measures of McLean county, - - - - - - - - 125
Coal measures, total thickness of, and number of beds, - - - - 43
Coal measures in Union county, - - - - - - - - 393
Coal measures, upper, order of superposition of, - - - - - 40, 42
Coal, Mick's branch, - - - - - - - - - - 216
Coal, Mr. Miller's, - - - - - - - - - - 137, 138
Coal, James Mulford's, Union county, - - - - - - - 397
Coal, Naut's, on Sandy creek, - - - - - - - - 160
Coal, Paint creek, - - - - - - - - - - 210
Coal, Peach Orchard, analysis of bottom part of, - - - - - 69
Coal, Pennsylvania Furnace, Greenup county, - - - - - 191
Coal, four-foot, Pennsylvania Furnace, Greenup county, analysis of, - 288
Coal, (main,) of centre of Perry county, - - - - - - 227
Coal seven miles below Pikeville, - - - - - - - - 232
Coal, (Shelby fork of Big Sandy,) Pike county, - - - - - 230
Coal, Pleasant Run, - - - - - - - - - - 133
Coal, Pitman range of hills, Pulaski county, - - - - - - 237
Coal, Pittsburg, analysis of, - - - - - - - - - 363
Coal, Pond river, Hopkins county, - - - - - - - 134, 340
Coal bed, head of Pond fork, Union county, - - - - - - 395
Coal, Poplar Chalybeate mountain, - - - - - - - 245
Coal, &c., at Prestonsburg, - - - - - - - - - 206
Coal region of Pulaski county, - - - - - - - - 233, 237
Coal, (under the conglomerate,) in Pulaski and Rockcastle counties, - 68

Coals, Raccoon Furnace, Grecnup county, analysis of, - - 195, 311, 312
Coal, Richland creek, - - - - - - - - - 131
Coal, Roberts', - - - - - - - - - 52, 140, 142
Coal, Robinson's, Hopkins county, analysis of, - - - - 339
Coal, Rockcastle river, - - - - - - - - - 237
Coal on Rockhouse creek, - - - - - - - - 229
Coal, Russey's, Muddy creek, - - - - - - - 160
Coal, Pardon Sheldon's, Butler county, analysis of, - - - - 265
Coal, Sloan's hill and Short mountain, - - - - - - 244
Coal, Sneed's mines, Crittenden county, analysis of, &c., - - 275, 397
Coal, Star Furnace, - - - - - - - - - 186
Coal mine, Taylor's, Green river, section of, - - - - - 158
Coal, Terry's, analysis of, Hopkins county, - - - - - 126
Coal, Thompson, Union county, - - - - - - - 397
Coal, Three-mile creek, York bed, - - - - - - - 203
Coal mines, Todd & Crittenden's, South fork Kentucky river, - - 215
Coal, Todd & Crittenden's, Owsley county, analysis of, - - - 354
Coals on Trade-water river, - - - - - - - - 125, 394
Coal in Tred's branch of Laurel, - - - - - - - 226
Coal, cannel, Troublesome creek, - - - - - - - 211
Coals from Tug fork of Big Sandy, - - - - - - 202, 203
Coal from Tygerts coal bank, Butler county, analysis of, - - - 265
Coal from Vincent branch of Tug fork, Big Sandy, - - - - 203
Coal, Watts' creek, - - - - - - - - - 240
Coal, Messrs. Wheatcroft's and others, Union county, - - - 396
Coal, Whitley county, opposite Williamsburg, - - - - - 239
Coal, Wright's mountain, Hopkins county, analysis of, - - - 339
Coal, Wolf hill, Daviess county, - - - - - - - 44, 154
Cook's coal, analysis of, - - - - - - - - - 43
Coralline Falls limestone, - - - - - - - - - 95
Coralline Falls limestone, growthof timber on, - - - - 97
Coralline Falls limestone, galena in, - - - - - - - 97
Crab Orchard creek, - - - - - - - - - 390
Crawford's cannel coal, (near Grayson,) analysis of, - - - 69
Crittenden springs, tested, - - - - - - - - 247
Croft's, Martin, coal, - - - - - - - - - 130
Cumberland river, above the falls, - - - - - - - 233
Cumberland river coal, analysis of, - - - - - - 234
Cumberland river iron furnace and ores, - - - - - - 246
Cumberland Falls, suppositious silver ore, - - - - - 235
Cypress creek, - - - - - - - - - - 389
Cypress creek of the Ohio, - - - - - - - - 390
Davis' (Capt.) Jackfield coal, Hopkins county, analysis of, - - 53, 128
Davis' (Capt.) Pigeon Run coal, analysis of, - - - - - 53, 128
Detailed geologico-topographical survey, - - - - - 106

Dorton's branch cannel coal, analysis of, - - - - - 224
Dudley's, (Dr.,) coal, Kentucky river, - - - - - - 216
Eade's coal, (No. 157,) - - - - - - - - 138
Eagle creek or Jerusalem school-house range of hills, - - - 387
Earthquake of 1811, - - - - - - - - - 117
Eaves', (George,) coal, - - - - - - - - 137
Edmonson county, section of geology of Northern part of, - - 164
Edmonson county coals, analyses of, - - - - - - 167
Edmonson county, best soil of table land of, - - - - - 168
Estis coal drift, Hancock county, - - - - - - - 181
Everley's ridge, section of coal measures in, - - - - - 147
Falls of Cumberland, section at, - - - - - - - 235
Ferruginous limestone, Clinton furnace, Greenup county, analysis of, 331
Ferruginous limestone, Christian county, analysis of, - - - 274
Ferruginous limestone, Green rock, Carter county, - - - - 269
Ferruginous limestone, New Hampshire Furnace, Greenup county, analysis of, - - - - - - - - - - 323
Fire-clays, - - - - - - - - - - - - 61, 369
Fire clays, Ashland, Greenup county, analyses of, - - - - 332
Fire-clay, Casey's mines, Union county, analysis of, - - - 361
Flats and low lands, Union county, - - - - - - 391
Fluor spar, - - - - - - - - - - - - 87
Franklin coal, - - - - - - - - - - - 130
Freestone for building, - - - - - - - - - 232
French Island coal, analysis of, - - - - - - - 45
Gamblin coal, Hopkins county, analysis of, - - - - - 53, 129
Gavits' main coal, Big Sandy, analysis of, - - - - - 70
Geology of Union county, - - - - - - - - 392
Gravel bank, flats of Cypress creek, - - - - - - 148
Grayson county, offset of coal measures in, - - - - - 170
Grayson springs, - - - - - - - - - - 170
Green river manufacturing and coal company mines, section at, - 141
Greenup Furnace ores, coals, &c., - - 193, 300, 301, 302, 303, 304, 305
Grey band iron ore, Muhlenburg county, analysis of, - - - 349
Goose creek salt works, - - - - - - - - - 67
Goose creek salt waters, coals, &c., - - - - - - 218
Harlan county coal beds, - - - - - - - - 225
Hawes' coal, Hancock county, analysis of, - - - - - 52
Hawesville main coal, analysis of, and remarks on, - - - - 178
Head's coal, Daviess county, - - - - - - - 182
Hearthstones, New Hampshire Furnace, - - - - - 198
Henderson coal company shaft, at Henderson, Kentucky, section of, - 36
Henderson coal, No. 206, analysis of, - - - - - - 150
Henderson two-foot coal, analysis of, - - - - - - 44
Highland creek, - - - - - - - - - - 390

Hines' coal, on Muddy creek, Ohio county, - - - - - - 157
Holloway boring, Henderson county, section of, - - - - 32
Hopkins county coal measures, - - - - - - - - 125
Hoskin's coal, Short mountain, analysis of, - - - - - 244
Hunting branch main coal, Hopkins county, analysis of, - - - 127
Ice-house coal, remarks on, and analysis of, - - - - - 51, 55
Industry mines, Big Sandy coal and manufacturing company, section at, - - - - - - - - - - - - - 205
Iron—See Pig-iron.
Iron Furnaces on Cumberland river, - - - - - - - 246
Iron Furnace Slag, Amanda Furnace, Greenup county, analysis of, - 316
Iron Furnace Slag, Bellefonte Furnace, Greenup county, analysis of, 292
Iron Furnace Slag, Buena Vista Furnace. Greenup county, analysis of, 290
Iron Furnace Slags, Buffalo Furnace, Greenup county, analyses of, - 298, 299
Iron Furnace Slag, Greenup Furnace, analysis of, - - - - 305
Iron Furnace Slags, of Greenup county Furnaces, remarks on, - - 72
Iron Furnace Slags, New Hampshire Furnace, Greenup county, analyses of, - - - - - - - - - - - - 324, 325
Iron Furnace Slags, Pennsylvania Furnace, Greenup county, analyses of, - - - - - - - - - - - - 286, 287
Iron Furnace Slags, Raccoon Furnace, Greenup county, analyses of, - 309
Iron Furnace Slags, table of composition of, - - - - - 367
Iron ore, Alexander's, McCracken county, analysis of, - - - 344
Iron ore, Backster's bank, Kelly's Furnace, Lyon county, analysis of, 344
Iron ore, Bath county, Messrs. Carter's Furnace, analysis of, - - 263
Iron ore, "best limestone ore," Amanda Furnace, Greenup county, analysis of, - - - - - - - - - - 315
Iron ore, best ore, Sandy Furnace, Carter county, analysis of, - - 268
Iron ore, "better quality impracticable ore," Pennsylvania Furnace, Greenup county, analysis of, - - - - - - - 283
Iron ore, "big block ore," Greenup Furnace, analysis of, - - - 301
Iron ores, black band, - - - - 60, 139, 182, 254, 347, 348, 349
Iron ore, "black bed," Greenup Furnace, analysis of, - - - 303
Iron ore, "black vein," Buena Vista Furnace, Greenup county, analysis of, - - - - - - - - - - - 288
Iron ore, "block kidney ore," Buffalo Furnace, Greenup county, analysis of, - - - - - - - - - - - 294
Iron ores, "block ores," New Hampshire Furnace, Greenup county, analyses of, - - - - - - - - - - 320, 321
Iron ore, "block ore," Pennsylvania Furnace, Greenup county, analysis of, - - - - - - - - - - - 280
Iron ores, "block ores," Raccoon ore banks, Greenup county, analyses of, - - - - - - - - - - - - 306, 307
Iron ore, "blue block ore," Amanda Furnace, Greenup county, analysis of, - - - - - - - - - - - 315

Iron ore, "blue limestone ore," Bellefonte Furnace, Greenup county, analysis of, - - - - - - - - - - - 291
Iron ore, "blue ore," near Clinton Furnace, Greenup county, analysis of, 330
Iron ores, Buena Vista Furnace, - - - - - - - - - 187
Iron ore, Bunt's gap, Hopkins county, analysis of, - - - - 336
Iron ore, (carbonate,) Butler county, analysis of, - - - - 264
Iron ore, (carbonate,) Muhlenburg county, analysis of, - - - 350
Iron ore, (carbonate,) White Oak branch of Rockcastle river, - - 241
Iron ore, Chandler bank, Suwannee Furnace, Lyon county, analysis of, 343
Iron ore, clay ironstone, Muhlenburg county, analysis of, - - 346
Iron ores at Coal Haven and head of French Island, - - - 60
"Iron ores" considered "impracticable," - - - - - - 72, 75
Iron ores from Cumberland river, - - - - - - - - 246
Iron ore, dark variety of "little block ore," Buffalo Furnace, Greenup county, analysis of, - - - - - - - - - - 294
Iron ore, "earthy kidney ore," Buena Vista Furnace, Greenup county, analysis of, - - - - - - - - - - 289
Iron ore, Falls of Blain, - - - - - - - - - 202
Iron ore, "flag ore," Greenup Furnace, analysis of, - - - - 300
Iron ores, Greenup Furnace, - - - - - - - - - 193
Iron ores of Greenup and Carter, value of, - - - - - 199
Iron ores, grey band, Muhlenburg county, - - - - - 349
Iron ore, "grey block ore," Buffalo Furnace, Greenup co, analysis of, 296
Iron ore, "grey limestone ore," Greenup Furnace, analysis of, - - 302
Iron ore, Hawes' ridge, Muhlenburg county, analysis of, - - 138, 345
Iron ore, "honey-comb ore," Amanda Furnace, Greenup county, analysis of, - - - - - - - - - - - 314
Iron ore, "impracticable hard limestone ore," Pennsylvania Furnace, analysis of, - - - - - - - - - - - 284
Iron ore, "impracticable part of limestone ore," Pennsylvania Furnace, analysis of, - - - - - - - - - - - 285
Iron ore, "impure limestone," Buffalo Furnace, Greenup county, analysis of, - - - - - - - - - - - 296
Iron ore, Jenkins' ore bank, Muhlenburg county, analysis of, - - 139, 345
Iron ores, Kenton Furnace, - - - - - - - - - 197
Iron ore, "Kidney ore," New Hampshire Furnace, Greenup county, analysis of, - - - - - - - - - - 321
Iron ore, Kincheloe's bluff, Muhlenburg county, analysis of, - - 346
Iron ores, Laurel Furnace, - - - - - - - - - 196
Iron ores, "limestone ores," Clinton Furnace, Greenup co., analyses of, 329, 330
Iron ores, limestone ores, Greenup Furnace, analyses of, - - - 303, 304
Iron ore, "limestone ore," New Hampshire Furnace, Greenup county, analysis of, - - - - - - - - - - 322
Iron ores, limestone ores, Pennsylvania Furnace, analyses of, - - 281, 282
Iron ores from Lithostrotion beds of sub-carboniferous limestone, - 85
Iron ore, "little block ore," Buffalo Furnace, Greenup co., analysis of, 293

Iron ore, "little block ore," Pennsylvania Furnace, analysis of, - 281
Iron ores, "main block" ores, Buffalo Furnace, Greenup county, analyses of, - - - - - - - - - - - 293, 295
Iron ore, "main upper kidney ore," Raccoon ore banks, analysis of, - 308
Iron ores on Meadow creek, Watts' creek, &c., &c., - - - 240
Iron ores in Muhlenburg and Hopkins county, lower coal measures, - 59
Iron ores, Mt. Savage Furnace, Greenup county, analyses of, - - 328
Iron ores, Pennsylvania Furnace, Greenup county, - - - - 191
Iron ore, "poor sandy ore," New Hampshire Furnace, Greenup county, analysis of, - - - - - - - - - - 322
Iron ores, Raccoon Furnace, Greenup county, - - - - - 195
Iron ore, "red and blue block," Amanda Furnace, Greenup county, analysis of, - - - - - - - - - - 314
Iron ore, "red ochre," Greenup Furnace, analysis of, - - - 301
Iron ores, Rough and Ready, - - - - - - - - - 184
Iron ore, "rough sandy block ore," Buffalo Furnace, Greenup county, analysis of, - - - - - - - - - - 295
Iron ore, "shot ore," Ashland, Greenup county, analysis of, - - 317
Iron ores, Sneed's mines, Crittenden county, analysis of, - - - 274, 275
Iron ore, "soft limestone ore," Raccoon ore banks, Greenup county, analysis of, - - - - - - - - - - 306
Iron ore, speckled, New Hampshire Furnace, analysis of, - - 198
Iron ores, Stewart's creek, Hopkins county, analyses of, - - - 336, 338
Iron ore, "Sugar creek," Hopewell Iron Works, Livingston county, analysis of, - - - - - - - - - - 341
Iron ores, tables of composition of, - - - - - - - - 364, 365
Iron ore, Top-hill ore, Pennsylvania Furnace, Greenup county, analysis of, - - - - - - - - - - 282
Iron ore, Tygert's creek, Carter county, - - - - - - 200, 268
Iron ore, Mr. Wallace's, Carter county, analysis of, - - - 267
Iron ore, Williams' landing, Green river, - - - - - 60, 347
Iron ore, "yellow kidney ore," Amanda Furnace, Greenup county, analysis of, - - - - - - - - - - 313
Iron ore, "yellow kidney ore," Buena Vista Furnace, Greenup county, analysis of, - - - - - - - - - - 289
Ironstones between the little vein and Well coal, - - - - 59
Ironstone, calcareous, used at Sandy Furnace, analysis of, - - 78
Ironstones of eastern coal field, - - - - - - - - 71
Ironstones in shales over ice-house coal, analysis of, - - - - 57, 58
Island district, on Cypress creek, - - - - - - - 147, 148
Jackfield coal, Capt. Davis', analysis of, - - - - - - 53, 128
Jellico Mountain, - - - - - - - - - - - 239
Kenton Furnace, ores, &c., - - - - - - - - 197
Kentucky river, north fork, coal, - - - - - - - - 211
Kentucky river, three forks, coal, - - - - - - - - 214
Kincheloe's Bluff coal, (No. 196,) analysis of, - - - - 145

Kincheloe's Bluff, or Lewisport, Green river, section at, - - - 145
King's coal, - - - - - - - - - - - 239
Laurel Furnace ores, &c., - - - - - - - - - 196
Lead and zinc ores, - - - - - - - - - 87
Lead ores, argentiferous, - - - - - - - - 88
Letcher C. H. coal, - - - - - - - - - 225
Lewellyn coal mines, Union county, - - - - - - 398
Lewisport coal, - - - - - - - - - - 181
Lick coal, No. 92 of collection, analysis of, - - - - - 132
Lignite and brown coal of quaternary deposits, - - 25, 26, 116, 262
Limestones, - - - - - - - - - - - 60
Limestone, Dr. Hopson's Marble, Trimble county, analysis of, - 358
Limestone, bituminous, supposed black band ore, Muhlenburg county, 350
Limestone, ferruginous, Christian county, analysis of, - - - 274
Limestone, ferruginous, Clinton Furnace, Greenup county, analysis of, 331
Limestone, ferruginous, New Hampshire Furnace, Greenup county, analysis of, - - - - - - - - - - 323
Limestone, ferruginous, like black band iron ore, Hopkins county, analysis of, - - - - - - - - - - - 337
Limestone, ferruginous, Sandy Furnace, Carter county, analysis of, 269
Limestone, magnesian, (hydraulic,) analysis of, - - - - 273
Limestone, table of composition of, - - - - - - 368
Limestones, used for flux at the Greenup Furnaces, 75, 285, 292, 297, 298, 304, 308
Limestone, used as a flux, Bellefonte Furnace, Greenup county, analysis of, - - - - - - - - - - - 292
Limestones, used as flux, Buffalo Furnace, Greenup county, analyses of, 297, 298
Limestone, used as flux, Greenup Furnace, analysis of, - - - 304
Limestone, used as flux, New Hampshire Furnace, Greenup county, analysis of, - - - - - - - - - - 323
Limestone, used as a flux, Pennsylvania Furnace, Greenup county, analysis of, - - - - - - - - - - 285
Limestone, used as a flux, Raccoon Furnace, Greenup county, analysis of, - - - - - - - - - - - 308
Limonites—see iron ores.
Limonite and other iron ores, Meadow creek and Watts' creek, - - 240
Linn Camp, section on, - - - - - - - - - - 220
Lithostrotion bed of sub-carboniferous limestone, or "Barren" limestone, - - - - - - - - - - - 82
Little Sandy river coal, - - - - - - - - - 185
Log Mountain coal beds, - - - - - - - - - 222
London, Laurel county, formation at, - - - - - - 241
Lost creek, - - - - - - - - - - - 390
Lower coal measures, order of superposition, - - - - - 45
Magnesian limestone, Christian county, analysis of, - - - 273
Mammoth Cave, - - - - - - - - - - - 169

Map of Union and Crittenden counties, scale of, - - - - 385
Marble, Conchitic, Dr. Hopson's, Trimble county, - - - - 358
Marcus coal, - - - - - - - - - - - 137
Martin coal, - - - - - - - - - - - 138
Martin's, Col., coal, analysis of, - - - - - - - 208
McHenry's coal, Tug Fork, Big Sandy, analysis of, - - - 70
McLean or Airdrie coal, (No. 192,) - - - - - - 143
McLean county coal measures, - - - - - - - 125
McNairy's coal bank, Pond river, section at, - - - - - 135
Megalonyx Bones, letter to Prof. Joseph Leidy, - - - - 22
Mick's branch coal, - - - - - - - - - 216
Milk sickness, - - - - - - - - 20, 95, 102, 159
Miller's (Mr.) coal, - - - - - - - - - 137, 138
Miller's (H. G.) mineral spring, examination of, - - - - 219
Millstone grit, quarries, - - - - - - - - 63
Mineral pitch or tar, Edmonson county, analysis of, - - - 166
Mineral waters, on Barnett's creek, - - - - - - 156
Mineral waters, on Clear creek, Sulphur spring, - - - - 225
Mineral waters, Crittenden spring, sulphur, - - - - - 247
Mineral waters, Fayette county, - - - - - - - 372
Mineral waters, Letcher C. H., chalybeate, - - - - - 225
Mineral waters, Miller's, chalybeate, - - - - - - 219
Mineral waters, Perry county, chalybeate, - - - - - 229
Mineral waters, Pulaski county, chalybeate, - - - - - 237
Mineral waters, Robb's, McCracken county, chalybeate, - - - 114
Mineral waters, Rockcastle river, chalybeate, - - - - - 238
Mineral waters, Social hill, sulphur, - - - - - - 148
Mineral waters, Mr. Swinney's, chalybeate, - - - - - 163
Mineral waters, Mr. Wilson's, Lexington, chalybeate, - - - 371
Mount Savage Furnace ores, &c., - - - - - - - 185, 328
Mount Savage Furnace, Stinson ore banks, section of, - - - 185
Muhlenburg county coal measures, - - - - - - - 125
Mulford's four-foot coal, analysis of, - - - - - - 50
Mulford's "little vein," analysis of, - - - - - - 50
Mulford's "little vein," cannel part, analysis of, - - - - 50
Mulford's middle coal, analysis of, - - - - - - - 51
Mulford's main or five-foot coal, Union county, analysis of, - - 49
Naut's coal, on Sandy creek, - - - - - - - - 160
New Hampshire Furnace ores, &c., 77, 197, 198, 320, 321, 322, 323, 324, 325, 326, 327
New Hampshire Furnace, speckled ore, analysis of, - - - - 77, 198
Nolin creek, Edmonson county, section at, - - - - - 164
Nomenclature of Kentucky Geological formations, - - - - - 16
Northern Kentucky mines, section at, - - - - - - 207
Oil Spring branch, petroleum, - - - - - - - 210
Paint creek coal, - - - - - - - - - - - 210

Peach Orchard coal, bottom part, analysis of, - - - - - 69
Pennsylvania Furnace ores, coal, &c., 72, 75, 191, 280, 281, 282, 283, 284, 285, 286, 287, 288
Petroleum on Oil Spring branch, - - - - - - - 210
Phosphoric acid, re-examination of soils for, - - - - - 378
Pigeon Run coal, Capt. Davis', analysis of, - - - - - 128
Pig-iron, Amanda Furnace, Greenup county, analysis of, - - - 317
Pig-iron, Bellefonte Furnace, Greenup county, analysis of, - - 292
Pig-iron, Buena Vista Furnace, Greenup county, analysis of, - - 290
Pig-iron, Buffalo Furnace, Greenup county, analyses of, - - - 299, 300
Pig-iron, Greenup Furnace, analysis of, - - - - - - 305
Pig-iron, New Hampshire Furnace, Greenup county, analyses of, - 325, 326
Pig-iron, Pennsylvania Furnace, Greenup county, analysis of, - - 287
Pig-iron, Raccoon Furnace, Greenup county, analyses of, - - - 310, 311
Pig-iron, from Sandy Furnace, analysis of, - - - - - 184
Pig-iron, table of composition of, - - - - - - - 367
Pittsburg coal, analysis of, - - - - - - - - 363
Pleasant Run coal, - - - - - - - - - 133
Pond fork valley, - - - - - - - - - - 391
Pond river coal, (No. 137,) - - - - - - - - 134, 340
Poplar Chalybeate mountain coal, - - - - - - - 245
Prestonsburg coal, &c., - - - - - - - - - 206
Quaternary deposits, - - - - - - - - - 17
Quaternary deposits, order of superposition, at the "Iron and Chalk banks," - - - - - - - - - - 22
Quaternary deposit, (silico-calcareous,) analysis of, near Columbus, - 18
Quaternary deposit, silicious, - - - - - - - 20
Quaternary deposits, soils from, - - - - - - - 27
Quaternary formation of McCracken, &c., &c., &c., - - - 113
Quaternary formation, sections of, - - - - - - 116, 120, 122
Raccoon Furnace coal, ores, &c., 195, 306, 307, 308, 309, 310, 311, 312, 313
Red lands and sub-soil of southern Kentucky, - - - - - 88
Red ochre, Greenup Furnace, analysis of, - - - - - 301
Reedy hills, Grayson county, - - - - - - - 172
Reel-foot lake, - - - - - - - - - - 117
Richland creek coal, - - - - - - - - - 131
Robb's Chalybeate spring, McCracken county, - - - - 114
Roberts' coal, (No. 191,) Muhlenburg county, - - - 52, 140, 142
Rockcastle river, narrows of, coal, &c., - - - - - - 237
Rough and Ready ore bed, - - - - - - - - 184
Rough creek, Grayson county, falls of, - - - - - - 173
Russey's coal, on Muddy creek, - - - - - - - 160
Salt borings, Brashears, - - - - - - - - 228
Salt borings, near Hazzard, Perry county, - - - - - 228
Salt borings, Whitesburg, - - - - - - - - 229
Salt efflorescence and licks, Shelby fork, Big Sandy, - - - 231

Salt river knobs, growth on, - - - - - - - - 91
Salt water, junction of Lost and Troublesome creeks, - - - 211
Salt water and other mineral waters, Barnett's creek, - - - 156
Salt water, mouth of Leatherwood creek, - - - - - 228
Salt well, on Big Sandy, near Kane farm, - - - - - 201
Salt works, Goose creek, - - - - - - - - 67, 218
Samuel's coals, (McLean Co.,) - - - - - - - 149
Sandstones of coal measures, for building, - - - - - 62
Sandstones, hearthstones, New Hampshire Furnace, Greenup county, analysis of, - - - - - - - - - 327
Sandstone, hearthstone, Raccoon Furnace, Greenup county, analysis of, 313
Sandstone, sub-carboniferous, - - - - - - - - 89
Sandstone suitable for hearthstones, Edmonson county, - - - 168
Sandy Furnace, calcareous and top hill ores, analysis of, - - - 183
Sandy Furnace ores, &c., &c., - - - - 78, 183, 184, 268, 269
Scatters of Cypress, - - - - - - - - - 386
Section at Amanda Furnace, - - - - - - - - 188
Section in Breathitt county, near Jackson, - - - - - 213
Section at Clarke's mill, Pond river, - - - - - - 136
Section, clover fork of Cumberland river, - - - - - 226
Section of formations of northern part of Edmonson county, - - 164
Section of coal measures, Everley's ridge, - - - - - 147
Section at south Carrollton, - - - - - - - - 146
Section, falls of Cumberland river, - - - - - - 235
Section at Green River Manufacturing and Coal Company's Mines, - 141
Section at forks of Green and Barren rivers, - - - - - 161
Section of Holloway boring, Henderson county, - - - - 32
Section at Industry mines, - - - - - - - - 205
Section south fork Kentucky river, - - - - - - - 215
Section at Kincheloe's Bluff or Lewisport, (Green river,) - - - 145
Section on Linn camp, - - - - - - - - - 220
Section at McNairy's coal bank, Pond river, - - - - - 135
Section at Nolin creek, Edmonson county, - - - - - 164
Section of quaternary deposits of McCracken county, &c., - 116, 120, 122
Section seven miles below Pikeville, - - - - - - 232
Section at Stinson ore banks, Mt. Savage Furnace, - - - - 185
Section at Taylor's coal mine, Green river, - - - - - 158
Section at Todd & Crittenden's coal mines, - - - - - 215
Section at William's Landing, Green river, - - - - - 143
Section at Joel Wright's to the top of Sounding gap, - - - 229
Septaria, calcareous, Morgan county, - - - - - - 210
Short mountain coal, - - - - - - - - - 244
Silver ore, suppositious, Cumberland falls, - - - - - 235
Sink holes in Barren limestone region, - - - - - - 84
Slate quarry, Hopkins county, - - - - - - - 133
Slate, Ring creek, Perry county, - - - - - - - 229

Sloan's hill coal, - - - - - - - - - - - 244
Social hill mineral water, - - - - - - - - - 148
Soils from Ballard county, analyses of, - - - - - 259, 261, 379
Soils, from blue limestone formation, remarks on, - - - - 100, 374
Soil, (ridge land,) Butler county, analyses of, - - - - - 266, 379
Soil, southern part of Christian county, analyses of, - - - 272, 379
Soils from the coal measures, remarks on, - - - - - 63
Soil from Daviess county, - - - - - - - - 153, 379
Soil, of Edmonson county, best of table land, - - - - - 168, 379
Soil, virgin, Fayette county, analysis of, - - - - - 276, 379
Soil, old field, Fayette county, analysis of, - - - - - 276, 379
Soil, Fulton county, analysis of, - - - - - - - 279, 379
Soil, under gravel bed, Fulton county, analysis of, - - - - 280, 379
Soil and forest growth, Graves county, - - - - - - 121
Soil, Henderson county, analysis of, - - - - - - 333, 379
Soil, white, of Bayou de Chienne, Hickman county, analysis of, - 334, 379
Soils, "white earth," Hickman county, analyses of, - - 334, 335, 379
Soil and sub-soil, Hopkins county, analysis of, - - - - 340, 379
Soil, Livingston county, analysis of, - - - - - - 341, 397
Soil, southern part Logan county, analysis of, - - - - - 342, 379
Soil, coal region, Muhlenburg county, analysis of, - - - - 351, 379
Soils from quaternary deposits, - - - - - - - 27
Soils, re-examination of, for phosphoric acid, - - - - - 378
Soil, Simpson county, analysis of, - - - - - - - 355, 379
Soil of sub-carboniferous or knob sandstone, - - - - - 89
Soils, table of composition of, - - - - - - - 370
Soil and sub-soil, Todd county, analysis of, - - - - - 357, 379
Soil, (red clay sub-soil,) Todd county, analysis of, - - - - 356, 379
Soil, Trigg county, analysis of, - - - - - - - 360, 379
Soils, Union county, - - - - - - - - - 392
Soil, Warren county, analysis of, - - - - - - - 361, 379
Sounding gap, section at, - - - - - - - - 229
South Carrollton, section at, - - - - - - - - 146
Southern coal field, boundaries of, - - - - - - - 30
Speckled iron ore, New Hampshire Furnace, analysis of, - - - 77, 198
Springs, Union county, - - - - - - - - - 392
Spring waters injurious, &c., Hickman county, - - - - - 19
Stanley coal bank, - - - - - - - - - 137
Star Iron Furnace coal, and ores, - - - - - - - 186
Stinson ore banks, Mt. Savage Furnace, section of, - - - - 185
Sub-carboniferous limestone, - - - - - - - - 79
Sub-carboniferous sandstone, - - - - - - - - 89
Sub-carboniferous limestone of Crittenden, Livingston, Lyon, Caldwell, and Trigg counties, - - - - - - - - 246
Sulphur spring, Box mountain, - - - - - - - 131
Sulphur spring, Cerulean, Trigg county, - - - - - 248

Sulphur spring, Clear creek, - - - - - - - - - 225
Sulphur springs, Grayson county, - - - - - - - - 170
Sulphur spring hills, - - - - - - - - - - 386
Sulphur spring of Livingston county, - - - - - - - 248
Sulphur spring, Social hill, - - - - - - - - - 148
Sulphuret of zinc, Crittenden county, analysis of, - - - - 276
Sulphur water, Crittenden spring, - - - - - - - - 247
Swift mine, - - - - - - - - - - - - 222
Swinney's, Mr., Chalybeate spring tested, - - - - - - 163
Table of composition of Kentucky clays, - - - - - - 369
Table of composition of Kentucky coals, - - - - - - 366
Table of composition of Kentucky iron furnace slags, - - - 367
Table of composition of Kentucky iron ores, - - - - - 364, 365
Table of composition of Kentucky limestones, - - - - - 368
Table of composition of Kentucky pig-iron, - - - - - - 367
Table of composition of Kentucky soils, - - - - - - 370
Table of mineral matter removed from the soil by crops, - - - 377
Tar, (mineral,) or pitch, from Edmonson county, analysis of, - - 166
Tar spring, Breckinridge county, Tar creek, - - - - - - 174
Taylor's coal mine, Porter's landing, Green river, section of, - - 158
Technical terms, - - - - - - - - - - - 378
Terry's coal, analysis of, Hopkins county, - - - - - - 126
Thoroughfare between Green river and Cypress creek, - - - 148
Three-mile creek, York bed of coal, - - - - - - - 203
Todd & Crittenden's mines, south fork Kentucky river, section at, - 215
Topographical Geological report, - - - - - - - - 381
Topographical survey, method adopted in, - - - - - - 383
Trade-water river, - - - - - - - - - - 389
Trade-water river coals, - - - - - - - - - 125, 394
Troublesome creek, cannel coal, and salt water, - - - - - 211
Tug fork, Big Sandy, coals on, - - - - - - - - 203
Tygert's creek iron ore, - - - - - - - - - - 200
Union county, Geology of, - - - - - - - - - 392
Union county, detailed survey of, remarks on, - - - - - - 106
Upper coal measures, order of superposition, - - - - - - 40, 42
Vegetables, mineral elements, of - - - - - - - - 375
War gap, Pine mountain, - - - - - - - - - 226
Water, supposed to cause milk sickness, - - - - - - - 159
Watt's creek coal, - - - - - - - - - - 240
Whitesburg, salt borings, - - - - - - - - - 229
William's landing, Green River, section at, - - - - - - 143
William's landing, iron ore at, - - - - - - - - 60
Wolf hill coal, Daviess county, (No. 189,) analysis of, - - - 44, 164
York bed of coal, Three-mile creek, - - - - - - - 203
Zinc ore, Crittenden county, analysis of, - - - - - - 276