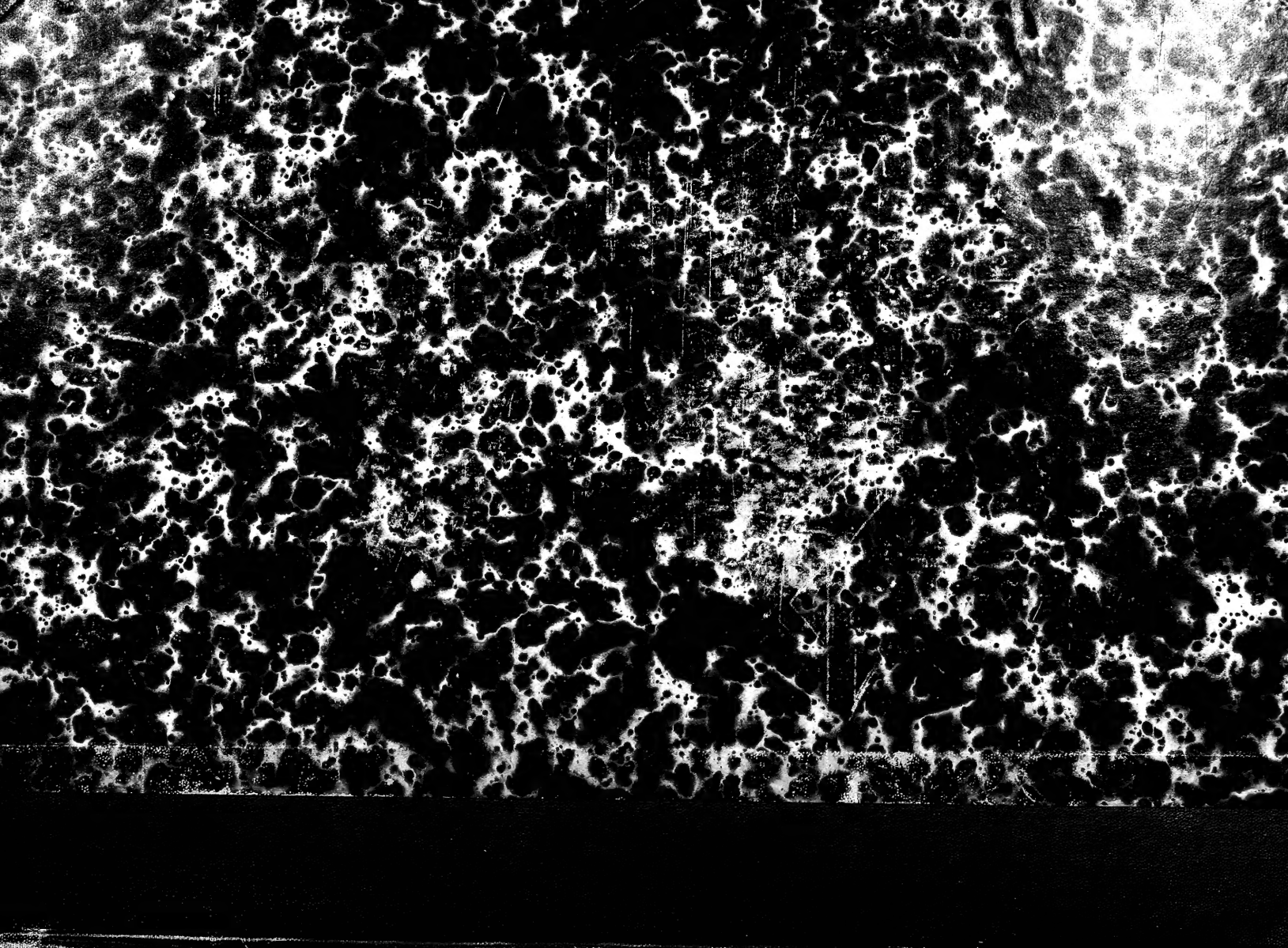

TRANSACTIONS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY,

HELD AT PHILADELPHIA,

FOR PROMOTING USEFUL KNOWLEDGE.

VOL. XII.—NEW SERIES.

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TRANSACTIONS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

ARTICLE I.

ON THE GEOLOGY AND NATURAL HISTORY OF THE UPPER MISSOURI.*

BY F. V. HAYDEN, M.D.

Read July 19th, 1861.

HISTORICAL INTRODUCTION.

In presenting a report upon the geological structure of the vast country drained by the Missouri river and its tributaries, it is but just to those who have preceded me that I should give a brief statement of the results of different travellers who have passed over that region, premising, however, that no detailed account has hitherto been given of its geological character.

The first reliable account of the Upper Missouri country was obtained by those enterprising travellers, Captains Lewis and Clarke, and published in their excellent journal;†

* Being the substance of a report made to Lieut. G. K. Warren, T. E., U. S. A., by F. V. Hayden, M.D., Surgeon and Geologist of the Expedition to the Upper Missouri and Yellowstone, under the command of Lieut. Warren.

† Lewis and Clarke's Journal of an Expedition to the Sources of the Missouri River, performed during the Years 1804, '5 and '6.

and though they appear to have had no definite idea of the geological age of the region examined by them, they gave so accurate descriptions of the general physical features of the bluffs, coal-beds, &c., that their report has proved an excellent guide to subsequent explorers. They often mention beds of "stone coal" (lignite), different strata of sands, sandstones, clays, &c., yet do not suggest any idea of the age of these deposits. A small collection of cretaceous fossils obtained by these travellers enabled Dr. Morton* to identify the existence of the Cretaceous formation in that country.

In 1832, the Prince of Neuwied made an expedition up the Missouri river, and the results of his travels were embodied in a magnificently illustrated work. The sketches taken from nature present a very vivid and accurate idea of the country. He mentions the occurrence, in numerous localities, of sands, clays, and lignites, and also observes that he collected Ammonites, Baculites, and other Cretaceous fossils, all along the river from the sources of the Missouri to Big Sioux. This statement led Von Buch to observe that "this great river (Missouri) flows uninterruptedly from the foot of the Rocky Mountains through strata of Chalk, at least as far as the mouth of Sioux river. This is the result of the accounts and collections of Prince Neuwied and of the report of the celebrated astronomer Nicollet."† Nothing very definite was ascertained however respecting the geology of the country by this expedition, except to confirm the fact of the existence of a Cretaceous formation on the Upper Missouri, indications of which had already been determined from the collections of Lewis and Clarke. He also obtained a fine specimen of the remains of a saurian animal, characterizing the Cretaceous Period, which has been described by Goldfuss as Mosasaurus Maximiliani, fragments of which were in the collections of Lewis and Clarke.

The next important expedition into that country was made in 1839, by the distinguished geographer Nicollet. He ascended the Missouri no farther than Fort Pierre in lat. 44° 23′, yet from his observations the first reliable information was obtained respecting the extent and interest of the Cretaceous rocks in that region.

He secured a considerable number of Cretaceous fossils at different points along the Missouri, but especially at the Great Bend; all of which were described by Conrad and Morton in the Proceedings of the Philadelphia Academy. Although passing rapidly through the country he formed a tolerably accurate idea of its geology, and gave in his report a vertical section of the Cretaceous rocks, which is correct, excepting that he seems to have had no knowledge of No. 2, and represented two of the subdivisions of No. 3 as dis-

* Synopsis of the Organic Remains of the Cretaceous Groups of the United States, &c., by S. G. Morton. Philadelphia, 1834.

† Silliman's Journal. September, 1850.

tinct formations. No. 1, he seems to have referred to the Carboniferous system. As he did not go above Fort Pierre he saw nothing of No. 5, though he obtained some of its characteristic fossils, which may have been presented to him by members of the American Fur Company.

Mr. Edward Harris, who accompanied Mr. Audubon to the mouth of the Yellowstone in 1843, was instructed by the Academy of Natural Sciences at Philadelphia to make some observations on the geology of that unknown region. This communication to the Academy on his return was very interesting, and contained many important facts, and from his notes and collections the committee were able to arrive at still more important conclusions. The committee, consisting of Professors Rogers, Morton, and Johnson, reported that they found incontestable proofs of a freshwater formation in that region. From one locality Mr. Harris obtained a specimen of "brown ferruginous rock, containing three or four species of freshwater univalve shells of the genera *Limnea*, *Planorbis*, &c. One of the species of *Planorbis* it is conjectured may be a form extinct, but the mutilated condition of the specimen prohibits a positive opinion. This bed of clay also contains leaves of deciduous trees, bearing a close resemblance to those of the Beech."

At various times, specimens of Mammalian remains were brought in by gentlemen connected with the American Fur Company, indicating the existence of an interesting deposit on White river; the first account of which was published by Dr. H. A. Prout of St. Louis, in the American Journal of Science, 1847.

In 1849, Dr. John Evans, one of the assistants in the geological survey of the Chippeway Land District, under the direction of Dr. D. D. Owen, was sent by that gentleman on an expedition to the Mauvaises Terres of White river. He there secured a fine collection of Mammalian and Chelonian remains, which were investigated by Professor Leidy of Philadelphia. He also collected many interesting Cretaceous fossils, which were described by Dr. Owen, and published in his final report in 1852. Dr. Evans's observations embracing a section of the Bad Lands, together with a description of their physical features, were also published in this report.

In the following year Mr. Thaddeus A. Culbertson visited the Upper Missouri country under the auspices of the Smithsonian Institution, during which expedition he collected some interesting vertebrate remains from the White river formations. He also ascended the Missouri on the Fur Company's boat, to a point above Fort Union, noting the character of the surface of the country, and the occurrence of lignite beds at various localities.

In the spring of 1853, Dr. Evans again visited this country incidentally, while on his way to Oregon Territory, in the geological survey of which he was engaged, under the patronage of the General Government. During this expedition he made another extensive collection of vertebrate remains and some freshwater Mollusca at the Bad Lands of White

river, as well as some Cretaceous fossils from Sage creek. The Mammalian remains of this expedition were also studied by Dr. Leidy, and the invertebrate fossils by Drs. Evans and Shumard, and published in the Proceedings of the Academy of Natural Sciences at Philadelphia, and the Academy of Sciences of St. Louis.

At the same time (1853), Mr. F. B. Meek and the writer, were employed by Professor James Hall of Albany, New York, to visit the Bad Lands of White river, for the purpose of making a collection of the Tertiary and Cretaceous fossils of that region. Many interesting and important facts were obtained during the expedition, in regard to the geological structure of the country from Fort Pierre to Council Bluffs, which formed the basis of a paper read by Professor Hall before the Association for the Advancement of Science at the Providence meeting, in the summer of 1855. The Mammalian remains collected during this trip were placed in the hands of Dr. Leidy for examination, and the new species of Cretaceous fossils were investigated by Messrs. Hall and Meek, in an interesting memoir published in the Transactions of the American Academy of Arts and Sciences at Boston. A brief vertical section accompanied this memoir, showing the order of the superposition of the different Cretaceous beds.

Subsequent to all these expeditions the writer again visited Nebraska and spent two years traversing various portions of that country; part of which time he was aided by Col. A. J. Vaughan, Indian Agent, and afterwards by Mr. Alexander Culbertson and other gentlemen of the American Fur Company. During this expedition he explored the Missouri to the vicinity of Fort Benton, and the Yellowstone to the mouth of Big Horn river, also considerable portions of the Bad Lands of White river and other districts not immediately bordering on the Missouri. The vertebrate remains collected by him, as may be seen by reference to the various papers by Prof. Leidy in the Proceedings of the Academy, embrace a larger number of species than all those previously known from that country, many of which belong to new and remarkable genera.

Large collections of mollusca were also obtained from Cretaceous and Tertiary formations, which have since been published by Mr. Meek and the writer, with remarks on the geology of different portions of the country, in several memoirs read before the Academy of Natural Sciences at Philadelphia. The geological results of the different expeditions along the Missouri and other portions of the Northwest, under the command of Lieutenant Warren, are embodied in the following report.

In regard to the geology and natural history of Kansas and the southern portions of Nebraska, or the Platte country, important facts were secured by those enterprising explorers, Cols. Long, Fremont, and Emory, and Capt. Stansbury. These have been already published in their several reports.

PART I.

DESCRIPTIVE GEOLOGY OF THE ROUTES.

CHAPTER I.

EXPLORATION OF PLATTE RIVER VALLEY FROM BELLEVUE TO THE MOUTH OF ELKHORN RIVER.

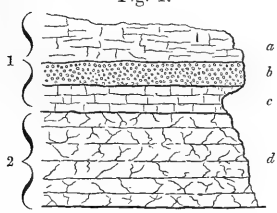
Landed at Bellevue, Nebraska, five miles above the mouth of the Platte river, from the steamer Twilight, June, 1857. The scenery at this point is, perhaps, the finest along the Missouri. The river bottoms, which are quite extensive, possess an inexhaustible fertility and sustain a luxuriant vegetation, while the broad upland prairies, clothed with grass and flowers of great variety and beauty, meet the eye of the traveller on every side. The yellow silicious marl, which underlies the high prairies to a great depth, renders them exceedingly well adapted to agricultural and grazing purposes. The limestone strata, which are so much valued here for economical purposes, belong to the age of the Upper Coal Measures, and constitute the basis formation of this region. A fine quarry may be seen near Col. P. A. Sarpy's old Trading Post, which has been diligently wrought for several years. The following section in descending order will represent the different beds as exposed in this vicinity:

1. Light gray limestone, well charged with fossils, *Fusulina cylindrica*, *Productus*, *Chonetes*, and several species of corals. This limestone is quite useful for building purposes and forms excellent lime.
2. Yellowish drab argillaceous limestone, very hard and compact; useful in the construction of buildings, but contains too much clay for lime. Fossils: *Allorisma terminalis*, &c. 6 to 10 feet.
3. Argillaceous shaly limestone, of a grayish brown color. Fossils: *Spirigera subtileta*, *Fusulina cylindrica*, *Productus* several species, *Chonetes*, *Allorisma*, and quite abundant crinoidal remains. Seen at Bellevue at low water. 6 feet exposed.
4. Compact blue argillaceous limestone having much the character of hydraulic limestone; soft and moist in place but hardening on exposure; contains too much clay for lime, but is quite useful for building purposes. Fossils: same as above mentioned. Seen at the mouth of the Platte, and at St. Mary's, Iowa. 6 feet exposed.

Trip from Bellevue to mouth of Elkhorn River.—While delaying for a time at Bellevue, in June, 1857, I took that opportunity to make a somewhat minute examination of the Platte valley as far as the mouth of Elkhorn river, a distance of about thirty miles. Having secured a horse through the kindness of Stephen Decatur, Esq., I left Bellevue pursuing a southerly course across the beautiful undulating prairies bordering on the

Missouri to the Papillion creek. Saw at this locality, on Mr. Watson's claim, a fine quarry of gray and yellowish gray limestone, same as bed 4 of the section. On the Platte river, six miles above its mouth, observed numerous large granite boulders scattered over the surface of the high hills. A bed of sandstone (No. 1, Lower Cretaceous) makes its appearance at this point, capping the bluffs. Its general character is a dark, ferruginous, coarse-grained, micaceous sandstone, but sometimes becoming a very tough compact silicious rock. Near the old Otoe village, eight miles above the mouth of the Platte, is a very good exposure exhibiting the sandstone resting conformably upon the Carboniferous Limestone. We have here the following beds in descending order:

Fig. 1.



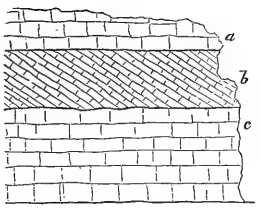
1. Gray, compact, silicious rock, passing down into a coarse conglomerate, an aggregation of waterworn pebbles, cemented with angular grains of quartz; then a coarse-grained micaceous sandstone. 25 feet.
2. Yellow and light-gray limestone of the coal measures containing numerous fossils, *Spirifer cameratus*, *Spirigera subtileta*, *Fusulina cylindrica*, *Productus*, *Chonetes*, and abundant corals and crinoidal remains.

a, quartz rock; *b*, conglomerate; *c*, coarse friable sandstone; *d*, carboniferous limestone.

A seam of carbonaceous shale, twelve to eighteen inches in thickness, crops out occasionally near the water's edge, and is regarded by the inhabitants as a sure indication of coal. The great scarcity of timber throughout this region would render such a discovery of the highest importance; but I am inclined to the opinion that it is a geological impossibility for a workable seam of coal to be found within the limits of the Territory of Nebraska. The limestones of Southeastern Nebraska belong to the Upper Coal Measures, and form the extreme northwestern rim of the great coal basin, and, inasmuch as the strata dip toward the northwest in ascending the river at least one foot to the mile, there must be from 600 to 1000 feet of clays, shales, and limestones, over the first seam of coal two feet in thickness, in any part of the country near the mouth of the Platte. A bed of coal to be really valuable for economical purposes, should be at least three feet in thickness, and even then it would not prove profitable if a large amount of labor were required in opening the mine.

Near the mouth of the Elkhorn, the sandstone presents much the same character as before described. At this point it reaches nearly to the water's edge, showing that the dip of the formations in this region is toward the northwest. Here formation No. 1 is at least eighty feet in thickness, about fifteen feet of Carboniferous limestone being exposed beneath. The latter soon passes beneath the water-level of the river, and the sandstone occupies the country.

Fig. 2.



Although all the rocks in this region are composed of strata holding a horizontal position, or dipping at a very small angle, examples not unfrequently occur in sandstone formation No. 1 of what is usually called "false or cross stratification," as is shown in Fig. 2, which was taken from the bluff exposed at the mouth of Elkhorn river, and indicates the different changes that took place in the currents of water that deposited the arenaceous sediments. Strata *a* and *c* are formed of thin horizontal layers of sandstone, while the lamina of stratum *b* seemed to have been deposited upon an inclined surface in very shallow water. Similar illustrations were observed by the writer in the Potsdam sandstone of the Black Hills, and they occur frequently in arenaceous rocks of all countries.

The bottoms along the Lower Platte are quite broad and extremely fertile, possessing a rich soil, and admirably adapted to the wants of the farmer. Fine crystal springs issue from the limestone banks, a sufficiency of timber skirts the river or clothes the bluffs, the climate is quite dry and healthy, and if it were not for the extreme cold of winter this region would be one of the most desirable agricultural districts in the West. The timber of the uplands consists chiefly of ash, elm, oak, soft maple, boxwood, &c.; while along the bottoms the cottonwood forms nine-tenths of the woodland. The land when in a state of nature supports a most luxuriant vegetation, and when cultivated by the farmer brings forth very abundant crops. The valley of the Elkhorn is similar to that of the Platte, and the land is at this time mostly taken up by the actual settler. The bluffs are formed of sandstone No. 1, often presenting lofty vertical walls, which, from the yielding nature of the rock, are of great service to the Indian, upon which to record his hieroglyphical history.

On my return to Bellevue, I passed over the upland prairie, several miles north of the Platte. Already nearly every valuable claim was occupied by the persevering pioneer, and as far as the eye could reach, the plain was dotted over with farmhouses, giving it much the appearance of an old-settled country. Very little timber, however, is to be seen except that which skirts the small tributaries of the Platte. The soil upon the surface is composed of a rich vegetable mould, the result of the annual decay of a luxuriant vegetation, underlaid by a yellow silicious marl, and is admirably adapted for the cultivation of all kinds of cereal grains and for grazing purposes. When the prairie turf is broken up by the plough and allowed to decay, the land becomes like a garden. The soil is so loose that it is tilled with great ease, but from this very fact is liable to suffer extensively from the wash of the heavy drenching rains of May and June.

CHAPTER II.

FROM BELLEVUE TO THE BIG SIOUX RIVER.

After having arranged my collections for transportation to St. Louis, I proceeded to explore that portion of Nebraska which borders on the Missouri from Bellevue to the mouth of Big Sioux river. Passing over an undulating country similar to that just described, underlaid with Carboniferous limestone, we find that Fort Lisa is the highest point on the river where these rocks are exposed. At Tekama, the ferruginous sandstone alone is seen presenting its usual lithological characters and containing much iron. This entire formation abounds with iron ore of the red hematite variety, which, if the deficiency of fuel in the country can be supplied from any other source, might be made of great economical importance. From this sandstone issue some excellent springs of water. The most important one is Golden Spring at Central Bluffs, which yields a large supply of pure cold water, and will at some future period become a great resort for seekers after health and pleasure.

From De Soto to Decatur, a distance of forty miles, the river bottom, on the Nebraska side of the Missouri, averages about five miles in width, forming a level prairie, with here and there a small grove of cottonwood. On the Iowa side, from Council Bluffs to Sergeant's Bluffs, a distance of one hundred miles, the bottom averages about ten miles in width, covered in many places with heavy bodies of timber, chiefly cottonwood, with a mingling to some extent of ash, elm, black walnut, &c. These broad bottoms possess an inexhaustible fertility, as is shown by the annual growth of vegetation, which year by year decaying adds still more to the richness of the soil. The subsoil seems to be composed of calcareous and silicious marls, formed from eroded materials of the Cretaceous and Tertiary rocks, which have been washed down by the river and mingled together upon its bottoms.

Above Fort Lisa the first cut banks we observed which afford a good section of the beds are at Wood's Bluffs, near Decatur.

Section of the strata in descending series:

1. Yellow Silicious marl, a recent deposit. 15 feet.
2. Yellow indurated clay, with a reddish tinge, also recent. 6 to 8 feet.
3. Heavy-bedded sandstone. 40 to 50 feet.
4. Yellow indurated clay passing down into an indurated ash-colored clay with a reddish tinge. 5 feet.
5. Ash-colored clay with a small seam of lignite at base. 25 feet.

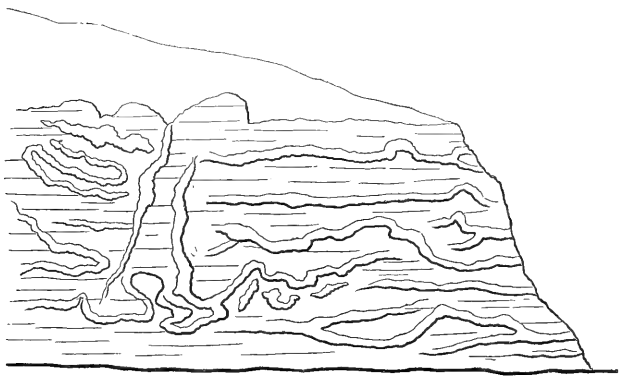
No fossils were observed at this locality excepting quite uncharacteristic vegetable remains. But near the Blackbird Mission, eight miles above, the sandstone is quite rich

in impressions of dicotyledonous leaves. The following section of the beds in descending order is exposed at this point:

1. Yellow marl, recent. 10 to 15 feet.
2. Yellowish and light gray, fine indurated grit, recent. 10 to 15 feet.
3. A reddish friable sandstone, passing down into a very tough compact silicious rock of a greenish gray color. The whole bed fully charged with vegetable impressions, quite well preserved. 10 to 20 feet.
4. Forty feet slope. The rocks though not exposed at this point are evidently formed of more friable sandstone, as is shown by the perpendicular bluffs cut by the river, three miles above, also at Wood's Bluffs, near Decatur.

The more compact silicious rock has been quarried during the winter and spring, and used in constructing a fine three-story building for the Omaha Mission, and it was found to serve an excellent purpose. The whole bed at this locality seems to be filled with impressions of leaves, mostly of dicotyledonous trees, some of them closely allied to our recent oaks, willows, &c., with many forms not represented among living species. Fragments of silicified wood abound with globular masses of the sulphuret of iron.

Fig. 3.



The bluffs of sandstone near this locality often present the appearance shown by Fig. 3. The whole surface being covered with projecting seams of iron, the more yielding arenaceous material being eroded, giving to the face of the bluff a very rugged aspect.

After stopping at Blackbird Hill three days enjoying the hospitality of Dr. Sturgis, the gentlemanly superintendent of the Mission, I pursued my course along the banks of the river toward the Big Sioux, about forty miles distant. The red sandstone No. 1 is the principal rock in that region, but upon the sandstone I often found layers of rather

soft yellowish white limestone fully charged with *Inoceramus problematicus* and fish remains. Near the north side of the Omaha reserve another bottom commences, averaging about five miles in width—greatest width ten miles—extending up the Missouri, above the village of St. John's. Dacota City is located on this broad level bottom.

At Sioux City, on the Iowa side, is a fine quarry in formation No. 1, which has yielded much excellent building-stone, and many attempts have been made to convert it into lime. The simple application of an acid would have shown it to be nearly destitute of calcareous matter. The whole bed presents the variation in color and structure peculiar to this rock. The more compact stratum extends below the water level, and will at some future day form a superior landing for steamboats. A few fossils have been found at this locality, impressions of leaves like the common willow, and some molluscous remains. Scattered over the high hills are exposures or outliers of formation No. 3, the rock of which is extremely calcareous, and is eagerly sought after by the inhabitants and converted into lime. I saw a load of this lime sold at Sioux City for the enormous price of one dollar and twenty-five cents per bushel. In the valley of the Big Sioux river, about three miles above its mouth, a bed of lignite is exposed, eighteen inches to two feet in thickness, but very impure. This is the same stratum seen near the Omaha Mission, at Omadi and other points along the river. As we pass up the valley of the Big Sioux, we see the different Cretaceous beds, Nos. 1, 2, 3, and 4, represented with a few of their peculiar fossils. No. 1 contains a *Pectunculus*, a *Cytherea*, a *Pholas*, with numerous vegetable remains; Nos. 2 and 3 contain *Ostrea congesta*, *Inoceramus problematicus*, and abundant fish remains; No. 4 has yielded nothing characteristic as yet at this locality, and is only thinly represented on the summits of the bluffs.

As we pass the mouth of the Big Sioux, latitude 42½°, longitude 96½°, the country begins gradually to lose, to a certain extent, its fertile character; many kinds of trees, as the soft maple, several varieties of oaks, one species of elm (*Ulmus fulva*), butternut, black walnut, wild locust, &c., reach their limits, and many others have already ceased to appear. From thence to the mountains not more than five or six species of forest trees are seen, and these appear very seldom except along the borders of streams.

Returning again to join the expedition at Omaha City, I found the travelling very difficult and was much delayed. A severe storm of rain had swollen all the small streams to an enormous extent, so that the bridges were all swept away. The yielding nature of the alluvial banks of streams, and the want of firm rock foundations, render it difficult to erect permanent bridges which will resist the strong power of the current of the rivers when swollen to their greatest height, as they frequently are in the months of May and June.

After an examination of that portion of Nebraska already occupied by settlers, I came to the following conclusions:

1. That the portion of Nebraska east of longitude 98° possesses a very fertile soil, a sufficiency of timber for all immediate purposes, is well watered, and is surpassed by few portions of the West as an agricultural and grazing country.

2. That, except in the southeastern or limestone region, there are very few good quarries of stone for building or other economical purposes.

3. That from its geological structure, the existence of workable beds of coal in the southeastern portion of Nebraska is quite problematical.

4. That, with the exception of iron in moderate quantities, no minerals will be found that can be rendered valuable for economical uses.

CHAPTER III.

FROM OMAHA CITY TO FORT LARAMIE.

July 3d. The country from Omaha City to Elkhorn river, as I have before mentioned, is mostly underlaid by limestones of the Upper Coal Measures. A great thickness of yellow marl, a modern deposit, covers the plain uniformly, concealing the limestones, except in a few localities. The prairie is as usual undulating. On the Elkhorn, the ferruginous sandstone (No. 1, Lower Cretaceous), occupies the country for about eighty miles up the Platte valley. It is seldom seen, owing to a great thickness of a superficial deposit composed of Post Pliocene marls. It is exposed in the valley of the Loup fork, near its mouth, and is exceedingly friable in its texture. On the distant hills remnants of No. 3 are seen, but No. 2 seems wanting. As we follow up the Platte valley from the Elkhorn, the timber gradually disappears in the same manner as on the Missouri. The bottom is broad and fertile, and the upland, owing to the yielding nature of the sandstone which underlies it, becomes more uniformly rolling than the limestone region near the Missouri.

July 20th. Indications of No. 3 were seen in the bed of Beaver creek, near the water's edge.

July 21st. Near the old Pawnee village, I observed No. 3 close to the water's edge, presenting its usual lithological characters, with a few specimens of *Inoceramus problematicus;* and overlying it stray masses of a pebbly conglomerate cemented with a calcareous grit, undoubtedly belonging to the upper beds of the Tertiary formation. After leaving Beaver creek I observed a change in the external features of the hills, more

abruptly undulating, as well as in their lithological characters, and am now convinced that they belong to the upper members of the Tertiary, probably Post Pliocene, but yet holding a lower position than the yellow marls of the Missouri.

July 22d. About two miles above our camp Loup fork cuts through undoubted Tertiary beds. The following section will show the strata in descending order:

1. Yellowish brown laminated grit; effervescing with muriatic acid.
2. Similar to the bed above but of a deeper color and containing a greater per cent. of clay with numerous calcareous concretions disseminated through it. 75 to 100 feet.
3. Light brown clay, with many whitish particles like magnesia. 20 feet.
4. Gray coarse grit, forming a heavy-bedded sandstone reaching to the water's edge. 30 feet.

In bed 2d I found fragments of the bones of mammals and turtles, and the whole series may be referred to the Pliocene period.

At the mouth of Calamus river the strata are represented as follows:

1. Yellowish brown grit. 12 feet.
2. Limestone assuming a concretionary form. 2 to 2½ feet.
3. Calcareous clay quite indurated. 6 feet exposed above the water's edge.

Lieutenant Warren explored the Calamus fork for about 30 miles above its mouth and saw the same beds represented in the above section, sometimes with an aggregate thickness of fifty feet, and gathered from them numerous water-worn fragments of bones and shells of turtles.

July 25th. Soon after leaving camp, a bed of arenaceous limestone was observed in several localities apparently containing traces of organic remains. There were many silicified tubes ramifying through the rock, which may have been the stems of plants, also many seeds like cherry-stones. Sometimes the rock becomes a partial conglomerate. The incoherent material above and below the more compact bed, is a yellow marl.

July 27th. Tertiary beds were observed throughout the day and a few bones and teeth were collected.

July 28th. Passed over a country very similar to that of yesterday, but the high hills are becoming apparently more rugged. They are cut through by numerous streams, forming ravines one hundred to two hundred feet in depth. The sandhills are also appearing.

July 29th. Passed through the sandhills all day. They have now become quite conspicuous, rising to the height of fifty to one hundred feet.

August 1st. Measured the height of the sandhills from the bed of the Loup fork with a pocket level, and found that the highest point was about two hundred and twenty feet above the water level of the river. I think, however, that there is not so great a

thickness of loose material, but that Pliocene beds form the base. The middle portion is Post Pliocene, and on the top from fifty to one hundred feet of loose incoherent sand.

August 2d. There are very few exposures of the different beds in the valley of the main branch of Loup fork, but fifteen miles south of our road towards the Platte, a branch of the Loup fork seems to pass between nearly vertical banks. One of them exhibits a section which shows the Pliocene character of the beds:

1. Yellowish-brown grit.
2. Whitish chalky stratum containing many freshwater shells. 3 feet.
3. Heavy-bedded gray grit. 8 to 10 feet.

From this point to the head of Loup fork the geology of the country is similar, consisting of sandhills and recent Tertiary beds. The true Tertiary beds are concealed for the most part by superficial deposits, a few places only being exposed by denudation. From these I was able to collect some interesting vertebrate remains, as a new species of *Mastodon* (*M. mirificus*), *Hipparion*, *Cervus*, *Elephas*, &c. The whole of this portion of the country may be regarded as a desert, nearly destitute of wood and water. From the head of Loup fork we pursued a northwest course to the Niobrara river. The surface of the country is covered with a superficial deposit of loose sand, which is blown by the wind into large conical hills rendering travelling quite difficult. Numerous freshwater and saline lakes are scattered about among these sandhills, affording a resort for myriads of water birds, ducks, geese, gulls, &c.

August 10th. On reaching the Niobrara we observed some of the Upper Miocene beds exposed in the channel of the river, very rarely, however, containing any organic remains. The more recent upper strata (Pliocene), reveal large quantities of the teeth and bones of mammals, with fragments of a species of turtle (*Testudo Niobrarensis*, Leidy).

Section of beds in descending order:

1. Alluvial and drift.
2. Quite hard arenaceous limestone; the same rock seen on the Loup fork containing cherry-stones. 15 feet.
3. Dark gray friable coarse sandstone. 4 feet.
4. Like bed 3, but more heavy-bedded and less distinctly stratified. 30 feet.

We seem to have represented here the highest bed of the Miocene Tertiary, with a full series of the Pliocene. A butte near our camp affording a fine section of the strata, measured from the edge of the river with a pocket level, proved to be one hundred and sixty-six feet in height. It is composed mostly of a gray calcareous grit, more or less compact, sometimes quite incoherent, containing many seams of concretionary sandstone. On the summit is a stratum formed of loose layers of limestone, similar to that which con-

tains the freshwater shells near Pinau's spring, though holding a higher geological position. Indistinct traces of shells and abundant remains of fishes, as scales, vertebræ, &c., were observed on the surface of tabular masses. It seems to form the upper part of gray sandstone bed E of the general section, and to vary much in its lithological characters in different localities, presenting every variety, from a translucent chalcedony to a fine-grained sandstone or compact limestone, and furnishing those chalcedonic masses which meet the eye of the traveller so often on the surface of this formation, having the appearance of erratic blocks. Further from the river and capping the hills, are beds of yellow and yellowish gray calcareous grit, undoubtedly of Pliocene age, containing numerous fragments of the jaws and finely preserved bones of the Mastodon and Elephant. As we pass up the Niobrara the gray sandstone bed assumes a variety of characters, sometimes forming a coarse conglomerate, then an aggregate of granular quartz cemented with calcareous matter. Lithological changes are constantly occurring in the Upper Tertiary beds. About fifty miles up the Niobrara from the point where we struck it (Aug. 10th), the Pliocene beds cease to appear, and the whole country is occupied by the Miocene formations D and E of the general section.

August 14th. On the distant hills saw large layers of a fine-grained arenaceous limestone, forming a bed ten to fifteen feet in thickness. At this locality we find in bed E, alternations of reddish flesh-colored grit and light ash-colored clay with layers of concretionary sandstone and limestone. Fifty miles above our camp of August 10th, a new bed arises above the water level of the river, composed of a flesh-colored calcareous grit with a reddish tinge. Sometimes it is a light yellow calcareous marl, and the eroded material gives a reddish yellow tint to the whole surface of the country. It seems to pass up quite gradually into the sandstone above. The remains of an animal allied to the *Oreodon*, named by Dr. Leidy, *Meycochoerus proprius*, were collected from this bed at this locality.

August 15th. One of the most characteristic and picturesque instances of the castellated appearance of the Bad Lands on the Niobrara, is seen near our camp. At this point the thickness of bed D is one hundred and twenty-four feet above the river. It has the same general lithological character as in the White river valley, where a much greater thickness is exposed. It contains many layers of silico-calcareous concretions, sometimes forming large ledges, which break into irregular fragments on exposure. The more incoherent material has much the color and composition of the turtle bed on Bear creek, but contains less aluminous matter.

Leaving the Niobrara for Fort Laramie we observe at Spoonhill creek the conglomerate composing a large portion of bed E, giving a very rugged appearance to the scenery. It consists of angular and water-worn pebbles of every variety and color, from the granitic and metamorphic rocks of the Black hills and other mountainous portions, varying in size

from one inch to four inches in diameter, cemented together with a silicious paste. Large masses of this conglomerate have fallen to the base of the hills or are scattered over the plains below. We also pass through a large area covered with sandhills after leaving the Niobrara. These hills all have a dull reddish tinge, evidently from the eroded materials of bed D. One of these hills was one hundred and eighty feet above the surrounding prairie with very steep sides, its present conformation being preserved by the roots of vast numbers of a species of Yucca (*Y. angustifolia*), which cover the hill and seem to attain their maximum growth in the sand. The sandhills are composed of the eroded materials of the different Tertiary beds, and from the loose incoherent nature of the sand, they suffer continual change of form and position by the action of winds.

On Rawhide Butte creek bed D approximates more closely in its character to the Oreodon bed B of the general section, at Ash Grove spring and Bear creek. In the valley of the creek, on an exposed or denuded area not more than eight or ten yards square, I observed fragments of a species of turtle (*Testudo Nebrascensis*) belonging to at least eight individuals, with a few mammalian remains (*Oreodon Culbertsonii*). The Upper Miocene beds occupy the country in the vicinity of Fort Laramie exclusively, and extend to the base of the Laramie mountains. Bed E attains the greatest thickness, having been eroded away to a great extent, while bed D becomes one hundred and eighty to two hundred feet in thickness. The channel of the Platte river cuts through Pliocene and Miocene strata alone from Fort Laramie to longitude 98°, a considerable distance below Fort Kearney.

CHAPTER IV.

GEOLOGY IN THE VICINITY OF FORT LARAMIE.

The plain country in the vicinity of Fort Laramie is underlaid for the most part by the upper members of the White river Tertiary beds. By referring to the Geological map, it will be observed that west of Fort Laramie, between the two main branches, Laramie and North Platte, but two small exposures of the Carboniferous rocks occur. As we proceed westward toward Laramie peak the first exposure is seen near the head of Warm Spring creek, occupying an area of not more than five or six hundred square yards. Its upheaval is probably local, the limestone being revealed by the erosion and removal of Tertiary beds, which are in this immediate region apparently undisturbed, and lie unconformably against the upheaved mass. The limestone strata dip in every direction from a central axis. The fossils are quite abundant, but the hard and brittle character of the rock renders it next to impossible to secure perfect specimens. At the base of the exposure are two or three feet of ferruginous shale, the lower layers of which seem to have been slightly affected by heat

from beneath. The fossils are *Productus*, *Chonetes*, *Spirigera*, probably *S. subtilita*, *Spirifer*, *Retzia mormoni*, *Rhynconella uta*, corals and crinoidal remains. Nine miles farther to the westward we find the Carboniferous rocks again exposed by the wearing away of the Tertiary beds in the valley of Cottonwood creek. Here we have a series of limestone eighty feet in thickness, with a central axis similar to the exposure previously noticed, the strata apparently dipping northeast and southwest at an angle of about 10°, while the Tertiary beds again rest unconformably upon their upturned edges. The lower strata which are exposed in the channel of the creek, have been subjected to considerable heat, so that their color is changed to a brick red.

Along the base of the mountains between the Laramie fork and the North Platte no Carboniferous rocks are exposed; indeed all the older fossiliferous beds are concealed by a recent heavy deposit, consisting of gravel and water-worn boulders, from all the geological formations represented in this region. This superficial deposit extends along the Laramie fork for a considerable distance from the mountains, the Tertiary beds being revealed here and there in the channel of the river. About twelve miles above Fort Laramie, both on the Laramie river and on the Platte, a remarkable deposit was observed, composed of a coarse conglomerate, fifty to one hundred and fifty feet in thickness, of a recent date and evidently accumulated since the rivers occupied their present beds. Indeed the form of the deposit is that of a basin twelve or fifteen miles in length, and reaching its greatest thickness only in the valleys of the rivers, while the elevated ridge between the rivers reveals the true Tertiary beds. The rock seems to vary in structure from an aggregation of particles of quartz or a quartzose sandstone to an exceedingly coarse conglomerate, made up of every variety of material, much of which I have not yet seen in place. It appears to have been formed during the drift epoch, possibly at a later period by the damming up of the two streams near this junction, and the materials were doubtless transported by strong currents from the mountains in the vicinity.

North and northwest of Fort Laramie we observe quite extended areas occupied by Carboniferous limestones with metamorphic and granitoid rocks. These exposures lie along the line of connection between the Laramie range and the Black hills. Surrounding all these exposures and occupying the valleys we see the Upper Tertiary beds, but never conforming to the older rocks. Near Horse-shoe creek along the base of the mountains, the Cretaceous, Jurassic, Carboniferous, and Potsdam formations are exposed, the strata sometimes inclining high upon the sides of the ridges of elevation. The White river Tertiary beds continue up to La Pule, when they gradually give way to the Lignite Tertiary beds, though remnants are still seen farther up the river. Here the White river Tertiary strata rest upon the Lignite beds, showing most conclusively their relative ages.

Southward of Laramie river along the foot of the mountains we have a continuation of

the same rocks exposed in outcropping narrow belts, sometimes expanding so as to occupy a wide area; again concealed or eroded away so that scarcely a trace can be seen. The plain country is occupied by the upper members of the White river Tertiary. The nucleus of the mountains is composed of granitoid rocks with very little variety. I shall dwell more at length on the general geology of this region in a succeeding chapter.

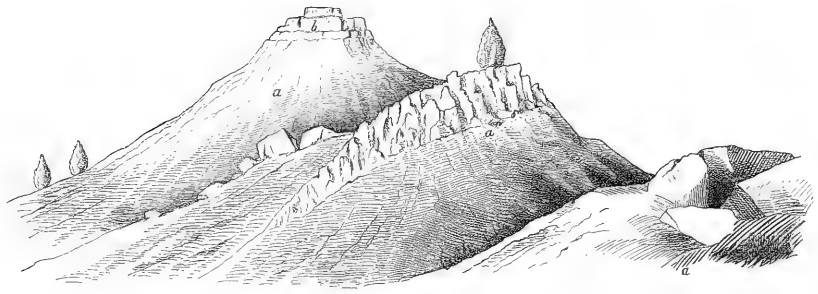
In the Laramie range are beautiful valleys with streams of pure water, margined with birches, poplars, and other trees such as are met with in more northern latitudes. Not unfrequently there are broad level plains with a soil composed of the disintegrated materials of the granitoid rocks, sustaining a good growth of vegetation. The mountains are covered with a fine growth of pine timber, which would furnish an almost inexhaustible supply of lumber for economical purposes.

CHAPTER V.

FORT LARAMIE TO THE BLACK HILLS.

About seven miles north of Fort Laramie, we pass the eastern extension of the Laramie hills, which is composed of numerous centres of upheaval, by which the granite is protruded and the overlying rocks thrown off in every direction. The elevations vary from one hundred to eight hundred feet in height, the nucleus formed of granitic and azoic rocks, while the Carboniferous limestones are scattered over the sides or base of the upheaved masses, or lie unconformably upon their summits. The Carboniferous limestones incline at various angles, depending upon the power of the disturbing force from beneath,

Fig. 4.



and when unchanged by heat contain a few fossils. We can here see every variety of the limestone, from the unchanged fossiliferous, to the completely metamorphosed rock, with the indications of stratification nearly or quite obliterated. Sometimes the melted ma-

terial is thrust up through the seams in the unchanged mass, so that in a single hand specimen we have the changed and unchanged rock. Not unfrequently the limestones are elevated in such a manner that the strata preserve their horizontality very nearly; again they dip at an angle of from 5° to 30°.

The above sketch, taken by Lieut. Warren, about six miles north of Fort Laramie, exhibits some of the phenomena just mentioned. *a*. Represents metamorphic rocks distorted at different angles. *b*. Strata of Carboniferous limestone capping the summit of the upheaved peak and still retaining their horizontal position.

Passing from the Platte toward the Niobrara, the upheaved ridges seem to tend in a northerly direction, and are for the most part capped with limestones in a more or less changed condition. At the foot of these ridges the upper beds of the Tertiary may be seen insinuating themselves into the valleys and ravines or deposited high up on the sides of the elevations, thus, as it were, filling up to some extent the inequalities of surface formed by the upheaval. In all cases the Tertiary beds are undisturbed and not unfrequently rest directly upon the vertical edges of the azoic stratified or granitic rocks. Rawhide peak is about eight hundred feet high and of the same geological character as Laramie peak. High upon its sides may be seen remnants of the Tertiary beds, left after denudation; showing very clearly that all these elevations and ridges once formed rocky islands in the great Tertiary lake.

Near Rawhide peak the quartzose limestone appears again in a more or less disturbed condition. A section across the vertical edges of the strata would stand thus:

1. Quartzose limestone with stratification nearly or quite obliterated.
2. Laminated clay slate.
3. Alternate strata of Gneiss, Hornblende, &c.

Directly west of Rawhide peak we have the greatest thickness of stratified azoic rocks met with on the trip. The strata were vertical and I could obtain a section only across the upturned edges.

1. Carboniferous limestone. 100 to 300 feet.
2. Quartzose arenaceous limestone. 150 feet.
3. Soft bluish clay slate. 15 feet.
4. Very compact quartzose arenaceous limestone. 500 to 700 feet.
5. Steel gray Hornblende. 30 feet.
6. A compact crystalline limestone with a somewhat fissile structure which gives it the appearance of being laminated, breaking into large rhomboidal masses. 80 to 100 feet.
7. Steel gray gneissoid slate with veins of white quartz disseminated through it. 150 feet.
8. Very hard gneissoid rock. 80 to 100 feet.

The Carboniferous limestones at this locality present a peculiar appearance not unlike the fused and semifused strata overlying the burned lignite beds on the Yellowstone. The fused masses are very compact and heavy, varying in composition, red, yellow, and mottled, oftentimes containing small fragments of partially changed rock, thus forming a kind of conglomerate. These appearances are more fully illustrated about eight miles west of Rawhide peak, where there is a vertical wall of limestone which exhibits every variety of character which we have mentioned. After leaving this ridge we descend into a valley stretching off to the northwest, and into every ravine the Tertiary beds seem to have penetrated or to have been deposited high upon the sides of the ridges.

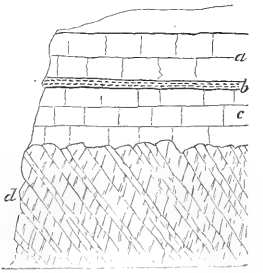
Fig. 5.

In the above wood-cut, *a* represent the azoic rocks upheaved in the form of conical peaks; *b*, the Tertiary beds deposited in the valleys and jutting against the older rocks on all sides.

At the head of Niobrara river we have indications of upheavals, but to a limited extent, near our camp, in the following section, the unchanged sedimentary strata lie unconformably on the vertical edges of the metamorphic rocks.

After crossing the Niobrara the Tertiary beds occupy the country with the exception of a few isolated exposures of Carboniferous limestone. Passing the dividing ridge between the Niobrara and Shyenne rivers into the valley of Old Woman's branch, we find that the Tertiary rocks by erosion assume a

Fig. 6.



a. Quartzose sandstone. 22 feet.

b. Red argillaceous slate. 5 feet.

c. Yellowish sandstone with reddish tinge. 37 feet.

d. Metamorphic and granitic rocks. 80 to 100 feet.

variety of fantastic shapes, such as domes, towers, and spires, one of which seems to be twenty or thirty feet high, but not more than four or five feet in diameter at its base. From this pillar the little tributary of the Shyenne derives its name. Very little timber is seen along our route excepting a few scattered pines among the hills.

On the north side of Old Woman's branch is a high ridge ranging northwest and southeast, composed of a variegated sandstone varying in structure from a compact fine silicious rock, to a coarse reddish conglomerate or sandstone, with no fossils but indistinct traces of vegetable remains. This ridge is the result of a gentle upheaval and is exposed by the erosion of the more yielding Tertiary beds from the valley. On the distant hills on each side of the valley the naked Tertiary beds are visible, while near the bed of the stream the Titanotherium bed is found with its usual lithological characters and containing bones and teeth of the animal from which it derives its name. The following section of the strata in descending series will show the details of this upheaval:

1. Layers of white oolitic limestone, doubtless Tertiary.
2. Compact ferruginous sandstone. 80 feet.
3. Yellow friable sandstone. 2 feet.
4. Light gray fine clay. 4 feet.
5. Yellowish white sandstone, quite friable. 5 feet.
6. Drab or ash colored indurated clay passing down into red clay 6 feet.
7. Variable incoherent clays, red, yellowish, &c, which may be of Jurassic age. 50 feet.

Passing down the valley of the Shyenne, the Tertiary beds disappear and the Cretaceous formation No. 5 occupies the country. At one locality an upheaval was observed exposing all the subdivisions of the Cretaceous rocks, as will appear from the following section:

No. 5. Presenting its usual lithological characters with numerous fossils; strata but slightly disturbed. 100 to 150 feet.
No. 4. Presenting the same characters as on the Missouri river. 100 feet.
No. 3. " " " " " " 150 feet.
No. 2. " " " " " " 200 feet.
No. 1. " " " " " " 250 to 300 feet.

No. 5 is but slightly disturbed as will be seen by examining the illustrative section. Nos. 4, 3, and 2, present only their vertical edges of their strata across which the above measurements were taken. The strata of No. 1 seems to have been elevated so as to retain a nearly horizontal position. No. 3 at this locality contains numerous fossils, the most abundant of which are *Ostrea congesta*, and *Inoceramus problematicus*. This bed does not present altogether the same lithological character as on the Missouri river, but pos-

sesses a more laminated and arenaceous structure, sometimes approaching to a calcareous sandstone.

Leaving this locality, we continue to pass over No. 5, and scattered over the surface of the ground are numerous fossils, loose or in argillaceous concretions, as *Inoceramus*, *Baculites*, *Ammonites*. About five miles north of our last night's camp, near the source of the south fork of the Shyenne, a few beds of the lignite Tertiary basin were observed.

1. Yellow arenaceous bed, holding the same position, I think, as the one at Fort Clark, which contains numerous freshwater shells.
2. Light gray grit, with numerous iron rust concretions, same bed seen on Cherry creek, at Fort Clark, on the Missouri above Fort Union and on the Yellowstone. 20 to 30 feet.
3. Very impure lignite. 4 to 6 feet.
4. Dark ash-colored clay passing up into lignite. 20 feet.
5. Fine yellow sand about 6 feet exposed.

These Tertiary beds rest conformably upon cretaceous formation No. 5, and no disturbance was observed in this locality.

Crossing the Shyenne on our way northward, we have the commencement of a series of ridges of upheaval, which surround the Black hills. As we approach the southern base of the Black hills, the strata dip very nearly to the southeast. No. 1 does not appear, but we have a fine development of No. 2, possessing its usual characters, a plastic clay with ash-colored arenaceous concretions and an abundance of well-preserved fossils. No. 3, with large quantities of *O. congesta*, and *I. problematicus*, in an exceedingly comminuted condition, No. 4 also appears, and No. 5 caps the hills on all sides. Nos. 2 and 3 are revealed only by the upheaval. On a branch of Beaver creek we find No. 2 one hundred and fifty to two hundred feet in thickness, and exhibiting its lithological characters in full; first, the summit is composed of ferruginous and gray laminated sandstone containing *I. problematicus* and fragments of fishes, seeming to form a bed of passage from No. 2 to No. 3, 6 to 10 feet in thickness; then, alternate thin layers of gray sand and black shaly clay, with an occasional seam one inch to six inches in thickness of ferruginous sandstone, the whole passing down into a black plastic clay, precisely like that which forms No. 2 on the Missouri river.

We ascend, therefore, to the Black hills by a series of steps or upheaved ridges gradually increasing in height as we approach the central ridge, and the strata more nearly approaching a vertical position. The first step or ridge is, perhaps, fifty to eighty feet in height, revealing Nos. 4 and 5; the second shows Nos. 4 and 3; third, Nos. 3 and 2, and so through all the series of strata until we come to the Potsdam sandstone resting unconformably upon the metamorphic rocks.

In order that my remarks in regard to the Black hills may be more clearly understood, the following general vertical section of the different beds is given, showing their order of succession and approximate thickness. A more detailed survey would doubtless reveal facts which would modify it to some extent, but I believe that it will show the order of superposition of the different strata with sufficient accuracy and detail for our present purpose.

General Section of the Geological Formations seen in and near the Black Hills (descending).

1. Miocene beds consisting of whitish clays and sandstones of various thickness.

Cretaceous System.

No. 5. Of the Nebraska general section, with its usual characters and fossils. 150 feet.

No. 4. Presenting its usual characters and containing its characteristic fossils. 150 feet.

No. 3. Usual fossils and composition. 150 to 200 feet.

No. 2. Usual lithological characters and fossils with some new forms. 200 to 250 feet.

No. 1. Upper part yellowish and reddish sandstone, sometimes in heavy beds, passing down into alternations of yellowish, gray, bluish, and reddish laminated shale, with seams and layers of dark carbonaceous matter, or impure lignite; beneath which there is a heavy bed of compact yellowish and reddish sandstone, with indistinct vegetable remains, and much fossil wood. Above beds variable at different places. 300 to 400 feet.

Jurassic System.

A. Then come alternations of light gray argillaceous grit and soft sandstone, containing *Ammonites Henryi*, and a small oyster; also in bluish gray compact argillo-calcareous masses, *Unio nucalis*, and a small *Planorbis*, with other small univalves like *Paludina*. Layers of argillo-calcareous, somewhat gritty mass, containing *Belemnites densus*, *Ammonites cordiformis*, *Avicula* (*Monotis*) *tenuicostata*, *Arca* (*Cucullæa*) *inornata*, passing down into a 6 or 8 foot bed light gray or yellowish sandstone, with ripple-marks and trails of marine worms. 50 to 80 feet.

B. Light red argillo-calcareous bed, with greenish seams and nodules (sometimes wanting). 30 to 40 feet.

C. Soft gray and dark brownish sandstone passing down into about 8 feet of laminated shale of various colors, below which there is a 6 foot bed of sandstone similar to that above, containing *Avicula tenuicostata* and trails of marine worms. Then comes 30 to 40 feet of bluish or ash-colored argillaceous shale, with great numbers of *Lingula brevirostra* and *Serpula*. Next we have a light gray calcareous grit, containing columns of *Pentacrinus asteriscus*, *Avicula tenuicostata*, *Serpula*, &c., the more compact and calcareous portions often perforated by *Pholas?* the latter bed passes down into a light, yellowish gray sandstone, splitting into thin layers, and containing imperfect casts of *Mytilus* (*Modiola*), *Pecten*, *Trigonia*, and other bivalves in considerable numbers. Whole 60 to 100 feet.

Red Arenaceous Deps.

D. Brick-red, incoherent, argillo-calcareous, very fine, slightly gritty material containing great quantities of gypsum in the form of seams, layers, and irregular beds. 100 to 150 feet.

E. Bluish and reddish gray, very hard, gritty limestone, in which were found a smooth *spirifer* like *S. lineatus*, two or three species of small *Pleurotomaria*, two species of *Macrocheilus*, and one or two species of *Bellerophon*. This bed is variable in thickness. 10 to 50 feet.

F. Brick-red material, very similar to the bed D, excepting that it contains much less gypsum; passing down into a very hard compact concretionary sandstone. 250 to 300 feet.

Carboniferous.

G. Hard, more or less gritty, yellowish and whitish limestone, containing *Productus*, *Spirifer*, *Euomphalus*, &c., &c., passing down into a light yellow calcareous grit. Altogether 50 feet.

H. Very hard reddish gray limestone, containing *Syringopora*, *Productus*, *Terebratula*, &c. In the middle of this bed there is an 8 foot layer of very hard compact bluish limestone filled with comminuted crinoidal remains. 50 feet.

Silurian. { I. Potsdam sandstone (oldest Silurian) containing *Lingula*, *Obolus*, and fragments of *Trilobites*. 30 to 50 feet.

J. Highly metamorphosed strata standing vertical.

K. Coarse feldspathic granite, forming mountain masses.

As we approach the loftier ridges of the Black hills, we find them capped with an immense thickness of very variable sandstone, which doubtless belongs to Lower Cretaceous formation No. 1, though it may pass down into Jurassic strata. No fossils were observed in it, excepting traces of uncharacteristic vegetable impressions with fragments of wood. One of these ridges by barometrical measurement was found to be thirteen hundred feet high, covered with pines and forming a portion of the Black hills proper. On the east side of the ridge the strata of sandstone slope gently down to the base; but the west side is abrupt, revealing the edges of the different beds, so that we see the sandstone before mentioned as attaining so great a thickness, passing down into alternate layers of gray sandstone and clay; containing fossils of the genera *Ostrea*, *Ammonites*, &c., with a freshwater deposit composed of a calcareous grit, with hard, dark-gray concretions containing fossils of the genera *Unio*, *Planorbis*, &c. Then comes a series of alternating beds of gray and red grits, and sandstones with numerous fossils of Jurassic types. In but one locality was any lignite observed in No. 1. Two seams were noted, one of them two to four feet in thickness, the other, six to eight feet, alternating with variable grits.

Near the head of Beaver creek on the west side of our road, we observed a ridge about four hundred feet in height, running northwest and southeast, presenting a nearly vertical front, the different beds of which appear to be undisturbed; but looking upon the opposite side, we find that the strata dip towards the prairie below at an angle of 20° to 30°. This ridge is composed of a great thickness of No. 1, passing down into variegated clays and grits one hundred to a hundred and fifty feet in thickness, from which I obtained *Ammonites*, *Belemnites*, and other fossils of Jurassic types in great abundance. Pursuing our course eastward, we passed through a valley between two of the upheaved ridges which surround the Black hills. In this valley we observed a bed of bluish ash-colored limestone (E of vertical section), which presents many peculiarities from the disturbing influences which have elevated this portion of the country. Sometimes it forms over large areas a sort of tessellated pavement from the peculiar fracture of its surface; again, it is puffed out, as it were, forming rounded protuberances thirty to sixty feet in height, the external surface yielding so as to adapt itself to any inequalities. It thus holds a great variety of positions. All along the valleys and on the hills are large exposures of the brick-red grit bed D, with intercalated seams of gypsum varying in thickness from one inch to four or five feet. In one instance I saw a local bed of gypsum twenty feet in thickness.

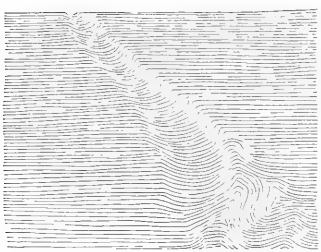
Our course to-day led us over a bed of blue limestone from the head of Beaver creek to Inyan Kara Paha or Stone peak. Scattered throughout the valley and over the hills are the incoherent materials of the brick-red grit beds, giving to the country a most picturesque appearance. Stone peak is chiefly composed of basalt, which at this locality assumes a columnar form similar to the columnar trap in the Lake Superior region. The rock is usually of an ashen-gray, sometimes becoming an iron-rust color, with much the texture of granular sandstone. A portion of the rock forming a lower ridge, but more recent, is trachytic, retains its stratification, has a much lighter color and a more porous structure.

We remained in our camp three days, surrounded by a wall of blue limestone, which has been disturbed in every conceivable way, yet seeming to adapt itself with wonderful flexibility to all the inequalities of the surface; sometimes it paves the valleys or the lower plains, again it seems to be wrapped about some conical hill like a garment. As cut through by the little stream near our camp, it varies in thickness from twenty-five to thirty feet, becoming yellowish on exposure. Many portions of it have a fine silicious or cherty structure. The following section will show the different beds seen in this vicinity in descending order.

1. Yellowish gray argillaceous grit.
2. Light-red incoherent sand and clay. 30 feet.
3. Laminated bluish clay shale. 8 feet.
4. Gray and grayish-brown sandstone. 6 feet.
5. Bluish ash-colored argillaceous shale, with *Avicula* (*Monotis*) *tenuicostata*, *Lingula brevirostris*. 30 to 40 feet.
6. Compact blue limestone, not fossiliferous at this locality. 25 to 30 feet.

Near the head of Beaver creek bed 2 of the above section presents the following layers: Gypsum 15 feet, passing down into 25 feet of red argillaceous grit; then 20 feet of gypsum; then incoherent brick-red grit, passing down into a heavy-bedded sandstone. 40 feet.

Fig. 7.

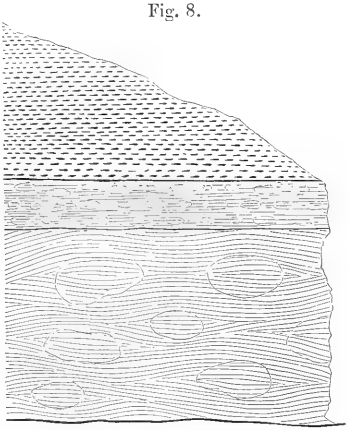


On our route to-day the blue limestone bed was very conspicuous, attaining a thickness of forty or fifty feet, presenting many peculiarities. Portions of it are made up of thin laminæ, which by pressure, when the materials of which the bed is composed were in a yielding state, have become very much contorted. These flexures in the laminæ have been quite common throughout our day's march. In some localities this bed contains many fine compact silicious nodules from which the laminæ seem to bend each way, so as to clasp them,

as it were. The streams cutting through this bed in various directions have formed deep cañons with perpendicular sides, rendering travelling quite difficult.

The valleys in the Black hills are quite picturesque from the incoherent character of the materials of the brick-red bed, which are strewed everywhere. On the hills I find the following beds represented:

Fig. 8.



1. Gray sandstone. 30 feet.
2. Yellowish, laminated, argillaceous shale, with numerous fossils. *Avicula (Monotis) tenuicostata, Lingula brevirostris, Pentacrinus asteriscus,* and many specimens of *Vermetes,* &c. 20 feet.
3. Dark bluish ash colored shale, with fossils same as in last bed. 30 feet.
4. White sandstone passing down into a red, coarse-grained, heavy-bedded sandstone. 50 to 80 feet exposed.

The sandstone which caps the hills is often broken into immense tabular masses, the surfaces of which are covered with trails of Planarian worms or mollusks, also impressions of raindrops and waved ridges such as are often seen on the shore of a stream.

We passed to-day over the brick-red bed beneath the blue limestone, both of which are fully represented. This lower bed, F, of the vertical section, which is so conspicuous in our day's march, is most variable in its character and color, changing from a nearly white to a deep red color, and from a friable grit to a compact silicious rock; sometimes it becomes a conglomerate composed of nodules and slightly worn fragments of flint rock, apparently from the Carboniferous rocks beneath. Eight miles before reaching our camp of September, we met with the true Carboniferous limestones for the first time, though they are everywhere revealed near the central portions of the Black hills. First an arenaceous limestone is seen, then a bluish limestone with cherty nodules like bullets, and a few characteristic fossils. The sandstone which we have before mentioned as so variable seems to rest conformably on the Carboniferous rocks, though all the beds are more or less distorted. When the Carboniferous rocks appear, the country becomes much more rugged and uneven, being elevated into high ridges, from the sides of which the different strata of limestone project and incline at all angles.

We remained during the day in the central portion of the Black hills. Here we find the Carboniferous rocks and the Potsdam sandstone conforming to each other and resting unconformably upon the metamorphic rocks. No rocks more recent than the Carboniferous

were observed in this locality. The following section represents the different beds in descending order:

1. A hard compact fine-grained yellowish limestone, of an excellent quality, passing down into a yellow calcareous sandstone somewhat soft and friable. Fossils: *Spirifer Rockymontana*, *Spirigera* like *S. subtileta*, *Cyrtoceras*, &c. 50 feet.
2. Loose layers of very hard yellow arenaceous limestone with a reddish tinge; then a bed 6 to 8 feet in thickness of very hard blue limestone, passing down into a repetition of loose layers of yellow arenaceous limestone. The whole contains vast quantities of comminuted crinoidal remains with corals and several species of *Brachiopoda*. 40 feet.
3. Variegated calcareous sandstone, gray and reddish quartzose with particles of mica. Some portions are very compact and silicious, others a coarse friable grit, others a conglomerate. Fossils: *Lingula prima*, *Lingula* undetermined, *Obolus* and fragments of Trilobites. 30 to 50 feet.
4. Metamorphic rocks standing in a vertical position for the most part.

The main ridge of upheaval seems to have a bearing about 40° west of north. The principal ridges appear to be nearly parallel, but the smaller upheavals cannot be brought into any system. I think the red granite at this locality contains more mica than usual, and might therefore be called micaceous granite. In other respects it presents much the same characters as that which forms the main body of Laramie peak and Rawhide peak. Here also we noticed a bed of clay or talcose slates, eight to ten feet in thickness, attached to and passing down into the granitic mass. Alongside of the slate, and evidently of more recent origin, is a bed of compact silicious rock, with stratification distinct, and differing very little from the quartzose rocks seen on the Platte.

The Potsdam sandstone presents a great variety of lithological characters. In many localities it assumes the form of a conglomerate of more or less water-worn pebbles, mostly whitish crystalline quartz, but representing every variety of the metamorphic rock beneath. The pebbles vary in size from an eighth of an inch to four inches in diameter, but the greater part are from one half of an inch to two inches in diameter, cemented together with quartzose sand. Some of the pebbles are scarcely worn, others are perfectly smooth. At the locality where the last section was taken, the sandstone is of a gray color, tinged with red at the base; but, passing up, it becomes more ferruginous until its color is a dark red, and its texture a coarse-grained friable sandstone, with many quartzose and micaceous particles and some calcareous matter. Seams two to four inches in thickness are very nearly composed of comminuted fragments of shells, comparatively few being sufficiently perfect to be identified.

The metamorphic rocks were not altogether vertical to-day, but dipping at an angle of 70° to the southeast. We travelled about nine miles through the metamorphic rock, Potsdam sandstone and Carboniferous limestone. A section taken on the southeastern

base of the Black hills represents some local changes that occur in the Carboniferous. Dip of strata 20° south of east.

Carboniferous System.

1. Deep yellow limestone with fossils. 60 feet.
2. Yellow argillaceous shale. 18 inches.
3. Compact yellowish cherty rock. 4 feet.
4. Light yellow argillaceous shale. 6 to 12 feet.
5. Very compact limestone with cherty nodules. 8 feet.
6. Alternate seams of yellow and drab arenaceous shale, tinged with red. 4 feet.
7. Reddish calcareous sandstone. 12 inches.
8. Very tough argillaceous limestone passing down into soft friable sandstone or Potsdam sandstone. 2 feet.

At another locality near the point where the last section was taken an upheaval shows the following beds:

1. Alternate layers of yellow and dark brown arenaceous shale and sandstone with fossil wood. 50 to 60 feet.
2. Whitish rather fine-grained sandstone. 15 feet.
3. Reddish gritty marl passing down into a yellow shaly arenaceous marl. 50 feet.
4. Yellow and yellowish gray sand and sandstone. 30 feet.
5. Red grit with layers of concretionary sandstone. 30 feet.
6. Layers of yellow arenaceous material, alternating with sandstone and shale. 40 feet.
7. Red grit with layers of reddish sandstone, but comparatively little gypsum. 50 to 80 feet.

Bed 1 belongs to Lower Cretaceous formation No. 1 of our general section; the others are undoubtedly Jurassic strata.

Leaving our camp near the central ridge of upheaval of the Black hills, and taking a southeasterly course toward the Shyenne river, we pass over; first, metamorphic rocks; second, Potsdam sandstone; third, a belt of Carboniferous rocks, about three miles in width; fourth, a belt of Jurassic strata, about eight miles in width; fifth, a complete series of the cretaceous formations ten to fifteen miles in width; and in the distance beyond the Shyenne the white clays and marls of the White river Tertiary basin could be seen.

Passed over metamorphic rocks and Potsdam sandstone for the most part. The latter assumes an unusual conglomerate character, and the exceedingly comminuted condition of the organic remains, together with the irregularity of the laminæ, indicates that this rock was deposited in shallow and turbulent water.

Our route to-day led us over Jurassic beds chiefly. At one locality a yellowish blue arenaceous shale, below bed B of vertical section, contained layers of rock six to eighteen inches in thickness, composed of an aggregation of shells of the genera *Ostrea*, *Belemnites*, *Avicula*, and many undetermined species, the whole very much broken up. The entire thickness of this bed is eighty or ninety feet, with the greatest abundance of organic remains distributed through it.

Ascended Bear peak, which is a solitary upheaval in the plain near the north fork of the Shyenne, and seems to be cut off from the main portion of the Black hills by a valley about six miles in width. The strata which underlie the surface of this valley are more or less disturbed. Bear peak is composed entirely of trap rocks, no granite being seen, and is evidently a protrusion or outburst of igneous rocks. Much of the rock is very porous trachyte; portions of it are more compact, breaking into irregular fragments, producing a peculiar ringing under the blows of a hammer like clinkstone. This rock also has a gritty structure, sometimes a dark gray or bluish gray color. Immense quantities of broken rocks cover the sides of the peak to the depth of twenty or thirty feet; the strata are vertical, or nearly so, and the ridges of upheaved Cretaceous and Jurassic beds which surround the peak in nearly a circular form, gives to the whole a crateriform appearance. The lowest unchanged rock exposed by this upheaval is the blue limestone bed *E* of the vertical section, then, alternate beds of red and yellowish gray argillaceous grits, shales, and sandstones are revealed, containing great quantities of Jurassic fossils. From the summit of the peak at a distance of twenty or thirty miles towards the north, the Deer's Ears and Slave butte are visible, and though the country in the vicinity is underlaid by Cretaceous formation No. 4, these hills are, I am confident from their appearance, composed of the sands and clays of the Lignite Tertiary, monuments left to indicate that the Tertiary beds once covered the surface of the country in that region. From the valley on the south side of Bear peak we ascend to the Black hills by a series of step-like ridges, composed of a full series of the Cretaceous, Jurassic, Carboniferous, Silurian, and metamorphic strata, with here and there protrusions or outbursts of igneous rocks. In one locality basaltic columns similar to those forming Stone peak were observed, some lying in nearly a horizontal position, others dipping at an angle of 20° to 40°. These columns are five-sided, the sides varying from eight to twenty inches in width. The rock is quite hard and compact in its structure, not differing from that which enters into the formation of Stone peak.

Near Beaver Creek, formation No. 2 is very largely developed, presenting its usual lithological characters, and containing great quantities of fragmentary fish remains, but no other fossils. No. 1 in this vicinity is composed of variegated clays, grits, and sandstones, with indistinct vegetable impressions, fossil wood, and a few uncharacteristic saurian bones. No. 3 is also exposed by the upheaval of the beds, containing its usual fossils, but possessing the character of a laminated calcareous sandstone, instead of the soft homogeneous calcareous marl of the Missouri river.

CHAPTER VI.

FROM BEAR PEAK TO FORT RANDALL ON THE MISSOURI RIVER.

October 3d. Travelled eighteen miles in a southeasterly direction over Cretaceous beds Nos. 2 and 3. All the upland prairie surrounding the base of the Black hills is covered with a heavy deposit of drift.

October 4th. Our route to-day led us over Cretaceous bed No. 4. Camped at night on the Shyenne river opposite the mouth of Sage creek. Found vast quantities of finely preserved fossils, *Ammonites*, *Baculites*, *Scaphites*, *Ostrea*, and many undescribed species. In the distance eastward the naked columns of the Bad Lands are seen quite conspicuously.

October 5th. Ascending the valley of Sage creek we pass over a blending of Cretaceous beds Nos. 4 and 5 for the first five miles, which contain an abundance of fossils similar to those found on the Shyenne yesterday. We then meet with the lowest bed of the great Tertiary basin of White river, resting conformably upon the Cretaceous strata. We have first the dark clays of No. 4, then the yellowish brown arenaceous shale of No. 5, with numerous ferruginous concretions; then, the Titanotherium bed, which sets regularly upon No. 5, and reaches its greatest development in the valleys of Sage and Bear creeks. It is there composed first of a band of argillaceous grit, weathering to a pink color, two feet in thickness, passing up into an ash-colored plastic clay, with a greenish tinge, full of chalcedony and calcareous concretions; third, a light-gray calcareous grit, upon which rests the turtle bed, the whole thickness being from 80 to 100 feet. A considerable deposit of water-worn boulders and fine sand is distributed over the surface of the Bad Lands to a greater or less extent.

October 6th. Passing up the valley of the Shyenne, we see only the Cretaceous beds Nos. 4 and 5, with many fossils, until we are beyond the mouth of Bear creek, when the Tertiary makes its appearance, crossing the Shyenne and stretching off toward the base of the Black hills in long ridges or isolated buttes. The drift material resting upon the Cretaceous rocks along the river sometimes attains a thickness of ten or fifteen feet.

October 7th. The bed of Tertiary on the left side of the Shyenne river is about thirty miles in width. A section about fifteen miles above the mouth of Bear creek, on the left side of the Shyenne, presents the following strata:

Titanotherium Bed.
1. Light gray indurated clay. 6 feet.
2. Seam of gray sandstone. 18 inches.
3. Ash-colored plastic clay with a greenish tinge, and a pinkish band of fine grit at the base. 30 feet.

The Titanotherium bed varies much in its lithological characters in different localities. The layer of gray sandstone is sometimes two to four feet in thickness, composed of an aggregate of water-worn pebbles with granular quartz and small particles of mica, forming somewhat conspicuous ledges. On the western side of the Shyenne the Titanotherium bed presents the following characters, proceeding upward from No. 5: First, alternate seams of small pebbles and sand, two to six inches in thickness, passing up into a fine ferruginous grit containing small plates of mica, weathering to a light gray color; then a band of pinkish gritty clay six inches in thickness, passing up into an ash-colored clay, which has also alternate arenaceous layers. The pinkish band is quite persistent, and being exposed wherever the T. bed is worn through, marks with a great deal of precision the base of the Tertiary. The surface in many places is covered with well-waterworn pebbles varying in size from a granule of quartz to a rounded boulder eighteen inches in diameter, though the pebbles are mostly small, representing all the varieties of metamorphic rocks with fragments of silicified wood, rounded masses of limestone and flint, and indistinct organic remains, so that the surface of No. 5, when the T. bed is eroded away, is paved with these stones. Sometimes the pebbly bed is twenty feet in thickness. The turtle bed above does not seem to be so marked in its character here as at Bear creek. It weathers to a light yellow color and passes almost insensibly into the bed above. I have indicated the line of separation at this locality between the turtle bed and the overlying stratum by a layer of very porous argillaceous sandstone of a dull brown or drab color. The turtle bed contains much more sand at this point than at Bear creek, and the upper portion consists of alternate layers of calcareous concretions and indurated argillaceous grit, with one band eight feet in thickness of ash-colored clay. Disseminated all through the bed in every direction are thin seams of silex in the form of chalcedony. A few organic remains were obtained, mostly of *Oreodon* and *Rhinoceros*.

On the right or east side of the Shyenne as we proceed toward White river, the Cretaceous bed No. 5 presents some peculiarities which are worthy of notice. We have, first, No. 4, black clay, laminated, gradually passing up into a dark brown clay; then a deep ferruginous color; then a dull purplish hue, with red iron rust seams, half an inch to an inch in thickness, passing up into a deep yellow arenaceous clay; lastly, a brown clay, underlying the Titanotherium bed. I have been thus minute in describing these beds from the fact that, although a long period must have elapsed after the close of the Cretaceous, and prior to the deposition of the Tertiary, the transition to the Tertiary epoch from the Cretaceous does not seem to be marked by any conspicuous physical break, but by a gradual change of sediments. We know, however, from observations at other localities that the Cretaceous surface was more or less subjected to erosion prior to the deposition of the Tertiary beds of this region.

At another locality the Titanotherium bed at the base consists of clay with a pinkish tinge filled with angular grains of quartz and water-worn pebbles, two feet; then a loose, incoherent gravel with pebbles three to four inches; then six to eight feet of light gray clay filled with pebbles and angular grains of quartz, sometimes forming a quartzose sandstone, passing up into a dark ash-colored clay with a greenish tinge.

October 8th. Between the Shyenne and White rivers, running through the turtle bed, is a seam of fine blue grit, vertical to the rest of the strata. A large number of these curious seams occur at different localities, which, doubtless, are caused by fissures in the strata being filled with a fine sediment by infiltration. A section of the different beds in descending order at this locality would be—

Bed.
1. Flesh-colored marl. 10 feet.
2. Bluish laminated clay with a yellowish tinge. 2 feet.
3. Flesh-colored indurated marl. 15 feet.

Bed.
4. Light gray, indurated argillaceous grit, forming a conglomerate of nodules of clay. 4 to 6 feet.

Oreodon Bed.
5. Flesh-colored indurated grit. 20 feet.
6. Bluish argillaceous grit. 10 inches.
7. Flesh-colored marl. 4 feet.
8. Argillaceous grit. 6 to 12 inches.
9. Flesh-colored marl. 30 feet.

Titanotherium Bed.
10. A fine light gray calcareous grit passing down into an ash-colored clay, with micaceous and silicious sandstone at base tinged with a purplish hue. 80 to 100 feet.

11. Cretaceous beds Nos. 5 and 4.

In the valley of White river the Cretaceous beds Nos. 5 and 4 are exposed by the erosion and removal of the overlying Tertiary strata. No. 5 contains numerous fossils in similar tough argillaceous concretions to those observed on the west side of the Shyenne. All the calcareous matter has been dissolved away from the fossils, leaving only casts. The upper portion presents a variety of lithological characters and is destitute of fossils.

Section of Tertiary beds on White river near camp. October 9th:

1. A calcareous grit, the lower portion seeming to contain more sand and less calcareous matter than the upper. At this point it has a thickness of about 40 feet, with 40 to 50 feet of Post Pliocene marly grit capping it, containing numerous freshwater shells identical with living species, like the Loess or Bluff marl near Council Bluffs. A few fragments of turtles and bones and teeth of *Oreodon* were found in this bed. Bed C, Upper Miocene.
2. Variegated bed, consisting of alternate layers of dark brown clay and light gray calcareous grits, of which I counted twenty-one at this locality, varying in thickness from one inch to two feet. 20 feet.
3. Deep flesh-colored marl, contains many concretionary layers of light gray sandstone, which gives the bed a banded appearance when weathered. The abundance of organic remains commences in this bed and ceases at the first dark band at the base of bed 6 above. This bed becomes much more arenaceous towards the base. The lower half contains five layers of concretionary sandstone from four inches to two feet in thickness. 48 feet.

The above section was taken some distance from the river, and the slope prevented me from continuing the section through the Titanotherium bed to the Cretaceous strata which are exposed in the channel of the river.

October 10th. Leaving the valley of White river we proceeded in nearly a southeast course, ascending gradually to the dividing ridge between White and Niobrara rivers, where we find the largest development of bed D, which exhibits its usual lithological characters, but contains very few fossils. This bed has been eroded so that the surface of the country occupied by it is covered with conical hills, which are often capped with a considerable thickness of loose material, sand or marl. A similar configuration of the surface forms the basis of the sandhills, and the wind accumulates the loose sand around the summits of the hills.

October 11th. Leaving Wounded Knee creek we begin to meet with indications of the Pliocene beds, which are so well developed on Loup Fork, Platte, and Niobrara rivers. A conical hill, left after the erosion of the surface around, reveals 42 feet of light gray and greenish gray fine calcareous grit, containing numerous fragments of shells and turtles, bones and teeth of *Hipparion*, &c. As we approach the Niobrara we find that not only the valley of the river but the whole country is covered with the Pliocene formation; and when the different strata are eroded, either in the channel of the streams or on the hills, bones and teeth of extinct mammalia and turtles are found. A section of the Pliocene beds from a vertical cut in the channel of one of the tributaries of the Niobrara presented the following series of strata:

1. Dark gray or brown, loose, incoherent sand, contains remains of *Mastodon* and *Elephant*.
2. A bed of sand gravel with pebbles.
3. A yellowish white calcareous grit with many concretions.
4. Gray grit with a greenish tinge. In this stratum most of the fossils are found.
5. Deep yellowish red arenaceous marl.
6. Yellowish gray calcareous grit with many concretions in layers two to six inches in thickness. Aggregate thickness 60 to 100 feet.

October 14th. Descended the Niobrara twenty-five miles. Sandhills cover the surface of the country a little distance from the river, and high vertical bluffs of Pliocene strata are revealed along the river. The banks of the river as well as those of its tributaries are very steep and high, and close together, forming deep cañons. Where the river has cut through the Pliocene bed numerous fossils were obtained. Upper Miocene bed D of the vertical section is not unfrequently revealed in the channel of the Niobrara, presenting a very irregular outline, showing most conclusively the great erosion that must have taken place prior to the deposition of the Pliocene beds. The irregularity in the surface of the Miocene bed D will be more clearly understood by the illustrated section.

About thirty miles above the mouth of Turtle river, the Cretaceous bed No. 4 is revealed in the channel of the Niobrara, and at the mouth of Turtle river it covers the country with the exception of here and there an isolated hill composed of Pliocene beds. Turtle hill, Medicine and Bijoux hills on the Missouri are outliers of this great recent formation. About forty miles above the mouth of the Niobrara, No. 3 Cretaceous rises above the water-level, and on the Missouri becomes 60 to 80 feet in thickness. The country along the Niobrara is for the most part exceedingly sterile. The surface is principally covered with the movable sandhills, which render travelling very difficult, and very little timber is seen except a few stunted pines along the banks of the little streams. The valley of the Niobrara from its mouth for a distance of 30 or 40 miles, has a tolerably fertile soil with some excellent timber; but above that point to its source near Fort Laramie, the country, though not destitute of vegetation, cannot, it seems to me, be considered otherwise than an uninhabitable desert, fit only for the wild animals of the prairie and the still wilder Indian.

PART II.

The rocks of Nebraska and Kansas, so far as they are known at the present time, are referrible to the following geological epochs:

I. Granite, Stratified Azoic, and Eruptive Rocks.
II. Lower Silurian (Potsdam Sandstone).
III. Carboniferous.
IV. Permian.
V. Jurassic.
VI. Cretaceous.
VII. Tertiary.
VIII. Post Pliocene or Quaternary.

CHAPTER VII.

I. Granite, Stratified, Azoic, and Eruptive Rocks.

In ascending the Missouri river, we meet with no indications of those disturbing influences which have wrought such changes in the physical features of the country in the

vicinity of the mountain chains, until we reach a point near the mouth of Little Rocky Mountain creek, not far above longitude 108°. We then find that the more recent fossiliferous rocks are thrown up and tilted at every angle, and not far distant on either hand we can see the more immediate causes of this disturbance. On our left, about fifteen miles from the Missouri, the Square buttes rise up out of the midst of the prairie like gigantic castles, composed of basaltic and other trappean rocks. These buttes are from 500 to 700 feet in height and cover an area of about three miles in circumference, apparently isolated from the other upheavals in the vicinity. About sixty miles to the west may be seen the Judith mountains, a much larger and loftier range, which seem to be of a geological structure similar to that of the Black hills and Laramie mountains. Far in the dim distance, just on the verge of the horizon, and white as if covered with perpetual snow, are the Girdle and Snowy mountains, quite formidable outliers of the great Rocky Mountain range. On our right, about thirty miles from the Missouri river, we observe the Bear's Paw and Little Rocky mountains, small isolated ranges, from thirty to fifty miles in circumference, the highest peaks of which are from 1500 to 2000 feet above the surrounding prairie. All these isolated upheavals or outliers seem to represent the dying out of that intense subterranean power which elevated the vast central chain.

If we return and ascend the Shyenne river, the first indication of upheaval which comes to our notice is Bear's peak, near longitude 103½°, rising cone-like to the height of 1500 feet above the surrounding country. This peak is also composed of trachytic and basaltic rocks, and seems to have exposed around its base the fossiliferous beds no lower down than the Jurassic or the upper portion of the Permian. We can thus form some idea of the vast area in the northwest, occupied by rocks with strata holding a nearly horizontal position.

If we pass up the valley of the Platte river from its mouth, near lat. 41°, long. 96°, we find the strata undisturbed until we reach Fort Laramie in lat. 42¼°, long. 104½°. About five miles north of the Fort we see the eastern end of a series of ridges formed of numerous conical peaks from 100 to 700 feet in height, the central nucleus composed of a coarse flesh-colored feldspathic granite, surrounded by a series of beds of stratified azoic rocks tilted at all angles. The lowest ridges or more gentle upheavals are usually capped with beds of Carboniferous limestone, which incline at various angles from 5° to 30°. The Tertiary formations in this region belong to the later Miocene period, and, as far as I could ascertain, have not been disturbed in this immediate portion of the country. West of Fort Laramie, on the south side of the Platte, sixty miles distant, we can see Laramie peak, the highest elevation in this region.

This immense mass of rock, which is about 7000 feet in height above the surrounding country, is composed principally of granite, while around its base and sides, as if thrown

off from the granitic nucleus by the upheaval, is a series of azoic stratified rocks, with here and there dikes of trap or basalt. These stratified beds consist of gneiss, hornblende,

Fig. 9.

micaceous and talcose slates, syenite and white quartz, with other varieties of igneous rocks. North of Laramie peak, the Platte river cuts through a large thickness of strata, the lower portion of which is composed of metamorphic rocks, the middle a quartzose limestone resting unconformably upon the rocks below, and the upper 200 feet or more formed of beds of limestone charged with Carboniferous fossils; but along the eastern and southeastern base of the Laramie range the recent Tertiary beds and drift jut up against the foot of the mountains, concealing all the fossiliferous rocks. On the south side of the Platte I observed the Carboniferous beds in but two localities, Warm spring and Cottonwood creek, where they are exposed at each locality over an area of not more than five or six hundred yards square. Proceeding northward from Fort Laramie we meet with frequent elevations revealing a nucleus of igneous rocks, while on the sides and summits are beds of Carboniferous limestone. The highest peak in this direction, forming the eastern limit of the Laramie group, is Rawhide peak, which is 800 feet high, and has a similar geological and mineralogical structure to Laramie peak and Black hills. No Carboniferous rocks were seen immediately in contact with Rawhide peak. Continuing our course toward the Black hills the indication of the internal forces which elevated the Laramie range seem to die out, only comparatively feeble traces remaining to show that the uplift of the two mountain groups were connected and synchronous. After leaving the Niobrara no rocks older than the Cretaceous formation No. 1 are seen until we reach the Black hills,

a group of elevations with a granite nucleus also and surrounded by a series of azoic strata occasionally penetrated by dikes or outbursts of trappean rocks.

"The Black hills, or more properly mountains, lying between the forks of the Shyenne on the 44th parallel, between the 103d and 105th meridians, cover an area of 6000 square miles. Their bases are elevated from 2500 feet to 3500 feet, and the highest peaks are about 6700 feet above the ocean level."* Juya-Kara peak is formed of vertical columns of basalt surrounded with trachytic rocks, which seem to have been thrown off from the summit when the columnar mass was protruded. Near Bear peak on the northeastern side of the Black hills is another example of the protrusion of these basaltic columns, which are five-sided, the sides varying from eight to twenty inches in width. At this locality some of the columns lie in nearly a horizontal position, the greater portion, however, inclining at an angle of 20° to 40°.

From our examinations we thus find that the important outliers on the eastern slope of the Rocky mountains are formed of a granite nucleus surrounded by a series of azoic strata, composed of argillaceous and talcose slates, gneiss, syenite, quartzose, and calcareous rocks. From these facts and from published reports of numerous explorers we think we are warranted in the conclusion that the great central Rocky mountain range possesses a similar geological and mineralogical character. The investigations of Sir John Richardson and Mr. Isbister indicate a striking similarity in the rocks all along the eastern slope from the Saskachewan to the Arctic sea, and the results of the other explorers show a like resemblance far south to Mexico.

The azoic strata which I have described as resting upon granite on the eastern slope of the Rocky mountains appear to be similar in lithological characters and to hold the same geological position as the azoic rocks so largely developed around Lake Superior and in Canada.

CHAPTER VIII.

II. Potsdam Sandstone (Lower Silurian).

The evidence of the existence of this formation in the vicinity of the Rocky mountains was ascertained for the first time in the summer of 1857, during Lieut. Warren's exploration of the Black hills, and first published in a paper read before the Academy of Natu-

* Preliminary Report of Explorations in Nebraska and Dacota, in the years 1855, '6, and '7. By Lieutenant Warren, Topographical Engineer. Page 67.

ral Sciences, in March, 1858. Its largest development and only fossiliferous condition is found in the Black hills, where, by upheaval, it is exposed in the form of a narrow belt or zone engirdling the azoic and granitic rocks, which form the central nucleus of the elevation. I observed no positive indications of this formation in the Laramie mountains or at Rawhide peak, but in most places the Carboniferous strata rested unconformably upon the metamorphic rocks, except in a few localities where a quartzose limestone which is of doubtful age is interposed. From lithological characters and position, I infer that a series of beds resting upon metamorphic rocks at the head of Niobrara river, are of the age of the Potsdam sandstone. Proceeding northward from Fort Laramie, we do not meet again with this formation until we reach the southeastern side of the axis of elevation, when we find it resting unconformably upon gneiss, hornblende, argillaceous and talcose slates, &c., and composed of a variegated gray and reddish-gray quartzose sandstone, filled with small plates of mica. Some parts of it are very compact and silicious, others a coarse friable grit containing seams almost wholly composed of broken fragments of shells cemented with a fine calcareous grit. The more compact masses contain fossils which are quite well preserved, among which can be recognized species of *Lingula*, *Obolus*, and *Trilobites*, similar to or identical with those found in the Potsdam sandstone in other well-known localities. The existence of this formation in some of the important outliers of the Rocky mountains being established beyond a doubt its geographical distribution in the far West then becomes a question of the highest interest. We are now prepared to believe that it is exposed by upheaval all along the eastern slope of the mountains to a greater or less extent, and probably coextensive with the Carboniferous, Permian, Jurassic, and Cretaceous rocks. I will here cite some examples from published reports of beds of sandstone which correspond both in their lithological characters and position to the Potsdam sandstone of the Black hills. Hall, in Stansbury's Report, says that Stansbury's island (Great Salt lake) is three thousand feet high, capped with Carboniferous limestone, which also rests upon a coarse sandstone and conglomerate. Again, north of Great Salt Lake city the limestone overlies a coarse sandstone and conglomerate, which almost invariably accompanies it. In several localities, as at Promontory point and near Mud island, the metamorphic strata appear to be overlaid by a coarse conglomerate or coarse sandstone, which is partially altered and assumes the character of a quartz rock. Marcou, in the third volume of Pacific Railroad Reports, page 156, speaks of a sandstone occurring in the Aztec mountains. He says: "We travelled seven miles upon the granite, and on our right we found a cliff twelve hundred feet in height. From the base to the middle we found the granite, then a band of red sandstone (Devonian or Old Red). Above this the beds of limestone and gray sandstone belonging to the mountain limestone. The following day we travelled three miles on the granite, the remainder on the Old Red sandstone.

The diagram showing the order of the superposition of the different rocks would apply equally well to the similar beds in the Black hills." Many other less evident indications of its existence along the base of the Rocky mountains might be cited from published reports, but what has been said will be sufficient to show, what we may hereafter expect with regard to its geographical distribution in the far West.

Hitherto no indications of the existence of any other member of the Silurian period has been discovered along the eastern slope of the Rocky mountains within the territory of the United States.

CHAPTER IX.

III. and IV. Carboniferous and Permian Periods.

In a former paper I gave to the Permian rocks of Kansas the position of a distinct system in the Kansas and Nebraska series. Subsequent examinations have rendered it somewhat questionable whether they are entitled to the rank of an independent system as developed in Kansas, but rather should be considered as a continuation upward of the Carboniferous period. For this reason I have concluded to treat both subjects under one head. In the first place I will give a brief history of the discovery of rocks in the West containing fossils belonging to Permian types and supposed to be on a parallel with the Permian beds of Europe. The discoveries of Mr. Hawn in Northeastern Kansas were announced in February, 1858, in a paper read before the Academy of Sciences at St. Louis, in which a number of new species of fossils were described and others considered as identical with forms characterizing the Permian rocks of Europe. March 2d of the same year a paper entitled, "Descriptions of new organic remains from Northeastern Kansas, indicating the existence of Permian rocks in that Territory," was read before the Albany Institute, by F. B. Meek and the writer, in which were described ten new species of fossils, most of which seemed to belong to true Permian types. At a meeting of the Academy of Sciences at St. Louis, March 8th, Dr. Shumard stated that he had been studying a group of fossils from a white limestone in the Guadalupe mountains of New Mexico, and arrived at the conclusion that they are of Permian age. He says that several of the species are identical with Permian forms from England and Russia, also with species obtained from the Permian rocks in Kansas. In a letter to the Academy of Sciences at St. Louis, dated March 31st, Dr. Norwood announced the discovery of Permian fossils in Illinois; and at the meeting of the American Association for the Advancement of Science at Baltimore, in April, Mr. A. H. Worthen, State Geologist of Illinois, read a paper on the Permian rocks

of that State, and exhibited a fine collection of fossils which he considered as belonging to that system. Prof. Hall, in his Iowa Report, thinks there is some evidence of the occurrence of the same series of rocks in Western Iowa, so that we already have indications of the existence of the supposed Permian system in Kansas, Nebraska, New Mexico, Illinois, and Iowa, and future investigations may reveal it in Missouri and other Western States.

During the past summer Mr. F. B. Meek and the writer made a geological exploration of that portion of Kansas bordering upon the Kansas river and its tributaries, for the purpose of attempting to solve the interesting problem of the relations of the Carboniferous rocks to the supposed Permian strata of that Territory. We found that all the eastern portion of that Territory from the Missouri river to longitude 98° was occupied by Carboniferous and Permian rocks, with outliers and overlapping edges of the Cretaceous Red Sandstone No. 1 of our Nebraska section. The results of our labors were embodied in a paper* read before the Academy of Natural Sciences at Philadelphia, January, 1859, from which I extract the following pages:

The route pursued by us while making these investigations, was first from Leavenworth city on the Missouri, across the country to Indianola, near the mouth of Soldier creek, on the Kansas; thence up the north side of Kansas and Smoky Hill rivers, to the mouth of Solomon's fork. Here we crossed the Smoky Hill, and followed it up on the south side to a point near the ninety-eighth degree of west longitude; from which point we struck across the country in a southeast direction to the Santa Fe road, which we followed northeastward to the head of Cottonwood creek. Leaving the road here, we went down the Cottonwood valley some thirty miles, when we turned across the country nearly due northward to Council Grove. From the latter place we followed the Santa Fe road back southwestward about twenty-four miles to a watering-place known as "Lost Spring;" here we again left the road and struck across the country in a northwest direction to Smoky Hill river, at a point nearly opposite the mouth of Solomon's fork. We then travelled down the south side of Smoky Hill and Kansas rivers to Lawrence, where we crossed the Kansas and proceeded in a northeast direction back to Leavenworth city.

The first outcrop of rocks examined by us during the expedition is at a point just below the steamboat landing at Leavenworth city. At this place and for some distance above on the river, the formation is well known to belong to the upper, but not the highest portions, of the great western coal measures.

The section here near the Leavenworth landing, presents the following beds, in descending order:

* Geological Explorations in Kansas Territory. Proc. Acad. Nat. Sci. Pa., January, 1859.

		Feet.
1.	Bluish gray clay, exposing a thickness of about	3
2.	Hard gray layer of *Fusulina* limestone,	1½
3.	Yellow laminated clay,	7
4.	Hard gray argillaceous limestone with *Fusulina*,	1
5.	Gray fine-grained argillaceous sandstone with fucoidal markings, sometimes contains seams of limestone,	1 to 3
6.	Gray, green, and blue, rather indurated clay, with sometimes near the base many compact concretions of limestone,	2
7.	Hard light yellowish gray limestone, usually of bluish tinge far in beyond the effects of weathering. Contains *Spirifer cameratus, S. Kentuckensis, S. lineatus, Spirigera subtilita, Orthisina Missouriensis, Productus splendens? ; P. semireticulatus? ; P. pustulosus* and *Fusulina cylindrica*, together with columns of *Crinoids*, and spines and plates of *Archæocidaris ;* also jaws and teeth of *Xystracanthus arcuatus*,	15
8.	Dark shale, passing up into gray less distinctly laminated clay,	5
9.	Hard dark bluish impure limestone, containing *Fusulina cylindrica, Spirigera subtilita, Productus Rogersi, P. Prattenianus, Arca carbonaria? ;* an undetermined *Monotis, Allorisma? Leavenworthensis, A. subcuneata, Myalina subquadrata, Leptodomus granosus*, and a large *Bellerophon*,	1½–2
10.	Gray, more or less laminated clay, becoming darker near the upper part, rising above the river,	11

Attached to the surfaces of bed No. 9 there is usually from one to two inches of soft dark argillo-calcareous matter containing great numbers of *Orthisina crassa*, with the undetermined species of *Pecten*, *Mytilus*, *Schizodus*, *Pleurotomaria*, &c.

All this section above No. 7 appears to vary considerably, at different places some of the beds being entirely wanting, or presenting quite different lithological characters at other localities not far from here. Owing to the dip of the strata and partly to the fall of the river, the bed of limestone No. 7, which is elevated eighteen feet above the river where this section was taken, rises as much as twenty-five feet above the level of the river at a distance of one mile or less below ; and on following the outcrop of these rocks along the shore above Leavenworth city, they were found to sink gradually beneath the water, so that at Fort Leavenworth landing, two miles above (in a north direction from the exposure first examined), all of beds Nos. 8, 9, and 10, as well as two or three feet of No. 7, were submerged. Should this dip continue at the same rate, without local undulations, the whole of No. 7 must pass beneath the river in less than two miles above the Fort.

Immediately above No. 1 of this section, we saw no exposure of rock in place, but on a small stream about two and a half miles below Leavenworth city, and perhaps one and a half miles back from the river, there is an outcrop of soft fine-grained yellow sandstone, showing a thickness of twenty-four feet, underlaid by a bed of blue clay, of which a thickness of about four feet was exposed. We had no opportunity to determine the elevation of these beds above the river with sufficient accuracy to form a definite conclusion whether or not they hold a position above the section seen near the Leavenworth landing, though we incline to the opinion that they come in above it.

In ascending the hills back of Leavenworth city we observed no outcrops of rock along the slopes until near the summit, where at an (estimated) elevation of about two hundred feet above the highest bed of the section at the river, there is an exposure of hard bluish gray impure limestone, weathering to a yellowish tinge, the beds of which are separated at places by partings of clay. Of this rock we saw a thickness of sixteen feet. It is much used for building purposes, and quarried rather extensively back of Fort Leavenworth. At one of these quarries, amongst the loose material thrown out by the workmen, we found specimens of *Spirifer cameratus*, *S. Kentuckensis*, *S. planoconvexa*, *S. hemiplicata*, *Spirigera subtilita*, *Productus semireticulatus*, *P. Norwoodii*, *Leptodomus Topekaensis*, *Fusulina cylindrica*, *Terebratula millepunctata*, and fragments of *Crinoids*, with *Chætetes* and *Fenestella* of undetermined species.

Above the quarry there is a slope of some forty or more feet to the summit of the hills, apparently occupied by clays; and the quarrymen informed us that there is immediately under the bed of limestone an eight feet bed of clay, beneath which they had made no excavations.

West of this locality the surface of the country soon descends gradually into a depression connected on the north with the valley of a small stream flowing into the Missouri above Fort Leavenworth. In this immediate neighborhood the face of the country is slightly inclined to be hilly, but the soil is rich, and the long gentle slopes are clothed in the spring and summer months with a luxuriant growth of prairie grass. From several points near here we had a fine view of the broad rich valley, with its beautiful groves and scattering farmhouses along the little stream to the north of us.

Beyond this the road, after passing over some undulations, ascends to the summit of the country, which is rich elevated prairie land. At several places near the upper part of the slopes, some five or six miles from Leavenworth, we met with outcrops of light gray limestone, apparently in ten to twelve inch layers, containing *Fusulina*, *Productus semireticulatus*, *Chætetes*, and small *Cyathophylloid* corals. These beds probably belong to the same horizon as the limestone near the top of the bluffs back of Leavenworth, or may even hold a higher position.

At Big Stranger creek, some fourteen or fifteen miles west of Leavenworth city, the following section was observed in descending order:

	Feet.
1. Slope, without any exposure of rocks,	60
2. Layers of limestone, weathering yellowish, containing *Spirifer cameratus* and *Fusulina cylindrica*,	8
3. Slope, probably occupied by shale or clay,	40
4. Grayish yellow limestone, with *Fusulina cylindrica* and *Spirigera subtilita*,	5
5. Bluish gray soft shale, or laminated clay with occasional harder sandy seams,	38
6. Coal immediately overlaid by one inch of *cone-in-cone*,	½
7. Bluish gray laminated clay or soft shale, extending down to the creek,	18

Again, on Little Stranger creek, some twelve miles southwest of Leavenworth city, there is a somewhat similar exposure, containing a twenty inch bed of coal. This bed is worked to some extent on the land of Mr. Charles Stone, where the following section may be seen in the descending order:

	Feet.
1. Light gray, or bluish gray, soft calcareous sandstone, with harder layers containing much argillaceous matter, with *Productus splendens?*, *Myalina subquadrata*, an undetermined *Monotis*, and many fucoidal markings, exposing a thickness of	15
2. Blue laminated clays more or less arenaceous above,	26
3. Coal,	1¾
4. Bluish gray somewhat ferruginous clay rising above the creek,	4

We have no means of determining what relations the rocks composing these two sections bear to the exposure at Leavenworth, but we think they hold a position between the bed of limestone seen near the top of the hills back of Leavenworth city, and the upper bed of the section near the Leavenworth landing.

Between Big Stranger and Grasshopper creeks, the road passes over a beautiful rich prairie, elevated about 350 or 400 feet above the Missouri. In crossing this prairie we met with no exposures of rock, the whole being covered by heavy Quaternary deposits, into which wells have been sunk at several places, from thirty to seventy feet, without striking solid rock *in situ*. At one or two places, however, we saw masses of limestone which had been quarried for building purposes along a little stream two or three miles north of the road. These contained amongst other fossils *Spirifer cameratus*, *Orthisina umbraculum?*, *Fusulina cylindrica*, and fragments of *Fenestella*, with spines and plates of *Archæocidaris*. We had no opportunity to examine the quarry from which this rock was obtained, but were informed that the bed is some sixty or seventy feet below the summit of the higher portions of the surrounding country.

In descending from this elevated prairie into the valley of Grasshopper creek, at Osawkee village, we observed,—

	Feet.
1. A bed of hard gray limestone near the summit of the slopes, containing great numbers of *Fusulina*,	8
2. Slope, no rocks exposed, about	55
3. Outcrop of *Fusulina* limestone, apparently	3
4. Slope, no rocks exposed,	50
5. Gray or bluish gray limestone, weathering yellowish, containing *Pleurotomaria humerosa*, *P. subturbinata*, and a large undetermined species of *Bellerophon;* also *Allorisma? Leavenworthensis*, *Myalina subquadrata*, *Pinna* undt., *Spirifer cameratus*, *S. planoconvexa*, and *Productus æquicostatus*, with great numbers of *Fusulina cylindrica*,	3
6. Dark gray indurated clay,	2
7. Rather soft argillaceous limestone,	4

The fact that several of the fossils seen here in bed No. 4 are the same species found in No. 5 of the section at Leavenworth landing, would seem to indicate that these beds occupy the same geological horizon. It is very difficult, however, to identify the same beds at different localities amongst these formations in consequence of the fact that the fossils found in them usually have a great vertical range, and exactly similar strata are often repeated in various parts of the series. Should it prove to be the case that they do occupy the same geological horizon, it would show that there is here a gentle eastward dip; for the lowest bed of this section on Grasshopper creek cannot be less than 100 feet higher than the base of the section at Leavenworth city.

Still we incline to the opinion that the strata near here, if not almost horizontal or merely undulating, have a general inclination towards the west, or somewhat north of west, and that the exposure on Grasshopper creek is composed of much more modern beds than those near the landing at Leavenworth city. At any rate we saw an exposure at Lawrence landing, on the Kansas, composed of ledges of limestone, overlaid by clay, and having a decided dip to the west or north of west, at a rate of not less than fifty feet to the mile. This limestone consists of an upper hard gray layer, about three feet in thickness, resting on a soft gray arenaceous bed, of which some one or two feet were visible above the surface of the river when examined by us. In these beds we saw *Spirigera subtilita*, *Productus splendens?*, and *Myalina subquadrata*. Above these, about eleven feet of gray laminated clay were exposed, the upper part of the bed having a more yellowish tinge, and containing more arenaceous matter than the lower.

If these beds continue to rise at the same rate towards the east, they must of course run out on the summit of the highest part of the country not far east of Lawrence; and the same inclination to the west or northwest would take them far beneath the horizon of the base of the section seen on Grasshopper creek.

Above this exposure at Lawrence landing, there is a space of about 160 feet in which no outcrops were seen excepting some red and blue clays near the upper part of the hills, back of the town. Just above these clays, some ledges of gray limestone were seen, apparently altogether about eight feet in thickness, containing *Fusulina cylindrica*, *Spirigera subtilita*, and *Spirifer cameratus*.

West of Grasshopper creek, on both sides of the Kansas, the country becomes lower near the river, but at a distance of some ten or twelve miles back, on the north side, it appears to be nearly as elevated as on the east of Grasshopper creek. Between this higher country and the Kansas there is a plateau, apparently elevated not more than sixty feet above the broad level prairie bottoms along the river; while on the south of the Kansas, some five or six miles southwest of Topeka, there are some isolated hills, apparently of the same elevation as the high country north of the Kansas.

At several places soon after crossing Grasshopper creek, we met with some highly-fossiliferous beds along the small streams, at an elevation of apparently about eighty feet above the Kansas. Below we give a section of these beds seen at a locality some eight miles southwest of the point where the exposures mentioned on Grasshopper creek were observed:

	Feet.
1. Rough seams and layers of concretionary limestone of bluish tinge with partings of clay, containing *Terebratula millepunctata, Spirigera subtilita, Spirifer cameratus, S. Kentuckensis, Retzia Mormonii, Rhynchonella Uta, Productus Norwoodii, P. splendens?, P. semireticulatus, P. Prattenianus, Orthisina*, similar to *O. umbraculum*, also *Fenestella*, and *Chætetes*, of undetermined species,	4
2. Black shale, shading upwards gradually into laminated blue clay,	2½
3. Hard blue or gray limestone, with *Spirifer cameratus, Spirigera subtilita, Myalina, Pecten*, &c.,	1
4. Bluish gray soft clay, with seams of hard limestone,	3
5. Light gray, somewhat granular limestone, with a few round grains, and very small pebbles of quartz,	2

At another place on the south side of the Kansas, about twelve miles southwest of the point where the last section was seen, there is an abrupt bluff near the old Baptist Mission, composed of the following beds in the descending order:

	Feet.
1. Slope, no rocks exposed,	20
2. Hard yellowish gray limestone, with fragments of fossils,	4
3. Slope, no rock exposed,	18
4. Light gray, rather hard, fine-grained sandstone,	3
5. Slope,	20
6. Fine-grained sandstone, in thin layers, not well exposed; apparently	2
7. Slope, with occasional outcrops of hard gray limestone,	16
8. Yellowish and dark gray laminated clay, or soft shale, with layers and nodular concretions of argillaceous carbonate of iron, near base,*	90
9. Hard bluish argillaceous limestone, of which there was exposed in the bed of a small stream, not more than 13 or 15 feet above the river, a thickness of	1

After passing this locality, we heard of a coal mine some three or four miles south of here, near the base of an isolated hill, known as Shunganunga mound. We did not visit this mine, but were informed that it is considerably above the summit of the last section, and that the bed is about eighteen inches in thickness. The coal is said to be of good quality.

Above here, on both sides of the Kansas, the country continues to be rather low, no part of it being, apparently, more than two hundred feet above the river. For a long distance above this there is a beautiful broad level bottom prairie, on the north side of the

* There may be some thin beds of limestone in this portion of the section, as every part of this ninety foot bed was not well exposed.

Kansas, extending back from four to six miles, and as much as eighteen or twenty miles along the river. Bounding this on the north the country rises by a gentle grassy slope to an elevation of from sixty to about one hundred feet, furnishing the most beautiful sites for dwelling-houses.

For a considerable distance above the locality where the exposure near the old Baptist Mission was examined, the hills, especially near the river on the south side, appear to be mainly composed of rather heavy deposits of laminated clays and shales, with soft sandstones and occasional thin beds of limestone, containing the usual fossils of the Upper Carboniferous series. At the crossing of Mission creek, at an elevation of perhaps not more than twenty-five or thirty feet above the Kansas, exposures were observed consisting first above of five feet of light gray laminated clay, resting upon two or three feet of soft yellow sandstone, which passes down into laminated arenaceous clays, of which some eight or ten feet were exposed above the creek.

Some fifteen or sixteen miles west of the point where the road crosses Mission creek, at a locality six or seven miles south of the Kansas, there is a high elevation, known by the name of Buffalo mound, rising as much as four hundred and fifty or sixty feet above the river. At one place a large creek, called on the maps Upper Mill creek, sweeps close along the northern base of this elevation, and has carried away the loose debris so as to leave the lower strata well exposed The section here beginning at the summit of this hill is,—

	Feet.
1. A slope of about 160 feet, along the lower forty feet of which we found loose specimens of *Spirifer cameratus, S. planoconvexa, Retzia Mormonii, Productus splendens?, Chenetes Verneuiliana, C. mucronata*, and *Fusulina cylindrica*, var. *ventricosa*, with fragments of *Chætetes, Crinoids*, &c., of undetermined species,	
2. Bluish gray limestone in two layers, the upper of which contains columns of *Crinoids, Productus Calhounianus*, &c., while *Myalina subquadrata, Orthisina Missouriensis, Allorisma, Pinna, Monotis*, &c., of undetermined species, occur in the lower,	3
3. Slope, with no exposures of rock,	96
4. Rather hard mottled brown and light gray compact limestone, with a few *Crinoid* columns; may be thicker, but only showing a thickness of	3
5. Brown, whitish, and green clays, with rugged white calcareous concretions,	4
6. Fine argillaceous sandstone, with streaks of yellow and brown colors,	1½
7. Ash-colored clay,	10
8. Clays of red or brownish colors above; blue and green below,	3½
9. Deep brown clay, with rugged concretions of same color,	3
10. Hard light bluish limestone, with some rather large columns of *Crinoids, Chonetes, Verneuiliana*, &c.,	2½
11. Brown, ash-colored, and blue laminated clays, which are more or less arenaceous, with near the middle some 5 or 6 inches black shale,	46
12. Gray and purple argillaceous limestone, with *Pinna, Productus*, and a few *Fusulina*,	1¼
13. Green laminated clay,	4

	Feet.
14. Two or three layers of soft fine-grained sandstone, more or less argillaceous, and separated by seams of clay,	2
15. Bluish and ash-colored clays,	21
16. Alternate layers of hard bluish gray limestone, and seams of clay with sandy concretions,	3
17. Rather hard yellowish limestone, with *Fusulina*,	2½
18. Ash-colored clay, not very well exposed,	15
19. Yellowish impure limestone, with *Fusulina*,	2
20. Ash-colored laminated clays—above the creek,	5

About three hundred yards below where this section was taken, the creek was observed to fall nearly a foot, over a ledge of hard limestone; and one mile further down, the bed of the creek is composed of a hard yellow limestone, containing great numbers of *Fusulina*. At these localities Mill creek is probably not elevated more than thirty feet above the Kansas.

Near half a mile east or southeast of the point where the *Fusulina* limestone was seen in the bed of Mill creek, and at a somewhat higher elevation, we saw apparently the same bed of *Fusulina* limestone, showing a thickness of three feet. Under this there was at one place exposed a thickness of some four or five feet of very fine yellow sandstone with minute specks of mica. These exposures indicate a moderate dip of the strata towards the west or northwest.

On the north side of the Kansas, in a direction a little west of north, and about sixteen miles from the last-mentioned localities, we observed an outcrop, on a small stream marked "Last creek" on the maps, presenting the following section, descending:

	Feet.
1. Seams of yellow magnesian limestone, alternating with clay, showing a thickness of about,	8
2. Yellow soft granular magnesian limestone, containing *Productus Norwoodi*, and an undetermined species of *Myalina*,	4
3. Fine laminated black shale,	1
4. Gray rather soft argillaceous limestone,	1
5. Blue somewhat indurated very fine calcareous clay, containing at its junction with the next bed below *Chonetes, Synocladia biserialis, Chætetes*, and fragments of *Crinoids*,	9
6. Seams of hard compact gray limestone, alternating with softer argillo-calcareous matter, and containing casts of many small *Cypricardia*-like shells, small *Murchisonia, Pleurotomaria, Macrocheilus, Naticopsis, Bellerophon*, &c.,	2
7. Bluish laminated clays weathering to drab color,	4
8. Yellow rather soft granular magnesian limestone, with embedded fragments of harder more compact do.,	5½
9. Bluish indurated calcareous clays,	3

The base of this section is evidently not elevated much above the Kansas, as it extends down to the bottom of a deep ravine formed by the creek, while its top appeared to be

nearly on a level with the surface of the bottom prairie in the Kansas valley. These beds dip a little to the northwest, and are very similar, especially the magnesian limestones, to some of the Permian strata holding a position far above this in the series, some considerable distance west of here. Only about three miles further west we saw the following exposure on Vermilion creek:

	Feet.
1. Slope of about fifteen feet, with near the base some ledges of gray limestone, amongst loose fragments of which we picked up specimens of *Spirigera subtilita*, *Spirifer hemiplicata*, *Productus Norwoodii*, and *P. splendens?*	15
2. Slope, no rock seen,	26
3. Soft bluish and gray more or less laminated clays, with irregular sandy seams and concretions,	12
4. Irregular hard blue calcareous seam one to six inches,	½
5. Blue clay,	2
6. Soft decomposing more or less laminated sandstone,	4
7. Blue clay one foot above the creek,	1

Almost directly opposite these localities, on the south side of the Kansas, some three or four miles back from the river, and nearly on a line between the locality where we saw the exposures on "Last creek" and Buffalo mound, but considerably below the level of the summit of the latter, we examined some exposures presenting beneath a slope of about eighty feet, in descending order:

	Feet.
1. Hard bluish gray limestone, of which there was exposed	1
2. Rough yellowish magnesian limestone with cavities lined with chalcedony,	3
3. Bluish and ash-colored clays,	5
4. Layer much like No. 2,	1
5. Yellowish green clay,	20
6. Bluish gray limestone in two layers, the upper of which contains columns of *Crinoids*, *Productus Calhounianus*, &c., while *Myalina subquadrata*, *Orthisina Missouriensis*, *Allorisma*, *Pinna*, *Monotis*, &c., occur in the lower,	3
7. Bluish and ash-colored clays, exposing a thickness of	5

The bed No. 6 of this section is evidently the same as No. 2 of the section at Buffalo mound (page 12), though here the dip of the strata has brought it lower. Its elevation above the Kansas at Buffalo mound must be about two hundred and fifty feet. We had no means of estimating very accurately its elevation where the last section was taken, though we do not think it as much as one hundred and seventy-five feet above the Kansas.

Ten miles farther west, on the same side of the river, along a small stream marked "Deep creek" on the maps, at a point some four or five miles back from the Kansas, and elevated perhaps as much as forty feet above it, some outcrops were examined near Zeandale, presenting the following section, descending:

	Feet.
1. Long slope of about one hundred feet, no rocks seen,	100
2. Dark argillaceous limestone, stained with iron, and containing fragments of *Crinoids*,	4
3. Soft decomposing argillaceous limestone,	2
4. Very hard light yellow compact limestone in one massive bed, containing great numbers of *Fusulina*, also *Productus Calhounianus*, &c.,	6
5. Ash-colored laminated clay,	22
6. Hard decomposing argillaceous limestone with *Fusulina*,	3
7. Blue, green, and ash-colored clay,	18
8. Gray argillaceous limestone, with more or less ferruginous matter,	3
9. Light bluish clay somewhat laminated,	7
10. White decomposing argillaceous limestone with *Productus Calhounianus*,	1

We heard of a bed of coal some four or five miles above this on the same creek, but were unsuccessful in an attempt to find the locality where it crops out. We were informed, however, by Mr. Pillsbury, an intelligent gentleman living at Zeandale, that the bed is from four to six inches in thickness, and overlaid by about three and a half feet of blue shale, strongly impregnated with alum. Above the latter he said there is an eight or ten inch layer of dark argillaceous material, weathering to an iron rust color, and containing many nodular concretions,—perhaps of carbonate of iron. From the information obtained in regard to the location and elevation of this coal bed, we are inclined to believe it must hold a position a little below the horizon of the middle of the slope at the top of the foregoing section. It is probably the highest bed of coal in the whole series of this region,—at any rate we saw no indications of coal above it.

About a mile or a mile and a half north of the locality where this coal bed has been seen, the dividing ridge between the Kansas and Deep creek, rises to an elevation of near three hundred and twenty feet above the latter stream at the nearest point. Here at the summit of this ridge there are some thin outcrops of gray and whitish argillaceous limestone, showing on weathered surfaces a somewhat laminated structure, and containing at places large spines of a species of *Archæocidaris;* beneath this there is about two feet of gray fragmentary limestone reposing on a more compact bed of hard gray limestone near three feet in thickness, and often cellular in the middle. Along the slope, about one hundred and twenty feet below the horizon of these beds, we found loose specimens of *Spirifer cameratus*, *Orthisina umbraculum?*, *Rhynchonella Uta*, *Allorisma*, *Synocladia biserialis*, &c. Just below these, there were many loose slabs of light yellowish fine-grained calcareous sandstone, containing *Productus*, *Pecten*, and *Fucoidal* markings. About forty-seven feet lower down the slope, and near one hundred and fifteen feet above the level of the Kansas, there is an exposure of light grayish yellow granular limestone, showing a thickness of three feet, in which we only saw fragments of a *Chonetes*, and

Crinoid columns: large tabular masses of this rock were strewed along the slope for some distance below.

At the mouth of the Big Blue river, on the south side of the Kansas, there is an abrupt bluff, along which several slides have exposed many of the beds composing the high ridge mentioned six or seven miles below here. The dip, however, of the strata towards the west or northwest is so great that the limestone containing spines of *Archæocidaris*, seen on the summit of the ridge below this, at an elevation of about 320 feet above the Kansas, is here, opposite the mouth of the Big Blue river, only elevated about 214 feet above the Kansas; consequently the three feet of grayish yellow limestone cropping out 115 feet above the Kansas along the slope of the ridge above mentioned, at the mouth of the Blue river, has sunk beneath the level of the Kansas.

This far we have scarcely attempted to draw parallels between the various beds seen by us at different places, in consequence of the fact that our observations were isolated, as must necessarily be the case in a mere reconnoissance, extended over a large area in a short space of time. In addition to this, the group of rocks examined presents no extensive beds of limestone or other hard material, forming well-marked horizons, or continuous lines of outcrop, by which the relations between strata seen at different localities could be traced out. This difficulty is also greatly increased by the frequent repetition of precisely similar beds at different horizons in the series, and above all by the great vertical range of the organic remains. Consequently we have preferred to present separately the local sections examined, instead of attempting to construct a continuous general vertical section showing the order of superposition of the various strata. To do this successfully throughout all the various rocks of the whole Kansas valley would require much more time than we had at our command.

As our examinations along the Kansas and Smoky Hill rivers above this point were made in more detail, where the outcrops were more frequent and continuous, we have, as we believe, been able to trace out the connections and order of succession of the various strata with considerable accuracy. Hence, we give below a general section of the rocks in this region, commencing with the Cretaceous sandstones on the summits of the Smoky hills, lat. 38° 30′ N., long. 98° W., and descending through the various intermediate formations seen along the Smoky Hill and Kansas rivers, to the base of the bluff already mentioned, opposite the mouth of Big Blue river, on the Kansas. It is true, there are a few gaps in this section, where we were unable to see the beds along some of the slopes, but as we know the position in the series, as well as the extent of these gaps, it will be easy to determine, when a greater number of exposures have been examined, the nature of the beds occupying them.

General section of the Rocks of Kansas Valley from the Cretaceous down, so as to include portions of the Upper Coal measures.

Feet.

1. Red, brown, and yellowish, rather coarse-grained sandstone, often obliquely laminated, and containing many ferruginous concretions; also, fossil wood and many leaves of dicotyledonous trees, some of which belong to existing genera, and others to genera peculiar to the Cretaceous epoch. *Locality, summit of Smoky hills,* 60
2. Whitish, very fine-grained argillaceous sandstone, underlaid by bluish purple and ash-colored clays. *Locality same as preceding,* 15
3. Long, gentle slope, with occasional outcrops of ash-colored red, blue, and whitish, more or less laminated clays, with thin beds of sandstone. *Locality same as preceding, and extending down at places nearly or quite to the bluffs of Smoky Hill river;* thickness about 200
4. Red sandstone, with some layers of hard, light gray calcareous, do., and both containing ferruginous concretions. *Locality, bluffs of Smoky Hill river, five or six miles above Grand Saline river.* Probably local, thickness seen about 15
5. Bluish, red, light yellow, and gray clays, and soft claystones, with sometimes a few thin layers of magnesian limestone. In many places these clays have been traversed in every direction by cracks, into which calcareous and argillaceous matter have found their way, and subsequently become consolidated so as to form thin seams of impure yellowish limestone, which cross and intersect each other at every angle. The red clays are usually less distinctly laminated, contain more arenaceous matter, and often show ripple-marks on the surfaces. *Locality, Bluffs along Smoky Hill river, above the mouth of the Grand Saline,* 60
6. Light gray, ash-colored, and red clays, sometimes arenaceous, and often traversed by cracks, filled with calcareous matter as in the bed above,—alternating with thin layers and seams of gypsum. *Locality, near mouth of Smoky Hill river,* 40
7. Rather compact amorphous white gypsum, with near the base disseminated crystals, dark-colored do. *Locality same as last,* . . . . . 4½ to 5
8. Alternations of ash-colored, more or less arenaceous clays, with thin beds and seams of gypsum above; towards lower part, thin layers of claystone, and at some places soft magnesian limestone. *Locality same as last,* 50
9. Rough conglomerated mass, composed of fragments of magnesian limestone and sandstone, with sometimes a few quartz pebbles, cemented by calcareous and arenaceous matter; variable in the thickness and probably local. *Locality, south side of Smoky Hill river, ten or twelve miles below Solomon's fork,* seen 18
10. Bluish, light gray, and red laminated clays, with seams and beds of yellowish magnesian limestone, containing *Monotis Hawni, Myalina perattenuata, Pleurophorus? subcuneata, Edmondia? Calhouni, Pecten* undt., and *Spiriyera* near *S. subtilita;* also *Nautilus eccentricus, Bakevellia parva, Leda subscitula, Axinus rotundatus,* and undetermined species of *Bellerophon, Murchisonia,* &c. *Locality, near Smoky Hill river, on high country south of Fort Riley, as well as on Cottonwood creek,* . . . 90
11. Light grayish and yellow magnesian limestone, in layers and beds, sometimes alternating with bluish and other colored clays, and containing *Solemya,* a *Myalina* near *M. squamosa, Pleurophorus? subcuneata, Bakevellia parva, Pecten* undt., and a *Euomphalus* near *E. rugosus;* also, a *Spiriyera* allied to *S. subtilita,* but more gibbous, *Orthisina umbraculum?, O. Shumardiana,* &c. *Locality, summit of the hills, near Fort Riley and above there; also seen on Cottonwood creek,* . . . . . 25 to 35

Feet.

12. Light grayish yellow, rather granular magnesian limestone, containing spines and plates of *Archæocidaris;* a few fragments of small *Crinoid* columns, *Spirifer* similar to *S. lineatus,* but perhaps distinct; also same *Spirigera* seen in beds above, *Orthisina Shumardiana, O. umbraculum?* and *Productus Calhounianus. Forms distinct horizon near summit of hills in vicinity of Fort Riley, also seen on Cottonwood creek,* . . . . . 7 to 8
13. Soft argillo-calcareous bed, apparently local. *Kansas falls,* 5
14. Light grayish and yellowish magnesian limestone, containing many concretions of flint, also the same *Spirigera* found in beds above, and *Productus Norwoodi, P. Calhounianus,* with *Discina tenuilineata* and an undetermined *Monotis. Fort Riley and below, also at Kansas falls and on Cottonwood creek,* . 38
15. Alternations, bluish, yellowish and brown clays, with a few thin seams of limestone. *Fort Riley, Kansas falls; also below Fort Riley, and on Cottonwood creek,* 35
16. Light yellowish magnesian limestone, containing *Fucoidal* markings, fragments of small *Crinoid* columns, *Pecten, Allorisma, Spirigera, Orthisina umbraculum?, O. Shumardiana, Discina tenuilineata,* &c. *Lower quarry at Fort Riley, and at other places above and below Fort Riley, as well as on Cottonwood creek,* . . . . . 4 to
17. Alternations of blue, red, and light gray clays, with sometimes thin layers and seams of magnesian limestone. *Fort Riley,* 28
18. Light gray and whitish magnesian limestone, containing *Spirigera, Orthisina umbraculum?, O. Shumardiana, Productus Calhounianus, Acanthocladia Americana,* and undt. *sp. Cyathocrinus.* Lower part containing many concretions of flint. *Fort Riley and on Cottonwood creek.* Whole thickness about 40
19. Brown, green, and very light gray clays, alternating; contains near the upper part fragments of *Crinoid* columns, *Synocladia biserialis, Spirigera, Productus Norwoodi, Chonetes mucronata, Orthisina Shumardiana, Orthisina umbraculum,* &c., with teeth of *Petalodus Alleghaniensis. Fort Riley,* . . . 14
20. Alternations of rather thin layers of light yellowish magnesian limestone, and various colored clays; the limestone layers containing *Monotis, Synocladia biserialis,* &c. *Locality same as last,* 33
21. Slope, no rocks seen. *Below Fort Riley,* 25
22. Whitish, or very light gray magnesian limestone, rendered porous by cavities left by the weathering out of numerous *Fusulina.* This is the highest horizon at which any remains of *Fusulina* were met with. *Some four miles below Fort Riley, along a creek on the south side of the Kansas, and apparently not more than ten feet above it,* 2
23. Bluish, light gray, and brown clays, with occasional layers of magnesian limestone. *Chonetes mucronata, Orthisina umbraculum?, Monotis, Fusulina,* &c. *Ten miles below Fort Riley,* 35
24. Hard, very light yellowish gray magnesian limestone, with *Fusulina,* and spines of *Archæocidaris.* Forms a marked horizon near the *same locality as last,* 6
25. Slope, with occasional exposures, thin layers of *Fusulina,* limestone, and seams of gray limestone containing *Myalina, Monotis, Pecten,* and fragments of *Synocladia biserialis. Near same locality as last,* . 36
26. Light gray argillaceous limestone, showing on weathered surfaces a somewhat laminated structure; contains large spines of *Archæocidaris. Near Ogden ferry and Manhattan,* 9
27. Gray limestone, often fragmentary, with much clay above; lower part hard, and more or less cellular in middle. *Locality same as last,* 5
28. Whitish clays and claystones, with a thin layer of hard compact gray limestone near the middle. *Locality same as last,* 10
29. Light greenish indurated clays. *Same locality,* 3

30. Hard, heavy-bedded, white argillaceous limestone, containing *Monotis* and *Avicula*. *Ogden ferry, and below there*, ... 5
31. Very thinly laminated dark green shale. *Three miles nearly east of Ogden ferry, on McDowell's creek; also at Manhattan on the Kansas*, ... 1
32. Light greenish and flesh-colored hard argillaceous limestone, with *Spirifer cameratus*. This is the highest horizon at which we found this species. *Same localities*, ... 3
33. Alternations of bluish, green, and red, more or less calcareous laminated clays, light gray limestones and claystones, with *Pecten*, *Monotis*, and fragments of *Crinoid* columns. *Same localities*, ... 30
34. Alternations of bluish, purple, and ash-colored calcareous clays, passing at places into claystones, and containing in a thin bed near the middle, *Spirifer planoconvexa*, *Spirigera subtilita*, *Productus splendens?*, *Rhynchonella Uta*, &c. *Locality same as preceding*, ... 12
35. Blue, light gray, and greenish clays, with occasional harder seams and layers of claystone and limestone. *Same locality*, ... 33
36. Somewhat laminated claystone of light gray color, with more or less calc spar near lower part. *Manhattan*, 19
37. Alternations of dark gray and blue soft decomposing argillaceous limestone, with dark laminated clays, or soft shale, containing great quantities of *Fusulina cylindrica*, *F. cylindrica* var. *ventricosa*, *Discina Manhattanensis*, *Chætetes*, and fragments of *Crinoids;* also, *Chonetes*, *Verneuiliana*, *C. mucronata*, *Productus splendens?*, *Retzia Mormonii*, *Rhynchonella Uta*, *Spirigera subtilita*, *Spirifer cameratus*, *S planoconvexa*, *Euomphalus* near *E. rugosus*, and *Synocladia biserialis;* also *Cladodus occidentalis*. *Locality, same as last*, ... 18
38. Soft bluish shale, with yellow laminated arenaceous seams below, containing Fucoidal markings. *Same locality*, ... 25
39. Two layers gray argillo-calcareous rock, separated by two feet of dark green and ash-colored clays. The calcareous beds contain fragments of Crinoids, Chonetes, and *Myalina* of undetermined species. *Same locality as last*, ... 4½
40. Light greenish, yellow, and gray clays and claystones, extending down nearly to high water mark of the Kansas, *opposite the mouth of Blue river*, ... 27

The foregoing general section of the strata seen along the valley of Kansas and Smoky Hill rivers, from the mouth of Blue river to the 98th degree of west longitude, is presented in its present form more with a view of illustrating the vertical range of the organic remains found in these rocks, than as an attempt to group the beds into formations that may be expected to preserve their distinctive lithological characters throughout areas of any great extent. As this has necessarily been done from a knowledge of only a portion of the fossils characterizing these strata, it is quite probable, when more extensive collections are obtained, that it may be found necessary, even on this principle, to classify and group the beds somewhat differently. We are also aware that some of these beds probably increase or diminish greatly in thickness, or may even entirely thin out, at no very great distances from the localities where we saw them.

Among the more peculiar features of the series of rocks represented by this general section, and in part by the preceding local sections, may be mentioned, first, the great

number of thin layers and beds; and secondly, the frequent repetition of similar beds at various horizons. Again, the almost entire absence of heavy massive strata of limestone, or other hard material possessing sufficient durability to form perpendicular escarpments of much extent, is worthy of note. As a general thing, the limestones vary from only a few inches in thickness, to from one to three or four feet, and rarely, as in Nos. 14 and 18, attain a thickness of from thirty-eight to forty feet. Although various light-colored laminated clays and soft argillaceous shaly beds predominate, and arenaceous material is not unfrequently present, it is somewhat remarkable that dark bituminous shales and beds of coal are rarely met with, even among the outcrops seen along the Kansas, below the mouth of Blue river, belonging to the upper Coal measures, and holding a position below the base of the foregoing general section; while through a considerable thickness of beds belonging to higher portions of the Coal measures included in the lower part of this section, as well as through the strata containing Permian fossils above, beds of coal and dark carbonaceous shales appear to be almost, if not entirely wanting.

It will be observed we have in this general section, without attempting to draw lines between the systems or great primary divisions, presented in regular succession the various beds with the fossils found in each, from the Cretaceous sandstone on the summits of the Smoky hills, down through several hundred feet of intermediate doubtful strata, so as to include the beds containing Permian types of fossils, and a considerable thickness of rocks in which we find great numbers of upper Coal measure forms. We have preferred to give the section in this form because, in the first place, the upper Coal measures of this region pass by such imperceptible gradations into the Permian above, that it is very difficult to determine, with our present information, at what particular horizon we should draw the line between them, while, on the other hand, it is equally difficult to define the limits between the Permian and beds above, in which we found no fossils.

Beginning near the base of this section, we find we have in great numbers the following well-known and widely distributed Coal measure fossils, viz.: *Fusulina cylindrica*,* *Chonetes Verneuiliana*, *Productus splendens* (or a closely allied species), *Retzia Mormonii*, *Rhynchonella Uta*, *Spirigera subtilita*, *Spirifer cameratus*, *S. planoconvexa*, and a *Euomphalus* similar to *E. rugosus* of the Coal measures, while the few new and undetermined species associated with these are, for the most part, also decidedly more nearly allied to Carboniferous than Permian forms. We should here remark, however, that we occasionally met with a species of *Monotis*, allied to the Permian species *M. Speluncaria* and *Synocladia biserialis*, also regarded in the Old World as a Permian genus, at horizons far beneath the

* In Russia, *Fusulina cylindrica* is said to occur only in the upper part of the lower Carboniferous series; but the fossil generally referred to that species in this country appears to be confined to the Coal measures. We have some doubts in regard to its identity with the Russian species.

base of this section, between Manhattan and the Missouri. We even found a single specimen of this *Monotis* as low down as bed No. 9 of the section taken near the landing at Leavenworth city, which must occupy a position several hundred feet below the lowest beds of the above section. Still as this shell is very rare in these lower rocks, and the *Synocladia* is a distinct species from the well-known Permian form of the Old World, while they are both, at these horizons, associated with great numbers of the common well-known Coal measure species, we can only regard their presence in these beds as establishing the existence of these genera at an earlier period in this country than in the Old World. This, it seems to us, is more philosophical than it would be to place all this great thickness of strata, with their vast numbers of well-known Coal measure species, in the Permian, merely because we also find with these occasionally a few forms which would in the Old World be regarded as characteristic of the Permian epoch.

Taking it for granted, then, that we have carried this section down far enough to include, not only all the beds containing almost exclusively Permian forms, but a considerable portion of the upper Coal measures, it will be interesting to notice, as we ascend in the series, how far each of the Coal measure species mentioned in the lower part of the section, as well as of a few others that occur above and below, range upwards. Thus we see that *Fusulina cylindrica* var. *ventricosa*, *Chonetes Verneuiliana*, and *Retzia Mormonii*, were not met with above division No. 37; while *Spirifer planoconvexa*, *Productus splendens?*, and *Rhynchonella Uta*, were not observed above 34, nor *Spirifer cameratus* above 32. *Fusulina cylindrica*, of the slender variety so common in the Coal measures of Kansas and Missouri, was not seen above 22; nor was any species or variety of that genus observed above this horizon.

Apparently the same species of *Monotis*, mentioned at various horizons far beneath, were occasionally met with in 30, 25, 23, and 20, generally associated with the same species of *Synocladia*, ranging far down into the upper Coal measures. In division No. 19, we again met with the *Synocladia biserialis*, and a *Spirigera* allied to *S. subtilita*, if not identical, along with a new species of *Chonetes* we have called *C. mucronata*, which ranges down into the beds near the base of the section. Along with these were also *Productus Norwoodii* and *Orthisina Shumardiana*, both of which are common in the Coal measures far below, and a large *Orthisina* similar to *O. umbraculum*, but apparently more finely striate.

Ascending through the intermediate beds to No. 12, we continue to meet with nearly all the species mentioned in 19, with the exception of *Chonetes mucronata*. We also have, first in 18, a large species of *Productus*, called *P. Calhounianus* by Professor Swallow; very similar to some varieties of *P. semireticulatus*, but thought by Prof. S. to present well-marked internal differences. There is likewise added in 16 a large *Allorisma*, and a *Spiriger* similar to *S. subtilita*, but much more gibbous; and in 14, *Discina tenuilineatus*,

together with apparently the same *Monotis*, so often mentioned below. In 12, we also have added a small *Spirifer*, similar to *S. lineatus*, but perhaps more nearly allied to the Permian species *Martinia Clannyana*, King.

The succeeding bed above, No. 11, appears also to contain a mingling of Permian with Coal measure forms, for we have in it the following Permian types, viz.: *Myalina* very similar to *M. squamosa*, *Pleurophorus? subcuneata*, *Bakevellia parva*, and *Monotis Hawni*, along with a *Euomphalus* near *E. rugosus*, the same gibbous *Spirigera*, similar to *S. subtilita*, *Orthisina umbraculum?*, and *O. Shumardiana*.

On passing into the next division above, No. 10, we find we have lost sight of all the characteristic Carboniferous forms, unless the *Spirigera* mentioned in some of the beds below be regarded as only a variety of *S. subtilita*, from which, however, we think it specifically distinct; for with this exception, nearly all the fossils seen by us in this division are such as would be regarded as Permian types. Although the number of *species* found by us in No. 10 is not great, *individual* specimens are often numerous. Above this horizon we saw no more fossils through a great thickness of various colored clays, claystones, &c., until ascending to the Cretaceous sandstones crowning the Smoky hills.

If we do not admit the existence in this region of an intermediate group of rocks, connecting by slight gradations the Permian above with the Coal measures below, and must draw a line somewhere, below which all is to be regarded as Carboniferous, and all above as Permian, we should certainly, upon palæontological principles alone, carry this line up as far as the top of division No. 11. The passage from the Carboniferous to the strata containing Permian types, however, is so gradual here, that it seems to us no one, undertaking to classify these rocks without any knowledge of the classification adopted in the Old World, would have separated them into distinct *systems*, either upon lithological or palæontological grounds, especially as they are not, so far as our knowledge extends, separated by any discordance of stratification, or other physical break.* Indeed, the fact that some of the Permian types occurring in No. 10, were first introduced in beds below this, containing many Carboniferous species, would seem to indicate that even No. 10 may possibly have been deposited just before the close of a period of transition from the conditions of the Carboniferous, to those of the Permian epoch.

The apparent absence of fossils in the beds above No. 10, renders it impossible, with our present information, to determine with certainty the upper limits of the series contain-

* We have been informed by Dr. J. G. Norwood, former State Geologist of Illinois, that the rocks in that State, referred by him and others to the same epoch as the Kansas Permian beds, rest unconformably upon the Coal measures. This, however, would be impossible in Kansas, since no disturbances of the strata occurred there, until after the close of the Cretaceous era, which would, of course, not only cause the Cretaceous and Carboniferous, but all intermediate beds, to dip at the same angle.

ing Permian forms. It is true there is at places a kind of conglomerated mass, occupying the horizon No. 9, which might appear to form a natural line of division between the beds containing the Permian fossils, and those above, in which we found no organic remains; but this seems to be local, and although there is a new feature presented by the zone of gypsum deposits above it, we find between the beds and layers of gypsum, and far above the horizon at which they occur, bluish, greenish, and other colored clays, not only similar to those between the beds and layers of limestone containing the Permian fossils in division No. 10, but also precisely like the laminated clays between the beds of limestone of the upper Carboniferous series far below. Again, in these clays of the gypsum zone, as well as through a considerable thickness of clays above it, there are occasional seams of claystone, which sometimes pass into seams of magnesian limestone, exactly like some of those containing Permian fossils, in division No. 10. We saw no fossils in these seams amongst the gypsum-bearing beds, nor higher in the series, but it is probable they may yet be found in some of the more calcareous portions.

Another fact apparently indicating some kind of relation between the gypsum-bearing beds, as well as some of the higher deposits, and the rocks below, is, that we often find, both in the clays between the beds of gypsum, and those between the limestone containing the Permian fossils, the same peculiar appearance, caused by the cracking of the clays and subsequent infiltration of calcareous matter, seen in division No. 5. At some places the thin plates of limestone formed by the impure calcareous matter filling these cracks, may be seen ramifying through some rather thin beds of these clays in all directions, so as to cross and intersect each other at every angle. Where beds of this kind have been exposed for any length of time along near the tops of bluffs, the softer clays filling the interstices often weather out, so as to have a curious cellular mass, with the numerous angular cavities.

From these facts we are inclined to suspect,—though we are fully aware that it is a question which can only be determined upon evidence derived from organic remains,—that not only the gypsum-bearing deposits, but a large portion, if not all, of division No. 5, belongs to the same epoch as the beds containing the Permian fossils below.

Between No. 5 and the Cretaceous above, there is still a rather extensive series of beds in which we found no organic remains; these may be Jurassic or Triassic, or both, though, as we have elsewhere suggested, we rather incline to the opinion that they may prove to belong to the former. As we have fully discussed the question in regard to the Cretaceous age of the highest division of the foregoing section in a paper read before the Academy in December last, and in an article in the American Journal of Science, January, 1859, it is unnecessary for us to add anything further on that subject here.

As already stated, our observations along the Kansas valley, to within twelve or four-

teen miles of the mouth of the Big Blue river, were too isolated to determine in all cases the relations between outcrops seen at different places. Consequently, although we saw at several points along this part of the valley indications of a westward or northwestward inclination of the strata, we were left in some doubt whether or not there is a general inclination of the rocks in that direction, between Wabounse and the Missouri. Above this point, however, our observations being more connected and the exposures more continuous, we were able to determine very satisfactorily that there is at least from near Wabounse, a uniform dip towards the west or northwest, so that in ascending the Kansas valley from this region we are constantly meeting with more and more modern rocks, as those we leave behind pass beneath the level of the Kansas.

To illustrate this more clearly, we would, in the first place, remark that a bed of light grayish yellow granular magnesian limestone, occupying a horizon about 115 feet above the Kansas, two or three miles west of Zeandale, passes beneath the level of the Kansas before reaching the mouth of the Big Blue river, a distance of near seven miles; while another bed (No. 26 of the foregoing section) seen on the very summit of the hills two or three miles north of Zeandale, at an elevation of about 320 feet above the Kansas, was observed opposite Manhattan at the mouth of Big Blue river, only some 214 feet above the Kansas. Again, bed No. 12 of the foregoing general section, which was seen at a locality nearly opposite Ogden, at an elevation of about 363 feet above the Kansas, is at Fort Riley, eight or nine miles further west, elevated only some 215 feet above the Kansas. Above Fort Riley this bed forms a marked horizon, and can be followed by the eye without interruption for several miles along the hills on both sides of the river. We observed it gradually sinking as we ascended the Kansas valley, until at a point on Chapman's creek, some fifteen miles a little south of west from Fort Riley, we saw it nearly down on a level with the Kansas; beyond this it was not again met with on the north side of the Kansas, but we saw it at somewhat higher elevations on the south side of the river a little west of this.

As the distance by an air-line, from the locality nearly opposite Ogden, where this rock occupies a horizon at an elevation of 363 feet above the Kansas, to the mouth of Chapman's creek, is about 23 miles, the dip would appear to be not far from 15½ feet to the mile. It must be borne in mind, however, that the average fall of the Kansas,—at least below Fort Riley,—according to the barometrical observations of Col. Fremont and others, is near one and a half feet to the mile, and that if we assume the distance by the windings of the river between Chapman's creek and Ogden, to be about thirty miles, it would make the elevation of the Kansas at the former locality some forty-five feet greater than at Ogden, which would reduce the dip to a fraction less than 14 feet to the mile. Still as the direction of the dip in this region is to the *north* of west, and the direction of the

mouth of Chapman's creek from Ogden is considerably *south* of west, it is probable the inclination of the strata here is greater than the above figures would indicate, and that it may not be less than twenty feet to the mile, in a northwest direction.

From the foregoing statements it will be seen that in consequence of the dip of the strata to the northwest, and in some slight degree to the fall of the Kansas and Smoky Hill rivers, the whole of the foregoing general section below No. 12 passes beneath the level of the Smoky Hill, between the mouth of Blue river and Chapman's creek. Consequently, the limestones of the succeeding beds above being thinner and less durable than those below, and separated by heavy beds of clay, we find, as might be expected, that the country here in the region of the mouth of Chapman's creek, is much lower than at Fort Riley and below.

On reaching the mouth of Solomon's fork, we found the face of the country characterized by long gentle grassy slopes, no part of it near the river being apparently elevated more than about 60 or 70 feet above its surface. A short distance beyond this, we caught the first glimpse of the Smoky hills, which were seen in a direction a little south of west from us, rising above the surrounding low country like dark blue clouds above the horizon. On approaching these, we found them always situated several miles back from the river, and rising some three hundred and fifty feet above it. The immediate bluffs of the river here, are generally composed of divisions No. 4 and 5 of the foregoing general section, and that portion of these hills above the level of the summits of the bluffs along the river, is made up of division Nos. 3, 2, 1, of the same section. On the south side of the river these hills have but a comparatively thin capping of the sandstone No. 1, but on the north side we saw it showing a thickening on some of them of sixty feet.

From some of these hills on the north side of Smoky Hill river, between it and the Grand Saline, we had an extensive and beautiful view of the surrounding country. In the north and northwest, many similar hills were in sight, and as the dip of the strata here is in that direction, it is probable some of them are not only chiefly made up of the sandstone No. 1, but surmounted by the other Cretaceous beds Nos. 2 and 3 of the Nebraska Cretaceous series; indeed, Mr. Engleman found all these formations occupying this relation on Republican river, not more than seventy miles north of this.*

Although this paper is merely designed to give a brief sketch of the leading geological features of those portions of Northeastern Kansas visited by us, we cannot close it without alluding to the truly great agricultural and other natural resources of this new and interesting territory. We mean no disparagement to other portions of the Mississippi valley, when we state, that after having travelled extensively in the Great West, and after having

* See Report of Secretary of War, Dec. 5th, 1857, page 497.

seen many of its most favored spots, we have met with no country combining more attractive features than Kansas territory. Her geographical position gives her a comparatively mild and genial climate, intermediate between the extremes of heat and cold, while the rich virgin soil of her beautiful prairies is admirably adapted to the growth of all the great staple grain and root crops of the West.

It is true that in some districts there is rather a deficiency of timber, but as a general thing there is along the streams sufficient for the immediate wants of the country. In addition to this, the wonderful rapidity with which forests are known to have sprung up on similar prairie lands in Missouri, as the country became settled so as to keep out the annual fires, shows that the present scarcity of timber should not be regarded as presenting any serious obstacle to the settlement of the most extensive prairie district in Kansas.

Before going out into the interior of the Territory, we had expected to find the whole country immediately west of Fort Riley comparatively sterile; on the contrary, however, we were agreeably disappointed at meeting with scarcely any indications of decreasing fertility as far as our travels extended, which was about sixty miles west of Fort Riley. Here we found the prairies clothed with a luxuriant growth of grass, and literally alive with vast herds of buffalo, that were seen quietly grazing as far as the eye could reach in every direction. Even on the high divide between the Smoky Hill and Arkansas rivers, south of this, we found the soil rich and supporting a dense growth of grass; and from all we could learn from persons who have gone further out, the same kind of country extends for a long distance beyond this, towards the west. Hence we infer that the belt of unproductive lands between the rich country on the east, and the eastern base of the Rocky mountains on the west, is much narrower than is generally supposed; and even this so-called desert country is known to possess a good soil, which may be rendered fruitful by artificial irrigation.

In regard to the mineral resources of Kansas, we have at present only time and space to say a few words. As already stated, coal is known to exist, though its extent is not yet fully determined, at several localities in the region of Leavenworth city, while the geological structure of the country, as well as discoveries already made, warrant the conclusion that this important and useful mineral abounds at many localities south of there. Limestone suitable for building purposes, and the production of quicklime, exists throughout large areas, while inexhaustible beds of gypsum are known to occur at several places not far west of the mouth of Solomon's river. Near this place we likewise saw in the lower Cretaceous rocks crowning the summits of the Smoky hills, deposits of iron ore, but were unable to determine, in the limited time at our command, whether or not it exists in large quantities.

Of the discoveries of gold in the mountains on the western borders of Kansas, much has

been said; nothing, however, but a thorough geological survey, by authority of the Territorial or State government (for Kansas must soon be a State), can lay before the public such full, accurate, and reliable information on these subjects as will bring from the older States the capital, skill and enterprise necessary to develop the great natural resources of the country.

Leaving the Territory of Kansas we find that the southeastern portion of Nebraska is underlaid by limestones of the upper Coal measures. Having already described these rocks in detail as they occur in Nebraska in a preceding chapter, I shall simply allude to them here in a general way. The town of De Soto is the highest point known on the Missouri river where these limestones are exposed. Ascending the valley of the Platte river we find them quite well developed as far as the mouth of the Elkhorn, where they pass beneath the water level of the river and are succeeded by the sandstone of Cretaceous formation No. 1. Both the fossiliferous contents and lithological characters of these limestones show that they form the northwestern continuation of the series of rocks which seem to be distributed to a greater or less extent over Iowa, Kansas, Illinois, Indiana, Missouri, Ohio, and portions of Pennsylvania. Leaving De Soto the Carboniferous limestones do not again appear along the Missouri river until we reach the vicinity of the mountains, where it is probable that they are revealed in the form of outcropping belts around the mountain elevations, though no evidence from actual observation has yet been published to the world sustaining the inference. Ascending the Platte river we find that the whole country from the Elkhorn to Fort Laramie is occupied by rocks of Cretaceous and Tertiary age, and not until we reach the Laramie mountains do we again meet with the Carboniferous limestones, which here form an outcropping zone, exposed by the upheaval of the older rocks. In the Black hills we again find them exposed around the nucleus of elevation with the same fossils and lithological characters as at the Laramie mountains. From these facts, and the accounts of explorers in the North and South, there is good reason for the inference that the Carboniferous rocks are probably co-extensive with the great central range of the Rocky mountains. This subject will be again alluded to in a subsequent portion of this report. The following catalogue embraces all the Carboniferous and Permian fossils obtained by the writer at Fort Laramie, Black hills, and Southeastern Nebraska; also those collected by Mr. Meek and the writer in the Kansas valley. The catalogue published in our paper to the Philadelphia Academy, January, 1859, has been used, with the additions of species found in the far West, with their geographical distribution. The descriptions of the new species have been omitted. This catalogue does not assume to be complete, but only to embrace such fossils as are in our possession so far as they have been determined.

FORAMINIFERA.

Fusulina cylindrica, Fischer, Oryct. Moscow, p. 126, p. 18, figs. 1–5.

In Russia this species is said to occur only in the upper part of lower Carboniferous or mountain limestone. Yet the species usually referred to *F. cylindrica* in this country, so far as our knowledge extends, is not found below the Coal measures. From this fact, and some slight differences we observe between our specimens and the figures of the Russian species, we suspect a careful comparison of good specimens may possibly prove them to be distinct. Ranges in Kansas from Division No. 22, of the foregoing section, far down into the Coal measures. Found at numerous localities between Manhattan and the Missouri, usually in great numbers. Also occurs in vast numbers in the southwestern part of Iowa and in Missouri. Dr. George Shumard has discovered a remarkable species of *Fusulina* in the white limestone of the Guadalupe mountains upwards of an inch in length, which he considers distinct and has been named by his brother *F. elongata*.

Fusulina cylindrica, var. *ventricosa*, Meek and Hayden, Proc. Acad. Nat. Sci. Phila. December, 1858, page 261. Division No. 37 of foregoing general section, at Manhattan on the Kansas, and at Juniata on Big Blue river.

BRYOZOA.

Synocladia biserialis. Prof. Swallow refers this species with doubt to *S. virgulacea*, Phillips, sp. in Transactions Acad. Sci. St. Louis, vol. i, p. 179, and points out some of the characters in which it differs, stating at the same time, in case it should prove to be distinct, that *biserialis* would be a good specific name for it. We regard it as quite distinct from Phillips's species, not only in scarcely ever having more than two rows of cellules, but also because the ? gemuliferous vesicles, instead of being merely "tubercular and open at the summit," have the form of short, but distinct spines, apparently closed and rather obtusely pointed at the apex. The branches or connecting process are likewise less distinctly angulated between the longitudinal stems than in *S. virgulacea*. Occurs at Fort Riley in No. 19 of foregoing general section, and at various lower horizons on the Kansas below there, down into the upper Coal measures.

Acanthocladia Americana. In the Trans. Acad. Sci. St. Louis, vol. i, p. 180, Prof. Swallow refers this species with a query to *A. anceps*, Schlot. sp. and remarks that it differs from that species in having "the rows of cellules diagonal to the axis of the stems, instead of longitudinal, as represented by King, and on ridges like that figured by Goldfuss." He also further remarks that "it is less regularly branched, and not so distinctly pinnated as those delineated by Goldfuss and King." In the specimens in our collection, the cellules are more numerous and much more crowded than in *A. anceps*, as figured by King. The specific name *Americana*, was suggested by Prof. Swallow.

We found this species in Division No. 18 of the foregoing general section, on Cottonwood creek.

ECHINODERMATA.

Cyathocrinus ——*?* A few scapular plates, bearing some similarity to those of *C. ramosus*, Schlot. sp. were met with by us in Division No. 18, but they are proportionably much thicker, and the articulating surfaces quite different. Cottonwood creek.

Archæocidaris ——*?* In No. 12, we found spines and detached plates of apparently an undescribed species of this genus, but they were too much weathered to show clearly the specific characters. The spines are rather slender, terete, nearly straight, and provided with short scattering spinous processes, directed rather obliquely outwards and forward. Cottonwood creek.

Archæocidaris ——*?* The spines of this species are much larger than the last, and apparently destitute of

spinous processes. They are as much as from three to four inches in length, nearly or quite straight, and not flattened or compressed.

Division No. 26, Manhattan, and in same position on Cottonwood creek.

Brachiopoda.

Discina tenuilineata, Meek and Hayden, Proceedings Acad. Nat. Sci. Pa. p. 25, January, 1859. Cottonwood creek, Division 16.

Discina Manhattanensis, Meek and Hayden, Proceedings Acad. Nat. Sci. Pa. p. 25, January, 1859. Found in great numbers in Division No. 37, opposite Manhattan on Kansas river.

Productus splendens (?), Norwood and Pratten, Jour. Acad. Nat. Sci. Phila. N. S. vol. iii, pl. fig. 5. We refer this shell to the above species with some doubt; it is always smaller than the figure given by Norwood and Pratten, and rather more convex over the visceral region of the larger valve, while the smaller valve appears to want the band-like flattening around the border mentioned in the description of *P. splendens*. The ears extend beyond the body of the shell, are distinctly vaulted, and rarely have more than one spine on each, often none. The spines, however, are more numerous over the surface of the larger valve, being in this respect more like *P. muricatus* N. and P., but both valves want the concentric wrinkles represented in the figures of that species.

This neat little *Productus* is found in great numbers between Fort Riley and Manhattan, as well as at the latter place, in Division No. 34; also at various horizons below that in the upper Coal measures of Kansas; also in Missouri, and along the Pecos river, in New Mexico.

Productus Norwoodi, Swallow, Trans. Acad. Sci. St. Louis, vol. i, p. 182. A few specimens of this species in our possession have the extreme point of the beak of the larger valve flattened or truncate, as though it had in the young state been attached to some marine body by that part of the shell. We have also in several instances found other shells associated with this species, with small discs not more than 0.20 inch in diameter, attached by the whole surface, as well as by a series of small spines seen radiating from the margin. May not these little bodies be the young of this species?

We think the specimen figured by Prof. Marcou in his work on the Geology of North America, plate 6, fig. 1, as *P. pustulosus*, is the same as the above species, and quite distinct from *P. pustulosus*. It occurs in Kansas at various horizons from No. 14 far down in the upper Coal measures. We found it at Fort Riley and numerous places between there and the Missouri, as well as at Leavenworth city.

Productus Rogersi, Norwood and Pratten, Jour. Acad. Nat. Sci. Phil. N. S. vol. iii, page 9, pl. 1, fig. 3. This species is nearly related to the last, and when the shell is exfoliated, may be easily confounded with it. *P. Norwoodi*, however, appears never to have the distinct concentric wrinkles of this species, nor do the pustules at the base of the spines have the tendency to elongate into indistinct ribs as in *P. Rogersi*. Prof. Marcou has figured in N. Am. Geol. pl. 5, fig. 6, as *Productus scabriculus*, a shell very like this.

Kansas valley below the mouth of Blue river, in upper Coal measures; at the Pecos villages in the Coal measures or upper Carboniferous limestone.

Productus pustulosus (?), Phillips's Geol. Yorkshire, vol. ii, p. 316, pl. 7, fig. 15. We have a specimen agreeing very nearly with this species in its external markings, but it is much narrower, and the beak of the larger valve more extended, in which respect it differs quite as much from *P. punctatus*.

Near Steamboat landing at Leavenworth city, in Coal measures.

Productus Prattenianus, Norwood, Jour. Acad. Nat. Sci. Phil. N. S. vol. iii, p. 17, pl. 1, fig. 10. In Coal measures at Indian creek and at Leavenworth city.

Productus Calhounianus, Swallow, Trans. Acad. Sci. St. Louis, vol. i, p. 181. This fine large shell is scarcely

distinguishable from *P. semireticulatus* var. *antiquus*, but Prof. Swallow, who has seen the interior, thinks it presents well-marked internal differences. It occurs in No. 12 and below, at Fort Riley, also on Cottonwood creek. Prof. S. thinks it even ranges down into the lower Carboniferous.

Chonetes Verneuiliana, Norwood and Pratten, Jour. Acad. Nat. Sci. Phila. vol. iii, p. 26, pl. 2, fig. 6, N. S. Occurs in Kansas in Division No. 37, at Manhattan, and perhaps in upper Coal measures at lower horizons.

Chonetes mucronata, Meek and Hayden, Proceed. Acad. Nat. Sci. Phila. Dec. 1858, page 262. Lower part of the section at Fort Riley (Division 9), and down near the base of the foregoing general section, also in same position on Cottonwood creek.

Orthisina crassa, Meek and Hayden, Proceed. Acad. Nat. Sci. Phila. Dec. 1858, p. 261. Occurs in Coal measures near landing at Leavenworth city.

Orthisina umbraculum? Schlot. sp. Petrefakt. 1, p. 256, et 2, p. 67. We find in Kansas, ranging from 16 to 19 of foregoing sections, many specimens of a large species of *Orthisina*, having almost exactly the form and other characters of *O. umbraculum*, excepting that the striæ appear to be more numerous. According to Koninck that species has about 108 striæ on each valve, while on our Kansas specimens, we count from 160 to 200; consequently we suspect it may be a distinct but closely allied species; if so, we would propose to designate it by the name of *O. multistriata*. We found it at Fort Riley and at several localities between there and Blue river; also in same position on Cottonwood creek.

Orthisina Missouriensis, Swallow, Trans. Acad. Sci. St. Louis, vol. i, p. 219. This is a very peculiar plicated species, often much distorted. When partly embedded in the matrix, it frequently bears a striking resemblance to *Plicatula striato-costata*, Cox, vol. iii. Dr. Owen's report on the Geol. Survey of Kentucky, page 558, pl. 8, fig. 7, of Atlas. Common in the upper Coal measures of Kansas, at Leavenworth city and west of there.

Orthisina Shumardiana, Swallow, Trans. St. Louis Acad. Sci. vol. i, p. 183. Although like the last, a plicated species, this is more symmetrical, and presents other well-marked differences. Ranges from No. 11 down some distance in upper Coal measures. Found at Fort Riley and between there and Blue river.

Terebratula millepunctata, Hall, Pacific Railroad Report, vol. iii, p. 101, plate 2, figs. 1, 2. We have the impression that this species is probably identical with *T. bovidens*, Morton (Silliman's Jour. vol. xxix), from Ohio. Our Kansas specimens appear, however, to be more elongated than those figures by Dr. Morton, and may be distinct. In form they resemble very much some varieties of *Epithyris elongata*, Schlot. sp. as figured by King, in Perm. Fos. Eng. pl. 6, particularly the narrower varieties, such as fig. 35. The beak of our Kansas shell, however, is not truncate but pointed, the perforation being on the outside, and a little removed from the extremity. If it is identical with *T. bovidens*, Morton's specific name will have to take precedence, being the older. It remains to be determined whether its internal characters agree with *Terebratula*, as now restricted.

This is a rather common form in the upper Coal measures of Kansas, and southward. We found it near the summit of the hills back of Leavenworth city, also at Indian creek, near Indianola, &c. It is also found at Pecos village (New Mexico), associated with *Spirigera*, *Subtileta*, *Spirifer cameratus*, and *S. lineatus*.

Rhynchonella Uta (*Terebratula Uta*, Marcou, Geol. N. A. p. 51, pl. vi, fig. 12). We have from the upper Coal measures in Kansas many specimens of a species agreeing exactly with Prof. Marcou's description of the above species. These we suspect may possibly go into the genus *Camerophoria*, King, if not into *Rhynchonella;* at any rate they are certainly not *Terebratula*. We are inclined to the opinion that a shell described by Prof. Swallow, in the Trans. Acad. Sci. St. Louis, vol. i, p. 219, under the name of *Rhynchonella* (*Camerophoria*) *Osagensis*, may be identical also with the above; yet Prof. S. says his species has from "two to six" plications in the sinus of the dorsal valve, while in the shell before us, of which we have quite a number of specimens, there are *invariably* but two plications in the sinus.

Quite common in Division No. 94 at Manhattan and at several localities between there and the Missouri, in the upper Coal Measures. Prof. Marcou cites it as a mountain limestone species, but we know nothing of its existence in rocks of that age. This species was also found by Mr. Marcou near Great Salt Lake city, associated with *Retzia Mormonii*, *Terebratula Roysii*, and *S. subtilita*. Also in the limestones near Fort Laramie.

Retzia Mormoni (*Terebratula Mormonii*, Marcou, Geol. N. A. p. 51, pl. vi, f. 11). We found this species quite abundant in Division 37 at Manhattan, where it is associated with the last. It also ranges far below this in the upper Coal measures between Manhattan and the Missouri, being quite common near the summits of the hills back of Leavenworth city. Dr. B. F. Shumard has described a species in the Trans. Acad. Sci. St Louis, under the name of *Retzia punctilifera*, which we suspect may possibly be a variety of the above; but as he describes it as having usually in the dorsal valve "a moderately wide, shallow sinus, which extends from the front nearly to the beak," and the species before us, of which we have many specimens, has no traces of a sinus, we are left in doubt. In other respects his description agrees exactly with our shell, and he also states that he has it from K. T. Prof. Marcou found this species at the Salt Lake city, Utah, in a rock he refers to the mountain limestone. We have never seen it from below the Coal measures. It is also found near Fort Laramie, Nebraska, and in the Carboniferous limestones of the Black hills.

Spirifer Kentuckensis, Shumard, Geol. Survey of Missouri, part 2, p. 203. Found in upper Coal measures near the top of bluffs, back of Fort Leavenworth, also near the landing at Leavenworth city, and at other localities between the Missouri and Blue river.

Spirifer cameratus, Morton, American Jour. Sci. vol. xxix, p. 150, pl. 11, fig. 3. This is the same species, as has been determined by Prof. Hall, described by Dr. Roemer as *S. Meusebachanus* (Kreid von Texas, p. 88, pl. 11, fig. 7), and subsequently by himself as *S. triplicatus*, in Stansbury's Rept. p. 420, pl. 4, fig. 5. Prof. Marcou has recently figured it in his work on the Geol. North America, p. 49, pl. 8, fig. 3, as a variety of *Spirifer striatus*, Martin, from which it is quite distinct. He found it at Pecos village in a rock he refers to the lower Carboniferous or mountain limestone. It has a great geographical range, being common in the Coal measures from Pennsylvania to the Rocky mountains, and from Nebraska to New Mexico; we have never seen it, however, from lower Carboniferous rocks. It is very common near Bellevue, Nebraska, at Fort Laramie, and in the Black hills.

Spirifer hemiplicata, Hall. Stansbury's Report, p. 409, pl. 4, fig. 3. Upper Coal measures near summit of hills back of Leavenworth, and at other localities between there and Blue river.

Spirifer lineatus. *Anomites lineatus*, Martin. *Spirifer lineatus* of Phillips. Geol. Yorks. ii, p. 219, pl. 10, fig. 17, and of other authors. We have, from near Leavenworth landing, in the Coal measures, a Spirifer, apparently identical with the above. It appears not to range very high in the upper Coal measures of Kansas.

Spirifer ——. In Division No. 12, above Fort Riley, we found a few imperfect specimens of a small, smooth *Spirifer*, similar, in some respects, to *S. lineatus*, but apparently more like *Martinia Clannyana*, King, from the Permian of England.

Spirifer planoconvexa, Shumard. Geol. Report, Missouri, 2d part, p. 202. We found this handsome little shell quite abundant in the upper Coal measures (Divisions 34 and 37) at Manhattan; also at Juniata, on Big Blue river, and near summit of hills back of Leavenworth city.

Spirigera subtilita. (*Terebratula subtilita*, Hall. Stansbury's Report, p. 409, pl. 4, figs. 1–2.) *Spirigera subtilita*, of Dr. George Shumard. Trans. St. Louis Acad. Sci. vol. i.

This is a very abundant species in Kansas; we found it ranging up at least as far as Division No. 37, at Manhattan, and met with some obscure forms resembling it still higher in the series. From these horizons, it ranges far down in the other members of the Coal measures. Several of our specimens collected at Leavenworth city show that it was provided with internal spiral appendages, as in the *Spirifer*, and consequently cannot remain in the

genus *Terebratula*, as now restricted. It has a wide geographical range, and is almost everywhere the companion of *Spirifer cameratus*. Prof. Marcou figures it in his work on the Geology of North America, pl. 6, fig. 9, from a formation in the Rocky mountains, which he refers to the lower Carboniferous; but we have never seen it from any position below the Coal measures.

Spirigera ——? At Fort Riley, and above there, as well as in the same position on Cottonwood creek, we found, ranging from Division 18 up to 10 of the foregoing section, a *Spirigera* resembling *S. subtilita*, but much more gibbous in form; it also appears to have a much thicker shell. If distinct from *S. subtilita* this might be designated by the specific name *gibbosa*.

Lamellibranchiata.

Monotis Hawni, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2, 1858. Prof. Swallow thinks this species not distinct from *M. speluncaria*, Schlot. sp. Although, like that species, it is quite variable, and some of its varieties are very similar to it; after a careful comparison of a large number of individuals with King's figures and descriptions, we still regard it as distinct. We have never seen any of its various forms with the beak of the larger valve elevated so far above the hinge, as in figs. 5, 6, 7, and 8, pl. 13, of King's work. Nor do any of our specimens possess the peculiar oblique posterior sulcus seen in the figures cited above. High country, south of Kansas falls; also above there, on Smoky Hill river and Cottonwood creek, in Division 10.

Myalina (*Mytilus*) *perattenuata*, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2d, 1858. Our description of this species was made out from one of the more slender varieties of this shell, sent to us from near Smoky Hill river by Mr. Hawn. We were probably wrong, however, in referring to it a specimen in our possession from a locality on the Missouri, opposite the northern boundary of Missouri; and we even suspect the rock from which this latter specimen was obtained may belong to an older epoch.

The species above cited is, we think, identical with *M. permianus* of Swallow, Trans. Acad. Sci. St. Louis, vol. i, p. 187. And we also suspect the form he describes in the same paper as *Mytilus* (*Myalina*) *concavus*, is only a broader variety of the same; at any rate we have these two forms, and every intermediate gradation between them, from the same bed. Locality and position same as the preceding.

Myalina squamosa. (*Mytilus squamosa*, J. de C. Sowerby. Morris's Catalogue, p. 93. *Myalina squamosa* of some other authors.)

Of the form, we refer with doubt to the above species; we have but one imperfect specimen. As far as the characters can be made out, it agrees with this species. We found it in Division No. 11, at Kansas falls, above Fort Riley.

Myalina subquadrata, Shumard. Missouri Geol. Rept. 2d part, p. 207, pl. c, fig. 17. Upper Coal measures, Leavenworth city, on the Kansas, at Lawrence and other localities in Kansas valley, below mouth of Big Blue river.

Edmondia? Calhouni, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2, 1858. We are still in doubt in regard to the generic relations of this species, having procured no better specimens than that first described by us. We suspect it may be a *Cardinia*. Near Smoky Hill river, in Division 10.

Bakevellia parva, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2, 1858. This is probably the same species referred by Prof. Swallow to *Avicula antiqua*, Munster,—*Bakevellia antiqua* of King, and others. In describing this species, we spoke of its very near relation to *B. antiqua*, but pointed out some characters in which it differs. At that time we had seen but a few imperfect specimens; since then, however, we have obtained many others, a careful examination of which causes us still to regard it as distinct from *B. antiqua*. Of a large number of individuals, we have never seen any one-half the size of the smallest, nor one-eighth the size of the largest figures

of that species given by King, while the cardinal area is also proportionably much narrower in our shell. Division No. 10. On Smoky Hill river and Cottonwood creek.

Area carbonaria, Cox. Vol. iii, Geol. Report Ky. p. 567, pl. 8, fig. 5. Our fossil is smaller and less distinctly striate, but exactly the form of the above. Near Leavenworth landing, Coal measures.

Leda subscitula, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2, 1858. Division No. 10. Smoky Hill river and Cottonwood creek.

Pleurophorus? subcuneata, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2, 1858. Our specimens of this species being casts we are left in doubt in regard to its generic relations. We suspect it may be a *Cardinia*. Same locality and position as preceding.

Axinus (Schizodus) ovatus, Meek and Hayden. Proceed. Acad. Nat. Sci. Phila. December, 1858. This is very much like the Permian forms, *S. rotundatus* and *S. truncatus*, but we found it in a rock on Cottonwood creek which we regard as below the Permian.

Axinus rotundatus, Brown. Trans. Manch. Geol. Soc. vol. i, p. 31, pl. 6, fig. 29. We have referred this little shell to the above species with some doubt, but we have seen no characters by which it can be distinguished. No. 10. Near Smoky Hill river.

Allorisma? Leavenworthensis, Meek and Hayden. Proc. Acad. Nat. Sci. Phila. December, 1858, p. 263. Upper Coal measures, Leavenworth city.

Allorisma subcuneata, Meek and Hayden. Proceed. Acad. Nat. Sci. Phila. December, 1858, p. 263. Locality and position same as last.

Allorisma? altirostrata, Meek and Hayden. Proceed. Acad. Nat. Sci. Phila. December, 1858, p. 263. Upper Coal measures, Grasshopper creek.

Allorisma? Cooperi, Meek and Hayden. Proceed. Acad. Nat. Sci. Phila. December, 1858, p. 264. (*Panopæa Cooperi*, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2, 1858.) Near Helena, in upper Coal measures.

Leptodomus granosus, Shumard. Trans. Acad. Sci. St. Louis, vol. i, p. 207. Upper Coal measures, near summit of hills, back of Leavenworth city; also near Leavenworth landing.

Gasteropoda.

Pleurotomaria humerosa, Meek and Hayden. Proceed. Acad. Nat. Sci. Phila. December, 1858. In upper Coal measures, at Grasshopper creek.

Pleurotomaria subturbinata, Meek and Hayden. Proceed. Acad. Nat. Sci. Phila. December, 1858, p. 264. Locality and position same as last. In the Proceedings of the Academy above cited, the locality of this species is *erroneously* given as at Helena.

Bellerophon ——*?* We found a small undetermined species of this genus in Division 10. On Smoky Hill river and near Cottonwood creek; also casts of a large species at Leavenworth landing and Grasshopper creek, in the upper Coal measures.

Euomphalus ——*?* The species here alluded to was found in Nos. 11 and 37 of the foregoing general section. Either it or a very closely allied species also ranges far below this in the upper Coal measures. It is nearly related to, if not identical with a species Prof. Hall has described in the Iowa Report, under the name of *E. rugosus*.

Cephalapoda.

Nautilus eccentricus, Meek and Hayden. Trans. Albany Inst. vol. iv, March 2, 1858. Smoky Hill river, Division No. 10.

FISHES.

Xystracanthus arcuatus, Leidy. Upper Carboniferous rocks at Leavenworth landing.

Cladodus occidentalis, Leidy. Division No. 37 of foregoing general section. At Manhattan.

Petalodus Alleghaniensis, Leidy. Jour. Acad. Nat. Sci. vol. iii, p. 161. Division No. 10 of foregoing general section. Fort Riley.

CHAPTER X.

V. JURASSIC SYSTEM.

The Black hills have up to this time afforded the most satisfactory evidence of the existence of this system in the West. It is there brought to the surface by the upheaval of the older rocks in the form of a belt or zone, five to fifteen miles in width, engirdling the principal axis of elevation. The group of rocks, which we have supposed to belong to this period, are characterized by beds of variegated argillaceous and calcareous grits, sand and sandstone, with seams and beds of gypsum, varying from one inch to twenty feet in thickness. The gypsum seems to form a portion of a series of brick-red beds, composed of argillaceous and calcareous grits, which give a remarkably picturesque appearance to the external features of the country, where these Jurassic rocks are exposed. None of the organic remains already discovered, which are quite numerous in species, are positively known to be identical with those found in rocks of the same age in the Old World, but they belong to the same genera, and many of the species are so closely allied to forms characteristic of the Jura of Europe, that we cannot now hesitate to admit this system into our series. In a paper by F. B. Meek and the writer, published in the Proceedings of the Academy of Natural Sciences of Philadelphia, March, 1858, the following list of fossils was given with comparisons showing their affinities to well-known Jurassic forms. This evidence I will here repeat with such additional proof as I have been able to secure by our investigation of the undescribed fossils in the collection up to the present time.

1. *Pentacrinus asteriscus*, Meek and Hayden, is so nearly like the Liassic *P. scalaris* (Goldfuss), that it is with some hesitation we have regarded it as new.

2. *Avicula* (*Monotis*) *tenuicostata*, M. and H., is very closely related to *M. substriata* of Munster, from the Lias.

3. *Arca* (*Cucullæa*) *inornata*, M. and H., is very similar to C. Munsteri (Zeiten), also from the Lias.

4. *Panopæa* (*Myacites*) *subelliptica*, M. and H., is similar to the Liassic forms *M. liasensis* and *M. Alduinensis* of Quensted.

5. *Ammonites cordiformis,* M. and H., is of the same type as the Oolitic species *A. cordatus* (Sowerby).

6. *Belemnites densus,* M. and H., is scarcely distinguishable from the Oolitic species *B. excentricus* (Blairville), if indeed it is really distinct.

Among the undescribed fossils from the supposed Jurassic rocks of the Black hills, are a species of *Hettangia*, a genus not known to occur in the Old World in formations newer than the Lias, an *Ostrea,* scarcely distinguishable from a form figured by Quensted in his work on the Jura, and a *Trigonia* more nearly resembling Jurassic types than those of any other formation.

VI. Cretaceous System. Upper, Middle, and Lower.

This system holds a very important position in the Northwest, not only from the vast area which it occupies, but also from the number, variety and beauty of its organic remains. The Cretaceous rocks as they appear in ascending the Missouri, have been separated into five divisions, which present well-marked lithological differences, and contain for the most part, distinct species of organic remains. From the following vertical section of the Cretaceous rocks of the Upper Missouri and the catalogue of Cretaceous fossils, it will be seen that formation No. 1 seems to constitute palæontologically an independent division, none of its organic remains ranging in other formations above or below. Nos. 2 and 3 appear to form one group, the *Ostrea congesta* and *Inoceramus problematicus* passing from one to the other. Divisions 4 and 5, which are the most fossiliferous formations on the Upper Missouri, contain many species in common, especially of the Cephalopoda, and therefore form a third group.

The Cretaceous system, as developed on the Upper Missouri, therefore forms lithologically five well-marked subdivisions, while palæontologically it admits of separation into but three independent groups. The age and geological position of Divisions 2, 3, 4 and 5 have been sufficiently attested by the numerous species of organic remains, which have been published from time to time by F. B. Meek and the writer. In regard to the age of No. 1, much doubt existed, until we had an opportunity to examine a fine series of Dicotyledonous leaves, discovered by the writer in this formation near Blackbird hill on the Missouri, while attached to Lieutenant Warren's party, in 1857. These leaves proved to us that the formation under consideration could not be older than Cretaceous. I will have occasion to allude to this point again in a subsequent part of this report.

VERTICAL SECTION OF THE CRETACEOUS FORMATIONS OF NEBRASKA TERRITORY, SO FAR AS DETERMINED.

		Subdivisions.	Localities.	Estimated thickness.
No. 5.		Gray and yellowish arenaceous clays and sandstones at many localities, very ferruginous, with numerous concretions and a profusion of molluscous fossils, as *Belemnitella bulbosa*, *Nautilus Dekayi*, *Ammonites placenta*, *A. lobatus*, *Scaphites Conradi*, *Baculites ovatus*, *Ostrea subtrigonalis*, and a great number of marine mollusca.	All around the Black hills and head waters of the Shyenne, Moreau trading post, and under the Tertiary at Sage and Bear creeks; at the head of Teton river and at Long lake on the Missouri.	100 to 150 feet.
No. 4.		Bluish and dark gray plastic clays, containing *Nautilus Dekayi*, *Ammonites placenta*, *A. Hulli*, *Baculites ovatus*, *B. compressus*, with numerous other marine mollusca,—remains of *Mosasaurus*. Along the Missouri river, below Fort Pierre, there is a local bed at the base of No. 4, composed of dark, very unctuous clay, containing much carbonaceous matter, with veins and seams of selenite, sulphuret of iron, and fish scales. 20 feet.	Around the Black hills; a great area around Fort Pierre, and along the Missouri. Under No. 5 at Sage and Bear creeks, along the Shyenne at Great Bend; on the Yellowstone and near Milk and Musselshell river.	350 feet.
No. 3.	100 feet.	Lead gray calcareous marl weathering above to a yellowish tint; scales and other remains of fishes; *Ostrea congesta*, passing downwards into	In the valley of Old Woman's creek; at Bear peak; around the Black hills and the sources of the Shyenne; in the bluffs along the Missouri, from Big Sioux river to Great Bend.	150 feet.
	30 feet.	Light gray yellowish limestone, containing great numbers of *Inoceramus problematicus*, *Ostrea congesta*, and fish scales.		
No. 2.		Dark gray laminated clay, with teeth and scales of fishes, *Ammonites alpinianus*, *A. percarinatus*, *Serpula tenuicarinata*, *Inoceramus problematicus*, a small oyster like *O. congesta*, &c.	Old Woman's creek; Black hills; along the Missouri river from ten miles above James river to Big Sioux river.	200 feet.
No. 1.		Yellowish and reddish friable sandstone, with alternations of dark and whitish clays. Seams and beds of impure lignite, fossil wood, impressions of dicotyledonous leaves; *Solen*, *Pectunculus*, *Cyprina*, &c. Lower Cretaceous.	Old Woman's creek; Black hills; near the mouth of Big Sioux river; Lower Platte; near Judith river.	100 to 200 feet.

Formation No. 1 of the Vertical Section.

In ascending the Missouri, No. 1 is first seen in the form of outliers overlapping the Carboniferous limestones near the mouth of the Platte. At De Soto it occupies the whole country, though concealed for the most part by grassy slopes. The first exposure along the Missouri occurs near Wood's bluffs, right bank, about one hundred and seventy miles above the mouth of the Platte. We have here a yellowish gray friable sandstone, twenty to thirty feet exposed, and overlying this, a recent deposit of water-worn pebbles, cemented by the hydrated oxide of iron, very deep rust color, 6 to 8 feet. Succeeding this in ascending order, 30 to 40 feet of yellow silicious marl. At Chalk bluffs about forty miles below the mouth of Big Sioux river, occurs the finest exposure of No. 1 along the Missouri.

	Feet.
1. Eight inches of earthy lignite, resting upon twelve inches of yellowish drab arenaceous clay, this in turn underlaid by eight inches of impure lignite.	
2. Ferruginous rather coarse-grained friable sandstone, ...	60 to 80
3. Yellow plastic or unctuous clay, toward the top becoming grayish blue, contains flat argillaceous iron concretions. Seen only during low water, ...	2

Overlying bed 1 are eight to twelve feet of ash-colored clay, which I suspect belongs to formation No. 2 of our general section. If so, it is an outlier, and the first indication of its appearance in ascending the river.

At this place I was unable to discover any well-preserved organic remains. In small seams of clay interstratified with the sandstone some traces of vegetable impressions were observed, and in some ferruginous concretionary sandstone some imperfect fragments of a plant resembling an *Equisetum*.

The next exposure of No. 1 is in a range of hills about two miles below the mouth of Big Sioux river, on the left bank of the Missouri. The sandstone at this point is quite variable in its character and structure. The whole forms a large concreted mass of rock of a dark dull reddish color, sometimes red or yellow, differing according to the amount of ferruginous matter contained in it. Only about twenty feet are exposed at this point. About fifteen feet above the base of the exposure, the rock has a compact silicious character, and from this portion is obtained the stone for building purposes. Near the top it becomes a friable coarse-grained ferruginous sandstone with dark purple nodules. These nodules possess merely a thin shell and are formed by concretionary action. A thin stratum occurs at this locality, filled with shells, of which casts only are obtained. The calcareous matter which formed the substance of the shells has been dissolved away, so

that most of their specific characters have been obliterated. The most abundant fossil is the *Pectunculus Siouxensis*, Hall and Meek. Great quantities of sulphuret of iron are found throughout the bed.

Passing up the Big Sioux river, about two miles above its mouth, the bed of lignite before mentioned is seen, two to two and a half feet in thickness, underlaid by sandstone, the same as seen at Wood's bluffs, Chalk bluff, &c. Here I found in considerable numbers a species of *Cytherea*. The lignite bed is exposed for several miles up the Big Sioux. Six miles above its mouth we have impure lignite, about twelve inches in thickness, underlaid by alternate layers of ferruginous sandstone, loose sand, yellow and ash-colored arenaceous clays, and fine whitish clay. The strata containing clay have quite distinct impressions of leaves, which belong to dicotyledonous trees. There were also some fine impressions in a dark gray though concretionary silicious rock. Two miles below the mouth of Iowa creek, on the Missouri, is a fine exposure of No. 1, in a bluff cut by the river; it contains at this locality large numbers of sandstone concretions, arranged in the coarse sand in horizontal strata. Great quantities of the sulphuret of iron are seen here in crystals or in large tabular masses, a fresh fracture of which has much the appearance of cast iron.

In the Platte valley, about four miles above the mouth of the Platte, No. 1 is first seen in a thin outlier, resting directly upon the limestones of the upper Coal measures. At the mouth of Elkhorn river, the limestones pass beneath the water-level, and No. 1 occupies the country until we reach a point about thirty miles above the mouth of Loup fork, where it is in turn concealed by the overlapping edges of No. 3, and the Pliocene and Miocene Tertiary beds of the Bad Lands of White river. Continuing a northwest course we do not meet again with No. 1 until we reach the valley of Old Woman's creek, a branch of the south fork of the Shyenne. It is here exposed over a small area by upheaval, and presents the same lithological characters as on the Missouri. Around the Black hills are a series of beds, supposed to belong to No. 1, exposed by the uplift of the mountains in the form of a belt or zone, which attain a thickness of 200 to 250 feet.

Returning again to the Missouri river, we take leave of the sandstone, which forms the type of our No. 1, near the mouth of Iowa creek; then succeed in regular order Cretaceous formations Nos. 2, 3, 4 and 5, and the Tertiary beds of the lignite basin. Near the mouth of Milk river, Cretaceous formation No. 4 rises to the surface, but 2 and 3 are wanting in this region. Near the mouth of Little Rocky Mountain creek, a bed of coarse-grained gray sandstone, variable in color and structure, rises above the water's edge from beneath the well-known Cretaceous formation No. 4 of section. In its lithological characters this bed of sandstone seems to resemble our No. 1, with which we have placed it provisionally, though we have no certain evidence that a single species of organic remains was common to both.

Although the group of beds observed along the Missouri river, near and below the mouth of the Judith, which we have referred provisionally to No. 1, has revealed many important facts to the geologist and palæontologist, yet the organic remains differ specifically from those of any other formation with which we are acquainted in the Northwest, so that we are unable to fix with certainty its exact position in the geological scale. We are confident, however, that the fossils for the most part belong to Cretaceous types, although some of the remains seem to point to the Jurassic. We have, therefore, regarded these beds as Lower Cretaceous, though we have no evidence as yet that they are on a parallel with No. 1 as revealed along the Missouri below the Big Sioux.

Having given the details of the geology of this group of beds in a memoir already published in the Transactions of this Society, I will not repeat them here in full, but in a subsequent chapter will present such additional information as I have been able to obtain. The following section will show approximately the lithological characters and order of succession of these deposits. The great disadvantage under which I labored and the hostile attitude of the Indians rendered it, much to my regret, impossible for me to examine this region over a large area to form a connected section of all the beds in detail. To attain so desirable a result will be the object of my exploration the coming season.

Section of the older Deposits at the Mouth of Judith River, in descending order.

Feet.

1. Yellowish and reddish rather coarse-grained sandstone, becoming deep red on exposure, containing *Inoceramus ventricosus, Mactra alta, Cardium speciosum*, &c. &c., ... 20 to 25
2. Mixed pure and impure lignite, whole bed containing many crystals of selenite and a yellowish substance like sulphur. The masses of lignite when broken reveal in considerable quantities small reddish crystalline fragments of a substance having the taste and appearance of rosin, ... 6 to 8
3. Variable strata of drab clay and gray sand and sandstone. Upper part containing large numbers of *Ostrea glabra*. Near the middle there are gray or ash-colored clays with very hard bluish gray, granular, siliceous concretions containing *Hettangia Americana, Panopæa occidentalis, Mactra formosa*, &c. &c., 80 to 100

A fine collection of fossils were obtained from these marine deposits, which will appear with the catalogue of Cretaceous species. Underlying these beds, where upheaved, were seen a series of variegated strata, clay, sands, &c., which undoubtedly are of Jurassic age.

Formation No. 2 of General Section.

This formation is first revealed in thin outliers below the mouth of Big Sioux river, and on the Big Sioux six miles above its mouth, it caps the bluffs, apparently mingling to some extent with the succeeding bed, and containing at this locality large numbers of *Inoceramus problematicus* and fragments of fishes. Near the mouth of Iowa creek and above, it shows

itself worthy of a separate position in the series. It is composed of a dark leaden gray plastic clay, containing few fossils, but great quantities of sulphate of lime in crystals, which assume a variety of beautiful forms. Its greatest thickness is seen about five miles below the mouth of James river.

Below the mouth of Vermilion river we have a perpendicular exposure showing Nos. 1, 2 and 3 in their order of superposition.

a. Gray and lightish yellow calcareous marl, containing in great numbers *Inoceramus problematicus* and comminuted fish remains. 40 feet. No. 3 of general section.

b. Dark plastic clay, with abundant fish remains in a fragmentary condition, also *Ammonites percarinatus, Serpula tenuicarinata*, and a species of *Ostrea* like *O. congesta*. 30 to 40 feet. No. 2 of general section.

c. Ferruginous sand-bed just above water's edge. At low water are seen large quantities of arenaceous concretions, with vegetable impressions and a species of *Pharella*. No. 1 of general section.

At this point *c* represents No. 1 as it dips beneath the water-level of the river; *a* No. 3 when it is seen for the first time largely developed and forming an independent bed.

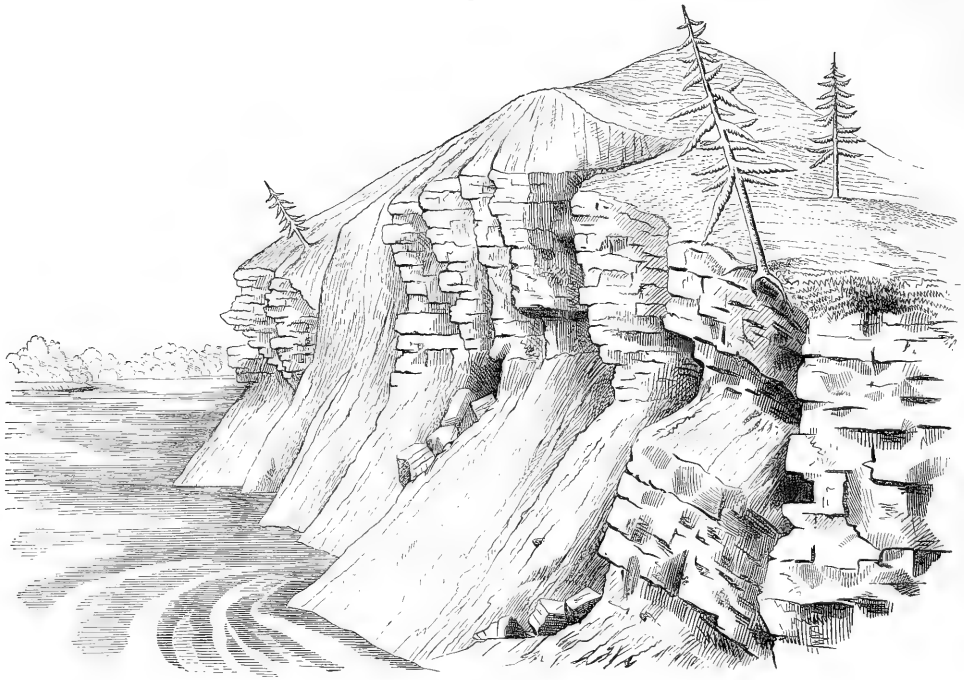
About five miles above the mouth of Vermilion river, on the right side of the Missouri, No. 2 is finely exposed. It here contains several layers of a very hard, compact, dark gray, concretionary limestone. The fossils observed at this locality were an *Ammonite*, *Cytherea*, and quite numerous well-preserved teeth and other remains of fishes. At Dixon's bluffs I found *Serpula tenuicarinata*, an *Ostrea*, perhaps *O. congesta*, and large masses of the sulphuret of iron. Twelve miles above the mouth of James river, No. 2 is only about ten feet above the water's edge. At this locality overlying No. 2 is seen, quite well developed, formation No. 3, with *Ostrea congesta*, and above it, capping the hills, the first appearance of formation No. 4, in a thin outlier. No. 2 is exposed over a small area by the upheaval of the older rocks in the valley of Old Woman's creek, a tributary of the south fork of the Shyenne. It is also a very conspicuous bed around the Black hills, presenting the same lithological characters as on the Missouri, and containing a great abundance of fossils, *Ammonites, Scaphites*, *Cytherea*, *Ostrea*, &c., with large quantities of fish remains. It here attains a thickness of about 200 feet.

Formation No. 3 of General Section.

The geographical extension of this formation and its influence on the scenery render it one of the most interesting on the Upper Missouri. It is first seen in thin outliers at and a short distance below the mouth of the Big Sioux, and becomes quite conspicuous on the summits of the bluffs ten miles above Iowa creek. At Dorion's hills there is a fine section of this bed, about eighty feet exposed above the water's edge, containing its most abundant

and characteristic fossil, *Ostrea congesta*. From there it continues to be the predominant formation until we reach the foot of the Great Bend, when it passes by a gentle dip beneath the water-level of the Missouri. In many places, as opposite the mouth of Niobrara river, it is shown in the form of a long series of precipitous bluffs, giving a pleasing variety to the general monotony of the scenery. This is one of the principal characteristic external features of this formation. (See fig. 10.)

Fig. 10.



The upper portion of this rock is a yellowish and gray calcareous marl, very soft and yielding, so that it is easily cut up into numerous ravines by the temporary streams, and thus the bluffs along this part of the Missouri often present the appearance of a series of cones. At the mouth of the Niobrara the upper portion, about twenty feet in thickness, is much softer than that below, and is of a deep yellow color from the presence of ferruginous matter, and the lower portion is in the form of large square masses of gray limestone, set in the yellow material, which acts as a kind of mortar or cement. The vertical walls of the bluffs resemble very much the labors of some gigantic mason, so regular are they in their structure.

In the vicinity of Bijoux hills this formation seems to have been much depressed or to have suffered denudation prior to the deposition of No. 4, not more than twenty or thirty feet being exposed above the water-level. About twenty miles above this point a thickness of sixty or seventy feet is seen. Near the mouth of White river I found in this bed a large mass of calcareous spar, six feet in length and eighteen inches in thickness, also nodules of limestone formed of concentric coats, which is, I think, the same described by Nicollet as "cylindrical limestone resembling Arragonite."

Although so well developed and covering so wide an area on the Missouri, the middle and upper portions at least, of this rock can never be made useful for building purposes. Quite soft and friable in place, when detached it absorbs moisture rapidly and crumbles in pieces. Being a rich calcareous marl, it may be used at some future time as a fertilizer.

The fossils of this formation, although belonging to few species, so far as yet known, are numerous in individuals. A species of oyster (*O. congesta*) is found in great quantities throughout the bed, and in localities *Inoceramus problematicus* is abundant. Fish remains, though consisting mostly of scales and obscure fragments, are disseminated throughout the deposit, several species of which have already been identified and described by Dr. Leidy.

Near First Cedar island a very singular bed makes its appearance, superimposed on No. 3, which may be considered as probably forming an upper member of this formation. It extends up the Missouri about eighty miles to a point near the Great Bend; lithologically it is a dull black unctuous clay, entirely destitute of any grit, and does not effervesce with an acid. It contains some carbonaceous matter, great quantities of selenite in crystals, in thin laminæ, and in thick rhomboidal masses. In a number of localities I noticed fish remains, but no other organic bodies. In several places the carbonaceous matter of this bed has been ignited, producing heat enough to give to the surrounding strata a brick-red color, and the slabs of clays thus affected by the heat give a ringing sound under a blow of the hammer. Ten miles below the mouth of White river this rock has been subjected to a considerable degree of heat for several yards, so that the surrounding strata present an appearance similar to those which have been affected by the burning of the lignite beds on the Yellowstone. The superincumbent beds have from this cause fallen in some instances fifteen or twenty feet below their original position. Mr. Nicollet, in his interesting report on this region, examined these phenomena with great care, and I cannot do better than to quote his explanation of them: "These pseudo-volcanic phenomena may be compared with those described as occurring in other portions of the globe under the name of *terrains ardens*, although they are not here accompanied by the emission of flames. They are evidently due to the decomposition, by the percolation of atmospheric waters to them, of beds of pyrites, which, reacting on the combustible materials, such as lignites and other substances of a vegetable nature in their vicinity, give rise to spontaneous combustion,

while further reactions—well understood by the chemist—upon the lime contained in the clay bed, produce the masses and crystals of selenite that are observed in the lower portion of this interesting deposit. This is the theory which, with some little confidence, we have formed of these pseudo-volcanoes."

About two miles above the mouth of White river, the burnt appearance is again visible in this bed. Near this locality there is a seam formed of an accumulation of saline matter, a yellow substance like sulphur, selenite, and the hydrated peroxide of iron, three feet in thickness, the whole presenting a variety of colors. Large masses have fallen down at the base of the bluffs.*

Formation No. 4 of General Section.

This formation is geologically the most important one in the Cretaceous system of the Northwest, not only from its thickness and its geographical distribution, but also on account of its influence on the agricultural capacities of the country. It is only second in interest to the succeeding bed in number, beauty, and variety of its organic remains. Commencing about ten miles above the mouth of James river, where it is seen only in thin outliers, capping the distant hills and bluffs, it continues, gradually assuming a greater thickness as we ascend the Missouri, until we reach the Great Bend, where it monopolizes the whole region, giving to the country underlaid by it a most gloomy and sterile aspect. At the Great Bend it attains a thickness of two hundred feet, and continues to occupy the country bordering the Missouri to the mouth of Grand river, where, in consequence of the northwesterly dip of the strata, it passes gradually beneath the water-level of the river.

The general lithological character of the formation, the boundaries of which have been described above, is a dark ash-colored clay, varying, however, in color and structure in different localities. From the Great Bend to the mouth of the Shyenne river, it shows but little of its shaly character. Its general stratification is horizontal, but the layers are broken into numerous irregular fragments. Not unfrequently the layers of clay have a seam of gray sand between them. This bed contains great quantities of a whitish saline substance,† a yellow material like sulphur, and an abundance of ferruginous matter, which

* Since this report was written I think I have obtained good evidence that the bituminous bed forms the base of No. 4 instead of the top of No. 3. In several places near Bijoux hills the surface of the marly portion of No. 3 exhibits the appearance of erosion to a considerable extent prior to the deposition of the bituminous clays.

† This white substance is found disseminated to a greater or less extent throughout all the Cretaceous and Tertiary beds of the Northwest. It effloresces on the surface of the hills or bluffs, giving them a snow-white appearance. It impregnates the water that issues from or flows over these beds, rendering it exceedingly disagreeable in its taste and purgative in its effects. It sometimes covers an area of considerable extent where the water has dried away in the autumn from a depression in the surface. Near the mountains it is sometimes seen covering the

often discolors the banks of the river. At the Great Bend, a local variation occurs in No. 4, near the summit of the hills. It is a seam two to six feet in thickness, of very fine light buff-colored clay, containing no fossils, and is visible only for a few miles.

After passing the mouth of Great Shyenne river, a slight change occurs in the lithological character of the upper portion of this formation, thence to the Moreau river it exhibits a laminated or shaly structure, and a dark silvery or leaden gray color. These characters are seen on the Moreau river eighty miles above its mouth, also at Sage creek near the Bad Lands.

After dipping beneath the water-level of the Missouri, between Grand and Cannon-ball rivers, this formation again rises to the surface near Quaking Asp river, in longitude 109°, by a reversed inclination of the strata. Its first appearance is in a little tributary of the Missouri, and is seen only for about a hundred yards, yet presenting its peculiar characters.

Thirty miles below the mouth of Milk river it is revealed by the reverse dip above referred to, for the first time along the Missouri, after leaving a point near Cannon-ball river, under the northern portion of the great lignite Tertiary basin. It here has a thickness exposed of forty to sixty feet, presenting the same general character as at the Great Bend. It contains numerous flat masses of rock arranged in horizontal layers in the exposure, with a few fossils. Just below the mouth of Porcupine river, there is a high range of bluffs, presenting a good exposure of this bed, containing fine argillo-calcareous concretions, fully laden with organic remains of the genera *Ammonites*, *Baculites*, *Inoceramus*, &c. I notice that the Inocerami seem to have existed in vast numbers to the exclusion of other forms. No. 4 continues to attain a greater thickness as we ascend the Missouri, until we come in the vicinity of Round butte, where we find it to be two hundred to two hundred and fifty feet. Here it is overlaid by a ferruginous sand-bed, composed in part of immense ledges of concretionary sandstone. No fossils were observed in it, yet I think it is the upper portion of No. 5, or a transition bed between the Cretaceous and Tertiary. Below the mouth of Mussel-shell river, as well as above, indeed wherever this formation is exposed in this region, its peculiar fossils are found in great abundance. Near the mouth of Mussel-shell river, I found an *Inoceramus* fifteen inches long and

ground to the depth of five or six inches, and is used by the traders in their culinary operations as a substitute for saleratus. Dr. Hayes of Boston made an analysis of an impure specimen obtained near Fort Benton, in Gov. Stevens's expedition, with the following result:

100 parts.
- Moisture=3.20.
- Sulphate of lime=5.60.
- Sulphate of alumina and iron=3.25.
- Sulphate of soda=43.40.
- Insoluble sand=44.00.

twelve broad, *Ammonites* eighteen inches to two feet in diameter, also the vertebræ of a huge Cetacean. Near Little Rocky Mountain creek, No. 4 begins to rise toward the summit of the hills, and about fifty miles below the mouth of the Judith it caps the bluffs, still containing its characteristic fossils. It continues to be seen in thin outliers to the vicinity of Fort Benton, perhaps even farther, but its limits in that direction have not yet been ascertained.

On the Yellowstone river I observed this formation in but one locality, about eighty miles above the mouth of that river. The Cretaceous strata here have an extent of only about eight miles, and are exposed only along the banks cut by the river, yet in that space they reveal the remains of marine mollusca in a profusion which I have seen in no other locality. In ascending the river its first appearance is a lightish blue clay, containing a few concretions. At its best exposure above the water's edge, we have the following section:

a. Dark ash-colored clay, upper part of a bluish cast, slightly indurated, filled with concretions fully charged with shells. The fossils are so abundant in the concretions that they form large masses of shell conglomerate, cemented with a fine blue calcareous clay, exceedingly hard and breaking with an irregular fracture. This is probably but an extension in a northwest direction of the same shell zone seen at Moreau and Grand rivers, forks of Shyenne, Sage creek, &c. 20 feet.

b. A very dark indurated clay, presents similar characters to its equivalent at Great Bend, and contains fewer fossils than the bed above.

The fossils of bed *a* indicate a blending of formations 4 and 5. The whole thickness of Cretaceous rocks exposed on the Yellowstone at this locality is not more than twenty-five feet, and the distant hills on either side are composed of Tertiary beds.

We will now return to White or Smoking Earth river below Fort Pierre, and trace this formation into the interior of that interesting region. Passing up the valley of White river, we find it occupying the country bordering upon that stream for about fifty miles above its mouth. Near this point outliers of the White river Tertiary basin begin to cover the highland, and No. 4 is seen along the river for about twenty miles farther, when it is concealed by Tertiary strata. The intervening country east and northeast of the Bad Lands to the Shyenne river, a distance of one hundred and fifty miles, is for the most part underlaid by this bed, except an extension of Fox ridge, to the sources of the Teton river, which is composed of formation No. 5 of the vertical section. The extensive area drained by the Shyenne river is composed of No. 4, excepting the sources of a few of its tributaries. Sage and Bear creeks take their rise in the White river Tertiary basin, but flow mostly through this formation, revealing large quantities of Cretaceous fossils. A few small tributaries have their origin in the Fox ridge, and Cherry river has its source in the Lignite Tertiary basin, near the head waters of the Little Missouri.

In summing up the extent of country underlaid by this great formation, we find that south of the Lignite basin, it occupies an area of two hundred miles in length and one hundred in breadth, or twenty thousand square miles. North of the Great Lignite basin, commencing at its first appearance near Milk river, we find it covering an area of two hundred miles in length and sixty in breadth, or about twelve thousand square miles. I have been thus particular in estimating its approximate limits and extent of surface, on account of its influence on the future destiny of that region. Wherever this deposit prevails it renders the country more completely sterile than any other geological formation I have seen in the Northwest. We see from the above estimate that it renders barren over thirty thousand square miles of the valley of the Missouri.

The organic remains of this formation are too numerous to mention in detail. The lower and upper members appear to be very fossiliferous, while the intervening portion, of considerable thickness, contains only a few imperfect specimens of *Cephalopoda* and the bones of *Mosasaurus Missouriensis*. The strata dip toward the northwest below Fort Clark. At the Lower Bend, which seems to be formed of the lower portion of No. 4, contains its peculiar fossils in great numbers. They are found in the loose clay or in tough argillo-calcareous concretions, and many fine specimens are found along the shore of the river at low water. We then have an interval of about two hundred and fifty miles, to a point near the mouth of Grand river, wholly occupied by No. 4, in which are only the few imperfect specimens of fossils before mentioned. Near the mouth of Grand river the upper members yield an abundance of organic remains, many of which are specifically identical with those occurring at the Great Bend, with many new and interesting forms. At Sage creek and along the Shyenne river above its forks are noted localities for fossils. *Baculites* are found in great perfection and beauty, *Ammonites placenta* occur three feet in diameter, and a peculiar fossil, having a columnar structure like some forms of coral, *Caprinella coraloidea* (Hall and Meek), which is known only in this region. On the Yellowstone many new forms are found, mostly belonging to small *Acephala* and *Gasteropoda*, and the only species of *Echinoderm* yet known in the Cretaceous rocks of the Northwest occurs at this locality. Above Milk river this formation is filled with fossils, revealing, in addition to many of the forms occurring in the localities already mentioned, a large number of new species, as *Gervilia subtortuosa*, *Ostrea patina*, *Ammonites Halli*, &c. For the complete list of the fossils occurring in each formation the reader is referred to the catalogue at the close of the remarks on the Cretaceous formations.

Formation No. 5 of Vertical Section.

This very interesting bed, though differing lithologically from the preceding one, contains many of the same species of fossils. It is worthy, however, of a distinct position in

the series, not only from its extent, thickness, and difference of composition, but also from the more favorable influence that it exerts upon the country underlaid by it. In ascending the Missouri river it first makes its appearance near the mouth of Grand river, about one hundred and fifty miles above Fort Pierre. Near Butte aux Gres it becomes quite conspicuous, acquiring a thickness of eighty or one hundred feet, and containing great quantities of organic remains. Here it forms an extension of what is called Fox ridge, a series of high hills, having a northeast and southwest course, crossing the Missouri river into Minnesota at this point. Its northeastern limits I have not ascertained. In its southwestern extension it continues for a considerable distance nearly parallel with the Missouri, crosses the Moreau river about thirty miles above its mouth, then forms a high dividing ridge between the Moreau and Shyenne rivers, at which locality it first took its name. Continuing thence its southwesterly course, it crosses the Shyenne, and is seen again in its full thickness at the heads of Opening creek and Teton river, forming a high ridge, from which tributaries of the Shyenne and Teton take their rise. The little streams flowing into the Shyenne have a northwesterly course, while those emptying into the Teton take a southeasterly direction. We thus find that this bed underlies an area of about two hundred miles in length and fifty miles in breadth, or about ten thousand square miles.

The general character of formation No. 5 is a yellow arenaceous and argillaceous grit, containing a great amount of ferruginous matter and in localities a profusion of organic remains. It forms a much more fertile soil, sustains a more healthy and luxuriant vegetation than formation No. 4, and abounds in springs of good water.

Like No. 4 this formation yields in the greatest abundance quite perfect and well-preserved organic remains. Many of the species approximate so closely to Tertiary forms that, did we not everywhere find them associated with *Ammonites*, *Scaphites*, *Baculites*, and other genera which are not known to have existed later than the Cretaceous epoch, we should at once pronounce the formation in which they occur to belong to the Tertiary period. Fossils are found throughout this formation to a greater or less extent, and the species are too numerous to mention any but the most characteristic and abundant ones. The greatest proportion of the species are restricted to this bed; and those which are common to it and formation No. 4 are chiefly *Cephalopoda*, which everywhere have an extensive vertical as well as geographical range. At Butte aux Gres on the Missouri we find great quantities of fossils inclosed in tough ferruginous silicious concretions, as *Scaphites nodosus*, *S. Conradi*, *Nautilus Dekayi*, a most abundant bivalve, *Mactra Warrenana*, &c. Along the Moreau river and on Fox hills, *Busycon Bairdi*, *Cucullæa Nebrascensis*, *C. Shumardi*, *Fusus Haydeni*, occur in great numbers. At the head of Teton river, where this formation attains a great thickness and presents its usual lithological characters, very few fossils are found, a single fish-tooth, a small undescribed mollusc, and a few impressions

on sandstone, supposed to be trails of Planarian worms, are all the organic remains yet known from this locality. At Sage creek and on the Yellowstone, where the Cretaceous rocks are exposed, the fossils indicate a blending of Nos. 4 and 5. Wherever No. 5 is exposed in the vicinity of Tertiary beds the strata of both the White river and lignite basins repose directly upon it. It covers a large area around the Black hills, but its entire limits are not yet known.

The following catalogue of Cretaceous fossils taken from a paper published by Mr. Meek and myself in the Proceed. Acad. Nat. Sci. Phila. Oct. 1860, is so arranged as to show the stratigraphical position as well as vertical range of each species, and the reader is referred to the vertical section of the Cretaceous rocks of the Northwest.

"Of the 194 Cretaceous species and varieties enumerated in the following catalogue, seven are common to the Nebraska and New Jersey beds, viz.: *Nautilus Dekayi*, *Ammonites placenta*, *A. complexus*, *A. lobatus*, *Scaphites Conradi*, *Baculites ovatus*, and *Gryphœa vesicularis?;* and the following five species are probably common to Nebraska and foreign localities, viz.: *Nautilus Dekayi*, *Inoceramus problematicus*, *Gryphœa vesicularis*, *Cucullœa fibrosa*, and *Microbacia coranula*."*

	Formations in ascending order.				
	1	2	3	4	5
CRETACEOUS SPECIES.					
ARTICULATA.					
ANNELIDA.					
TUBICOLA.					
Serpula? tenuicarinata, M. & H. May 1857, Pr. Acad. Nat. Sci. Phil. 134,		*			
MOLLUSCA.					
CEPHALOPODA.					
TEUTHIDÆ.					
Phylloteuthis subovatus, M. & H. May 1860, Pr. Acad. Nat. Sci. Phil. 175, .					*
BELEMNITIDÆ.					
Belemnitella bulbosa, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 70, .					*
NAUTILIDÆ.					
Nautilus Dekayi, Morton, 1834, Synop. Or. Rem. 33, pl. 8, fig. 4, and pl. 13, fig. 4, ...				*	*
AMMONITIDÆ.					
Ammonites percarinatus, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v. N. S. pl. iv, fig. 2, ...				*	
Ammonites vermilionensis, M. & H. May 1860, Pr. Acad. Nat. Sci. Phil. 177, ...		*			
Ammonites complexus, Hall & Meek, 1854, Mem. Am. Arts and Sci. Boston, v, N. S. 394, pl. iv, fig. 1, ...				*	

* See remarks accompanying the paper from which this Catalogue is taken.

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Ammonites Halli, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 70, . .				*	
Ammonites placenta, Dekay, 1827, New York Lyc. Nat. ii, pl. 5, fig. 2. (Non *A. placenta* Leckenby, 1858.)				*	*
Ammonites placenta, var. *intercalaris*, M. & H. Pr. Acad. Nat. Sci. Phil. 177,				*	*
Ammonites lobatus, Tuomey, 1854, Pr. Acad. Nat. Sci. Phil. vii, 168, . . *Ammonites lenticularis*, Owen, 1852. Report Iowa, Wiscon. and Min. tab. 8, fig. 5. (Non *A. lenticularis* of Phillips, 1825.)					*
Scaphites Mandanensis, Morton sp. . . . . *Ammonites Mandanensis*, Morton, 1841, Jour. Acad. Nat. Sci. Phil. viii, 208, pl. 10, fig. 2. *Scaphites Mandanensis*, Meek & Hayden, Nov. 1836, Pr. Acad. Nat. Sci. Phil. 281.					*
Scaphites abyssinus, Morton sp. . . . . *Scaphites Mandanensis?* Meek & Hayden, Nov. 1836, Pr. Acad. Nat. Sci. Phil. 281.					*
Scaphites Cheyennensis, Owen sp. . . . . *Ammonites Nebrascensis*, Owen, 1852. Report Wisc. Iowa and Min. pl. vii, fig. 2. *Ammonites Cheyennensis*, Owen, " " " pl. viii, fig. 2. *Ammonites Moreauensis*, Owen, " " " pl. viii, fig. 2. *Scaphites Conradi* (pars) Meek & Hayden, Nov. 1856, Pr. Acad. Nat. Sci. Phil. 281.					*
Scaphites Conradi, Morton sp. . . . . *Ammonites Conradi*, Morton, 1834, Synop. Org. Rem. 39, pl. xvi, fig. 1, 2, 3. *Ammonites Dancæ*, d'Orbigny, 1850, Prodrom. de Palæont. ii, 213. *Scaphites Conradi*, d'Orbigny, 1850, " " 214.					*
Scaphites Conradi, var. *gulosus*, Morton, sp., ... *Ammonites* var. *gulosus*, Morton, 1854, Synopsis Org. Rem. 39, pl. xvi, fig. 2.					*
Scaphites Nicoletii, Morton sp. . . . . *Ammonites Nicoletii*, Morton, 1841, Jour. Ac. Nat. Sci. Phil. viii, pl. x, fig. 3. *Scaphites comprimus* (?), Owen, Report Wiscon. Iowa and Min. tab. vii, fig. 4. *Scaphites Nicoletii*, Meek & Hayden, Nov. 1856, Proc. Acad. Nat. Sci. Phil. 281.				*	*
Scaphites (Ammonites?) nodosus, Owen, 1852, Report Iowa, Wiscon. and Min. 581, tab. viii, fig. 4, ...				*	
Scaphites nodosus var. plenus, M. & H. May 1860, Pr. Acad. Nat. Sci. Phil. 177, ...				*	
Scaphites nodosus var. brevis, Meek & Hayden (MSS.)				*	
Scaphites nodosus var. quadrangulus, Meek & Hayden (MSS.) . .				*	
Scaphites nodosus var. exilis, Meek & Hayden, ...				*	
Scaphites larvæformis, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 58, .		*			
Scaphites Warreni, M. & H. May 1860, Pr. Acad. Nat. Sci. Phil. 177, . .		*			
Ancyloceras? uncus, Meek & Hayden, ... *Ancyloceras* (*Hamites*) *uncus*, M. & H. Pr. Acad. Nat. Sci. Phil. 56.				*	
Helicoceras Mortoni, Hall & Meek sp. . . . . *Hamites Mortoni*, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. v. N. S. pl. iv, fig. 3.				*	

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Helicoceras tenuicostatum, M. & H. March 1858, Pr. Acad. Nat. Sci. Phil. 56.					
Helicoceras cochleatum, Meek and Hayden, ...				*	
Turrilites (Helicoceras) cochleatus, M. & H. March 1858, Pr. Acad. Nat. Sci. Phil. 55.					
Helicoceras cochleatum, M. & H. May 1860, Pr. Acad. Nat. Sci. Phil. 185.					
Helicoceras Nebrascense, Meek & Hayden, ...				*	
Ancyloceras? Nebrascensis, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 71.					
Turrilites Nebrascensis, M. & H. Nov. 1856, " " 280.					
Helicoceras tortum, M. & H. March 1858, " " 54, .				*	
Helicoceras Cheyennense, Meek & Hayden, ...				*	
Ancyloceras? Cheyennense, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 71.					
Turrilites Cheyennensis, M. & H. Nov. 1856, " " 280.					
Helicoceras angulatum, M. & H. May 1860, " " 176, .				*	
Helicoceras umbilicatum, Meek & Hayden.					
Turrilites? umbilicatus, M & H. March 1858, Pr. Acad. Nat. Sci. Phil. 56.					
Helicoceras umbilicatum, M. & H. May 1860, " " 185, .				*	
Ptychoceras Mortoni, M. & H. May 1857, " " 134, .				*	
Baculites ovatus, Say, Jour. Acad. Nat. Sci. Phil. vi, pl. v, fig. 5, 6, . .				*	*
Baculites grandis, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. 402, ...					*
Baculites asperoides, Meek & Hayden. (MSS.)					
Baculites compressus, Say, Am. Jour. Sci. ii, 41, ...				*	
Aptychus Cheyennensis, Meek & Hayden. (MSS.)					*
Aptychus fragilis, Meek & Hayden. (MSS.)				*	
GASTEROPODA.					
MURICIDÆ.					
Fusus (Neptunea) Dakotensis, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 65.					*
Fusus (Pyrifusus?) Newberryi, M. & H. March 1857, Pr. Acad. Nat. Sci. Phil. 66, ...					*
Fusus subturritus, M. & H. May 1857, Pr. Acad. Nat. Sci. Phil. 139, . .				*	
Fusus intertextus, M. & H. " " " 139, . .				*	*
Fusus? flexicostatus, M. & H. March 1856, " " 66, . .					*
Fusus Vaughani, M. & H. May 1857, " " 139, . .					*
Fusus vinculum, Hall & Meek sp., ...				*	
Buccinum? vinculum, H. & M. Mem. Acad. Sci. and Arts, Boston, v, N. S. pl. iii, fig. 5.					
Fusus vinculum, M. & H. May 1860, Pr. Acad. Nat. Sci. Phil. 183.					
Fusus Scarboroughi, M. & H. May 1857, Pr. Acad. Nat. Sci. Phil. 139, .					*
Fusus Culbertsoni, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 66, .					*
Fusus Haydeni, Evans & Shumard, 1857, Trans. Acad. Sci. St. Louis, 41.					
Fusus Galpinanus, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 65, .					*

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Fusus? tenuilineatus, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v. N. S. 394, pl. iii, fig. 9, ...				*	
Busycon Bairdi, Meek & Hayden, ...					*
Pyrula Bairdi, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 66.					
Busycon Bairdi, M. & H. June, 1856, " " 126.					
TURRITIDÆ.					
Turris minor, Evans & Shumard sp.					*
Pleurotoma minor, E. & S. 1857, Trans. Acad. Sci. St. Louis, i, 41.					
Turris contortus, Meek & Hayden, ...					*
Fusus contortus, M. & H. March 1856, Pr. Acad. Nat. Sci Phil. 65.					
Pleurotoma contorta, M. & H. May 1860, " " 183.					
BUCCINIDÆ.					
Buccinum constrictum, Hall & Meek sp.				*	
Fusus constrictum, H. & M. Mem. Am. Acad. Arts and Sci. Boston, v, 391, pl. iii, fig. 7.					
Pseudobuccinum Nebrascense, Meek & Hayden, ...					*
Buccinum? Nebrascense, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 67.					
Pseudobuccinum Nebrascense, M. & H. May 1857, " " 140.					
FASCIOLARIADÆ.					
Fasciolaria? cretacea, M. & H. March 1856, Pr. Acad. Nat. Sci. Phil. 66, .					*
Fasciolaria buccinoides, M. & H. " " " 67, .					*
NATICIDÆ.					
Natica (Lunatia) subcrassa, M. & H. April 1856, Pr. Ac. Nat. Sci. Phil. 87,					*
Natica (Lunatia) Moreauensis, M. & H. Mar. 1856, " " 64,					*
Natica (Lunatia) occidentalis, M. & H. " " " 64,					*
Amauropsis paludinæformis, Hall & Meek, sp.				*	
Natica paludinæformis, H. & M. 1854, Mem. Am. Sci. and Arts, Boston, v, 389, pl. iii, fig. 3.					
Amauropsis paludinæformis, M. & H. May 1860, Pr. Acad. Nat. Sci. Phil. 185.					
SCALIDÆ.					
Scala (Acirsa) cerithiformis, Meek and Hayden, ...					*
Scalaria cerithiformis, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 63.					
Turbonilla cerithiformis, M. & H. May 1860, " " 185.					
CERITHIOPSIDÆ.					
Cerithiopsis Moreauensis, Meek & Hayden, ...					*
Turritella Moreauensis, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 70.					
Cerithiopsis Moreauensis, M. & H. May 1860, " " 185.					
STROMBIDÆ.					
Gladius? Cheyennensis, Meek & Hayden, ...				*	
Rostellaria fusiformis, H. & M. 1854, Mem. Acad. Sci. and Arts, Boston, v, N. S. pl. iii, fig. 10.					
(Non *R. fusiformis*, Pictet and Roux, 1848.)					

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
APORRHAIDÆ.					
Aporrhais Americana, Evans & Shumard sp. . . . . *Rostellaria Americana*, E. & S. 1857, Trans. St. Louis Acad. Sci. i, 42.				*	
Aporrhais Nebrascensis, Evans & Shumard, sp. . . . . *Rostellaria Nebrascensis*, E. & S. Aug. 1854, Pr. Acad. Nat. Sci. Phila. 164.				*	
Aporrhais sublevata, M. & H. May 1860, " " 178, .				*	
Aporrhais biangulata, Meek & Hayden, ... *Rostellaria biangulata*, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 65. *Aporrhais biangulata*, M. & H. May 1860, " " 185.				*	
Aporrhais parva, M. & H. " " " 178, .				*	
LITORINIDÆ.					
Fossar? Nebrascensis, Meek & Hayden, ... *Natica ambigua*, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 66. (Non *Fossar ambiguus*, Lin. sp.)					*
NERITOPSIDÆ.					
Neritopsis? Tuomeyana, Meek & Hayden, ... *Natica Tuomeyana*, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 270.	*				
TROCHIDÆ.					
Margarita Nebrascensis, Meek & Hayden, ... *Turbo Nebrascensis*, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 64. *Margarita Nebrascensis*, M. & H. May 1860, " " 185.				*	
*Margaritella flexistriata, Evans & Shumard, sp. . . . . *Solarium flexistriatum*, E. & S. Aug. 1854, Pr. Acad. Nat. Sci. Phila. 163.				*	
DENTALIADÆ.					
Dentalium gracile, H. & M. 1854, Mem. Am. Acad. Arts. and Sci. Boston, v, N. S. pl. iii, fig. 11, ...				*	
Dentalium pauperculum, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 178,					*
TECTURIDÆ.					
Tectura occidentalis, Hall & Meek, sp. . . . . *Capulus occidentalis*, H. & M. 1854, Mem. Am. Acad. Sci. and Arts, Boston, v, N. S. p. 385, fig. 13.				*	
Tectura? parva, Meek & Hayden. (MS.)				*	
Tectura? papillata, Meek & Hayden, ... *Capulus fragilis*, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 68. (Non *Tectura fragilis*, Gray & Gamard.)					*
Anisomyon borealis, Morton sp. . . . . *Hipponyx borealis*, Morton, 1842, Jour. Ac. Nat. Sci. Phila. viii, pl. xi, fig. 6. *Helcion carinatus*, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 68. *Anisomyon borealis*, M. & H. Jan. 1860, Am. Jour. Sci. xxviii, 2d ser. 35.				*	
Anisomyon Shumardi, Meek & Hayden. (MS.)				*	
Anisomyon patelliformis, Meek & Hayden, ... *Helcion patelliformis*, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 68.				*	

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Anisomyon patelliformis, M. & H. Jan. 1860, Am. Jour. Sci. xxviii, 2d ser. 35, pl. i.					
Anisomyon subovatus, Meek & Hayden, ...				*	
Helcion subovatus, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 68.					
Anisomyon subovatus, M. & H. Jan. 1860, Am. Jour. Sci. xxviii, 2d ser. 35.					
Anisomyon alveolatus, Meek & Hayden, ...				*	
Helcion alveolatus, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 68.					
Anisomyon alveolatus, M. & H. Jan. 1860, Am. Jour. Sci. xxxviii, 2d ser. 35.					
Anisomyon sexsulcatus, Meek & Hayden, ...				*	
Helcion sexsulcatus, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 68.					
Anisomyon sexsulcatus, M. & H. Jan. 1860, Am. Jour. Sci. xxxviii, 2d ser. 35.					
SOLIDULIDÆ.					
Solidula subelliptica, Meek & Hayden, ...				*	
Acteon subelliptica, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 63.					
Solidulus (Acteonina?) subelliptica, M. & H. May 1860, " 185.					
Solidula (Acteonina?) attenuata, Meek & Hayden, ...				*	
Acteon (solidulus) attenuata, M. & H. Mar. 1858, Pr. Acad. Nat. Sci. Phila. 54.					
Solidulus attenuatus, M. & H. May 1860, " " 185.					
Cinulia concinna, Hall & Meek, sp.					*
Acteon concinna, H. & M. 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. pl. iii, fig. 4.					
Avellana subglobosa, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 64.					
BULLIDÆ.					
Bulla occidentalis, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 69, .				*	
Bulla minor, M. & H. " " " 69, .					*
Bulla volvaria, M. & H. " " " 69, .					*
Bulla speciosa, Meek & Hayden, ...				*	
Bulla subcylindrica, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 270.					
(Non *B. subcylindrica*, d'Orbigny, 1847.)					
Bulla speciosa, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 185.					
CYLICHNIDÆ.					
Cylichna scitula, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 178, . .					*
CONCHIFERA.					
PHOLADIDÆ.					
Pholas? Stimpsoni, Meek & Hayden, ...				*	
Xylophaga Stimpsoni, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 141.					
Pholas (Martesia) cuneata, M. & H. Mar. 1858, " " 53, .				*	
Xylophaga elegantula, M. & H. May 1857, " " 141, .				*	
Teredo selliformis, M. & H. May 1860, " " 178, .					*
Teredo globosa, M. & H. March 1858, " " 53, .					*
SAXICAVIDÆ.					
Panopæa occidentalis, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 270, .	*				

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
SOLENIDÆ.					
Pharella? Dakotensis, Meek & Hayden, ... *Solen? Dakotensis*, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 242.	*				
CORBULIDÆ.					
Corbula crassimarginata, Meek & Hayden. (MSS.)				*	
Corbula inornata, M. & H. March 1858, Pr. Acad. Nat. Sci. Phila. 52.					
Corbulamella gregarea, Meek & Hayden, ... *Corbula? gregarea*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 84. *Corbulamella gregarea*, M. & H. May 1857, " " 143.				*	*
Neæra ventricosa, Meek & Hayden, ... *Corbula ventricosa*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 83. *Neæra ventricosa*, M. & H. May 1860, " " 183.					*
Neæra Moreauensis, Meek & Hayden, ... *Corbula Moreauensis*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 83. *Neæra Moreauensis*, M. & H. May 1860, " " 185.					*
ANATINIDÆ.					
Thracia subtortuosa, Meek & Hayden, ... *Tellina subtortuosa*, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 272.	*				
Thracia gracilis, Meek & Hayden, ... *Tellina gracilis*, M. & H. April 1855, Pr. Acad. Nat. Sci. Phila. 82. *Thracia? gracilis*, M. & H. Nov. 1856, " " 284.	*				
Thracia Prouti, Meek & Hayden, ... *Tellina Prouti*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 85.	*				
Pholadomya (?) fibrosa, Meek & Hayden, ... *Avicula (?) fibrosa*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 86. *Pholadomya fibrosa*, M. & H. Nov. 1856, " " 283.				*	
Pholadomya subventricosa, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 142, ...	*				
Pholadomya undata, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 81, .	*				
MACTRIDÆ.					
Mactra (Trigonella?) formosa, Meek & Hayden, Nov. 1856, Pr. Acad. Nat. Sci. Phila. 271, ...	*				
Mactra (Trigonella?) alta, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 271,	*				
Mactra (Trigonella?) Siouxensis, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 179, ...	*				
Mactra (Trigonella?) Warrenana, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 281, ...					*
Mactra (Trigonella?) gracilis, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 179, ...				*	*
TELLINIDÆ.					
Tellina equilateralis, Meek & Hayden, April 1856, Pr. Acad. Nat. Sci. Phila. 82, ...				*	
Tellina scitula, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 82, . .					*

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Tellina (?) formosa, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 179, .				*	
Tellina (?) subelliptica, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 83,					*
Tellina (?) Cheyennensis, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 82,				*	
VENERIDÆ.					
Venus circularis, Meek & Hayden, Nov. 1856, Pr. Acad. Nat. Sci. Phila. 272,				*	
Meretrix tenuis, Hall & Meek, sp., ...		*			
Cytherea tenuis, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. 383, pl. i, fig. 8.					
Meretrix tenuis, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 185.					
Meretrix pellucida, Meek & Hayden, ...				*	
Cytherea pellucida, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 272.					
Meretrix pellucida, M. & H. May 1860, " " 185.					
Meretrix Deweyi, Meek & Hayden, ...					*
Cytherea Deweyi, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 83.					
Meretrix Deweyi, M. & H. May 1860, " " 185.					
Meretrix Owenana, Meek & Hayden, ...	*				
Cytherea Owenana, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 273.					
Meretrix Owenana, M. & H. May 1860, " " 185.					
Meretrix orbiculata, Hall & Meek, sp., ...		*			
Cytherea orbiculata, Hall & Meek, 1854, Mem. Acad. Arts and Sci. Boston, v, N. S. pl. i, fig. 7.					
Meretrix orbiculata, Meek & Hayden, May 1860, Pr. Acad. Nat. Sci. Phila. 185.					
CYPRINIDÆ.					
Cyprina arenarea, Meek & Hayden, May 1857, Pr. Acad. Nat. Sci. Phila. 143,	*				
Cyprina subtumida, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 144, .				*	*
Cyprina humilis, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 179, . .					*
Cyprina ovata, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 144, . . .					*
CARDIDÆ.					
Bucardia? Moreauensis, Meek & Hayden, ...					*
Cyprina cordata, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 143. (Non. *B. cordata*, sp. Buckm.)					
Tancredia Americana, Meek & Hayden, ...	*				
Hettangia Americana, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 274.					
Tancredia Americana, M. & H. May 1860, " " " 185.					
Cardium speciosum, Meek & Hayden, Nov. 1856, Pr. Acad. Nat. Sci. Phila. 274, ...	*				
Cardium rarum, Evans & Shumard, Trans. Acad. Nat. Sci. St. Louis, i, 39, .				*	
Cardium subquadratum, E. & S. " " " i, 39, .				*	
LUCINIDÆ.					
Lucina occidentalis, Morton, sp., ...				*	
Tellina occidentalis, Morton, 1842, Jour. Acad. Nat. Sci. Phila. viii, pl. xi, fig. 3.					
Lucina occidentalis, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 272.					

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Lucina subundata, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. pl. i, fig. 6,				*	
Lucina ventricosa, Meek & Hayden. (MSS.)					
SOLEMYIDÆ.					
Solemya subplicata, Meek & Hayden, *Solen subplicata*, M. & H. Pr. Acad. Nat. Sci. Phila. April 1856, 82.					*
ASTARTIDÆ.					
Crassatella Evansi, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. 383, pl. i, fig. 9,				*	
Astarte gregaria, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 84,					*
MYTILIDÆ.					
Mytilus subarcuatus, Meek & Hayden, Nov. 1856, Pr. Acad. Nat. Sci. Phila. 276,	*				
Modiola Meekii, Evans & Shumard, sp., *Mytilus Galpinianus*, E. & S. Aug. 1854, Pr. Acad. Nat. Sci. Phila. 164.					*
Modiola attenuata, Meek & Hayden, *Mytilus attenuatus*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 86.					*
AVICULIDÆ.					
Avicula linguiformis, Evans & Shumard, 1854, Pr. Acad. Nat. Sci. Phila. 163,				*	
Avicula subgibbosa, Meek & Hayden, May 1860, Pr. Acad. Nat. Sci. Phila. 180,					*
Avicula Nebrascana, Evans & Shumard, 1857, Trans. Acad. Sci. St. Louis, i, p. 38,				*	
Avicula Haydeni, Hall & Meek, 1854, Mem. Am. Acad. Sci. and Arts, Boston, v, N. S. 382, pl. i, fig. 5,				*	
Gervillia subtortuosa, Meek & Hayden, Nov. 1856, Pr. Acad. Nat. Sci. Phila. 276,				*	
Inoceramus pertenuis, Meek & Hayden, Nov. 1856, Pr. Acad. Nat. Sci. Phila. 276, *Inoceramus ventricosus*, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 87. (Non. *I. ventricosus*, Sowerby.)	*				
Inoceramus pertenuis, var. *subdepressus*, Meek & Hayden,	*				
Inoceramus subcompressus, Meek & Hayden, May 1860, Pr. Acad. Nat. Sci. Phila. 181,	*				
Inoceramus fragilis, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. 388, pl. ii, fig. 6.		*			
Inoceramus problematicus, Schlot. sp.?, *Mytilites problematicus*, Schlotheim, Petrefact. 312. *Inoceramus mytiloides*, Mantell, 1822, Geol. Sussex, pl. xxvii, fig. 3, and pl. xxviii, fig. 2. *Inoceramus problematicus*, d'Orbigny, 1843, Palæont. Franc. t. iii, 510, pl. cdvi.		*	*		
Inoceramus pseudo-mytiloides, Schiel. 1855, ii, Pacific Railroad Report, 108, pl. iii, fig. 8,			*		

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Inoceramus aviculoides, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 181,			*		
Inoceramus sublaevis, Hall & Meek, 1854, Mem. Acad. Arts and Sci. v, N. S. 386, pl. ii, fig. 1,				*	
Inoceramus convexus, Hall & Meek, 1854, Am. Acad. Arts and Sci. v, N. S. 386, pl. ii, fig. 2,				*	
Inoceramus tenuilineatus, H. & M. 1854, Am. Acad. Arts and Sci. v, N. S. 386, pl. ii, fig. 3,				*	
Inoceramus cuneatus, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 181,				*	*
Inoceramus Sagensis, Owen (?), 1852, Report, Survey Min. Iowa, and Wiscon. 582, tab. vii, fig. 3,				*	
Inoceramus incurvus, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 277,	*				
Inoceramus umbonatus, M. & H. March 1858, Pr. Acad. Nat. Sci. Phila. 50,					
Inoceramus Mortoni, M. & H. (MSS.)				*	
Inoceramus Nebrascensis, Owen, 1852, Rept. Iowa, Wiscon. and Min. 582, pl. viii, fig. 1,				*	
Inoceramus Vanuxemi, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 180,				*	
Inoceramus Balchii, M. & H. " " " " 180,				*	
ARCIDÆ.					
Arca sulcatina, Evans & Shumard, 1857, Trans. St. Louis Acad. Sci. 39,				*	
Arca exigua, Meek & Hayden, *Cucullæa exigua*, M. & H. Nov. 1856, Pr. Acad. Nat. Sci. Phila. 275.				*	
Cucullæa fibrosa, Sowerby, 1818, Min. Conch. iii, 9, *Arca fibrosa*, d'Orbigny, 1843, Palæont. Franc. t. iii, 212, pl. cccxii. *Arca (cucullæa) Shumardi*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 86.					*
Cucullæa cordata, Meek & Hayden, *Arca (cucullæa) cordata*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 86. *Cucullæa cordata*, M. & H. Nov. 1856, " " 285.					*
Cucullæa Nebrascensis, Owen, 1852, Rept. Wiscon. Iowa, and Min. 582, pl. viii, figs. 1, 1 *a*,					*
Axinæa Siouxensis, Hall & Meek, sp., *Pectunculus Siouxensis*, H. & M. 1854, Mem. Acad. Arts and Sci. Boston, v, N. S. 384, pl. i, fig. 12. *Axinæa Siouxensis*, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 185.	*				
Axinæa subimbricata, Meek & Hayden, *Pectunculus subimbricatus*, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 146. *Axinæa subimbricatus*, M. & H. May 1860, " " 185.					*
Limopsis parvula, Meek & Hayden, *Pectunculina parvula*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 86. *Limopsis parvula*, M. & H. Nov. 1856, " " 285.					*
LEDIDÆ.					
Leda (Yoldia) scitula, Meek & Hayden, *Nucula scitula*, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 84. *Leda scitula*, M. & H. May 1860, " " 185.					*

CATALOGUE OF CRETACEOUS FOSSILS, *continued.*

	Formations in ascending order.				
	1	2	3	4	5
Leda (Yoldia) Evansi, Meek & Hayden, ...					*
Nucula Evansi, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 84.					
Leda Evansi, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 185.					
Leda (Yoldia) ventricosa, Hall & Meek, sp., ...					*
Nucula ventricosa, H. & M. 1854, Mem. Acad. Arts and Sci. Boston, v, N. S. 385, pl. i, fig. 11. (Non. *N. ventricosa*, Hind, 1843.*)					
Leda (Yoldia) subnasuta, Hall & Meek, sp., ...				*	
Nucula subnasuta, H. & M. Mem. Am. Acad. Arts and Sci. Boston, v, N. S. 384, pl. i, fig. 11.					
NUCULIDÆ.					
Nucula equilateralis, M. & H. April 1856. Pr. Acad. Nat. Sci. Phila. 84, .					*
Nucula subplana, M. & H. " " " 85, .				*	
Nucula cancellata, M. & H. " " " 85, .					*
Nucula planimarginata, M. & H. " " " 85, .					*
Nucula obsoletastriata, M. & H. " " " 275, .				*	
PECTENIDÆ.					
Pecten rigida, Hall & Meek, 1854, Mem. Am. Acad. Sci. and Arts, Boston, v, N. S. 381, pl. ii, fig. 4, *a*, *b*, *c*, ...				*	
Pecten Nebrascensis, M. & H. April 1856, Pr. Acad. Nat. Sci. Phila. 87, .				*	*
ANOMIADÆ.					
Anomia obliqua, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 181, . .			*		
Anomia subtrigonalis, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 181,				*	
OSTREADÆ.					
Ostrea inornata, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 181, . .				*	
Ostrea translucida, Meek & Hayden. (MSS.)				*	
Ostrea larva, Hall & Meek (non. Lamarck), 1854, Mem. Acad. Arts and Sci. Boston, v, N. S. 406, ...				*	
Ostrea congesta, Conrad, 1843, Nicollet's Report, Explor. N. W. Territories, 167, ...			*		
Ostrea patina, M. & H. 1856, Pr. Acad. Nat. Sci. Phila. 277, . . .				*	
Gryphæa vesicularis, Lamarck? sp.				*	
Ostrea vesicularis, Lamarck, 1860, Am. Mus. viii, 160, t. 22, fig. 3.					
Ostrea deltoidea, Lamarck, 1860, Am. Mus. viii, 160, and xiv, t. 21, pars.					
Ostrea vesicularis of numerous authors.					
BRACHIOPODA?					
HIPPURITIDÆ.					
Caprinella? coraloidea, Hall & Meek, 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. 381, pl. ii, fig. 3, ...				*	
RADIATA.					
FUNGIDÆ.					
Macrobacia coronula, Goldf. sp. Petrefact. Germ. i, 50, tab. 14, fig. 10, .				*	*
VERTEBRATA.					
Mosasaurus Missouriensis, Leidy, ...				*	

CHAPTER XI.

VII. Tertiary Basins of the Upper Missouri.

This system occupies so extended a geographical area in the Northwest, that it forms a most important feature in its geology. As far as it is now understood on the Upper Missouri it may be separated into two distinct divisions or basins, exhibiting well-marked lithological differences and containing organic remains peculiar to each.

1st. Great Lignite Tertiary Basin, commencing near the mouth of Cannon-ball river and extending along the Missouri nearly to the mouth of the Mussel-shell, a distance of about six hundred miles. I have traced this formation up the Yellowstone to the mouth of Big Horn river, a distance of three hundred miles. Its limits have not been ascertained with accuracy, in several directions.

2d. *Les Mauvaises Terres*, or Tertiary basin of White river, which, with its outliers, including the sandhills and Pliocene beds, occupy an area of from four hundred to five hundred miles from east to west, and four hundred to six hundred miles from north to south. Exact limits not yet ascertained.

1*st. Great Lignite Tertiary Basin.*

This great basin occupies an immense geographical area, and when thoroughly explored will undoubtedly be found the largest freshwater deposit in our country. Indeed the wide extent of country which it underlies, its influence on the external features of the country, the character and abundance of its organic remains, render it a matter of the highest interest to determine its exact age and its true relation to other Tertiary deposits. It has been known since the time of Lewis and Clarke that a deposit containing lignite, &c., existed on the Upper Missouri. Reports of a similar nature have been given to us by other travellers since that time, but no details of its lithological characters, no collection of its fossils, or other information that would enable us to determine its age or extent. The collections which have been already secured by the writer from this great deposit, show most conclusively that it possesses the mixed character of an estuary and freshwater formation, and its fossil flora indicates its age to be probably of the Miocene Tertiary.* We will now give a few of the details of its geology, together with some views in regard to its economical value to the country.

In ascending the Missouri river we meet with outliers of this deposit between Grand and Cannon-ball rivers, near lat. 46°, in the form of denuded hills. These are scattered to

* The lower portion, at least, is probably Eocene.

a greater or less extent over the prairie, resting upon Cretaceous formation No. 5 of the vertical section. At Long lake the Lignite Tertiary begins to assume considerable importance. On the left side of the Missouri from a series of denuded hills we have the following section of strata in descending order.

	Feet.
1. Yellow and drab arenaceous grit,	20 to 30
2. Impure lignite,	1
3. Gray arenaceous grit, indurated, contains a small portion of clay, also vertebrate remains, as *Compsemys victus, Emys obscurus, Trionyx*, &c.,	40
4. Impure lignite of a reddish color, with somewhat the character of a carbonaceous clay,	4
5. Rather fine-grained gray silicious grit, with a slight admixture of clay, contains great numbers of dull red argillaceous concretions, fragments of turtles mentioned in bed 3, and the bones of a huge deinosaurian, described by Dr. Leidy as *Thespesius occidentalis*,	30 to 50

The lowest bed of the above section rests directly upon the well-known Cretaceous formation No. 5 of the vertical section. Bed 5 is the same yellow sandstone seen near Fort Clark, which there contains so many freshwater and estuary shells. On the Square hills, thirty miles below Fort Clark, it becomes a heavy-bedded, coarse-grained, ferruginous sandstone, containing *Paludina, Melania Nebrascensis, M. Warrenana*, and *Corbula mactriformis.*

Near Apple creek on the Missouri, in a bank cut by the river, we have the following section of beds in descending order.

	Feet.
1. Deep yellow grit, with some clay, caps the hills.	
2. Yellow sand, passing down into a gray and dark gray grit,	40
3. Impure lignite, with a shaly structure,	1
4. Drab indurated arenaceous clay,	8
5. Impure lignite; 2 feet. First appearance of lignite immediately along the river.	
6. Gray and dark gray grit,	30

Underneath the Tertiary bed 6 comes a layer of yellow arenaceous and argillaceous grit, containing several species of *Pectunculus, Fusus*, &c. This is undoubtedly the upper portion of No. 5 of vertical section, though its fossils all have a peculiar Tertiary aspect. Indeed all the mollusca from formation No. 5 approximate so closely to well-known Tertiary forms, that I am inclined to consider it a transition or bed of passage from the Cretaceous to the Tertiary epoch.

At Fort Clark we have a bed of lignite, two feet in thickness exposed, presenting its usual characters.

1. Ferruginous sandstone, 30 to 40 feet. Near the base of the sandstone is a seam eighteen inches in thickness, composed of shell-marl, with fine specimens of *Paludina, Melania, Corbula*, &c. These shells are

Feet.

distributed somewhat sparingly throughout the bed of sandstone. It also contains some fine impressions of dicotyledonous leaves.

2. Dark indurated carbonaceous clay, ... 2½
3. Lignite, of an average degree of purity, ... 2
4. Indurated clay with a reddish tinge containing much carbonaceous matter, ... 2
5. Light yellow clay with seams of carbonaceous matter disseminated through it, a sort of fine clay, 4 feet exposed above the water-level.

Thirteen miles above Fort Clark, at Red spring, on the right side of the Missouri, are a long series of nearly perpendicular bluffs, exposed by the river. This is the best locality for the collection of fossil plants I have yet seen. They are finely preserved, occur in great profusion, and belong nearly all to dicotyledonous trees. The following is a vertical section of the different beds in descending order, as they appear in this range of hills:

Feet.

1. Ferruginous marl, ... 10
2. Variegated bands of argillaceous grits, ... 30
3. Seam of impure reddish lignite, 2 inches.
4. Yellowish gray grit, with numerous concretions, in horizontal layers, filled with beautiful impressions of leaves, ... 10
5. Seam of lignite, 2 inches.
6. Yellowish gray sand with argillo-calcareous concretions, laden with impressions of dicotyledonous leaves, 10
7. Earthy lignite, 3 inches.
8. Yellow and drab clay and sandstone, containing argillaceous concretions with vegetable impressions, . 15
9. Dark reddish earthy lignite, 4 inches.
10. Yellow argillaceous grit, ... 20
11. Alternate layers of lignite and clay varying in thickness at different localities within a distance of four miles, ... 4 to 15
12. Heavy-bedded friable sandstone, very ferruginous, varying in color from yellow to gray and yellowish gray. Same bed, I think, as seen at Fort Clark and on the summit of Square hills, containing so many fossils. Here we have *Melania Nebrascensis, Paludina multilineata,* and *Corbula matriformis,* . . . 40
13. Seam of lignite, 2 inches.
14. Gray argillaceous grit, ... 4
15. Lignite of excellent quality, ... 2
16. Bluish gray clay, slightly arenaceous, ... 6
17. Lignite near water's edge, quite pure, ... 3 to 4

Beneath bed 17 may be seen at low water a heavy-bedded gray sandstone.

In speaking of lignite as of a good quality, I mean, that it contains a small amount of earthy material, but I have not yet seen any of it that would be of much value for economical purposes.* Specimens from this locality and from Fort Berthold, forty miles above,

* I am satisfied that some of the beds of lignite, especially those on the Yellowstone, can be used for fuel, when the country is sufficiently settled to induce a demand for it. There are some excellent beds of lignite on the North

present the following characters on examination: contain no bitumen; sublaminated structure; compact fragments have a somewhat conchoidal fracture and a jet shining black color; almost always reveal the vegetable fibre; ignites very slowly; burns with a light yellowish flame, and emits a sulphurous smell.

Throughout the denuded portions of this formation, great quantities of silicified wood are found in a fine state of preservation and so close is the resemblance that it may readily be mistaken at a distance for recent wood. Near the foot of the Great Bend of the Missouri, above Fort Berthold, I observed a silicified stump near the base of the bluff, standing upright, three feet in diameter, with a cavity in the centre 6 inches in diameter, and so perfectly is the original fibre preserved, that the layers of growth are as distinct as in the stump of a tree just felled with the axe.

Near the Great Bend the surface of the country presents an exceedingly rugged appearance, and is called by the Indians and traders "Les Mauvaises Terres," or Bad Lands. The bluffs here afford fine examples of the spontaneous ignition of the lignite beds, by which the superincumbent strata are fused or heated to various degrees of compactness, sometimes giving the hills the appearance of an accumulation of fragments of burnt bricks. Oftentimes the clays and sands contiguous to the lignite beds are fused, so as to exhibit every variety of character, from a nearly vitreous mass to a light vesicular lava with a specific gravity less than water. Many of these light vesicular masses fall down to the edge of the river, and the current in high water carries them down, scattering them on sandbars and bottoms, even below St. Louis, and thus the origin of the opinion that there were volcanic products somewhere near the sources of the Missouri.

Section of strata at Crow hills, about one hundred miles below Fort Union:

	Feet.
1. Yellow and gray arenaceous marl with horizontal layers of hard concretionary rocks, containing some impressions of plants,	30 to 40
2. Impure lignite, 4 inches.	
3. Indurated clay, ferruginous, with many deep iron-rust concretions,	30
4. Reddish drab, indurated arenaceous and argillaceous grit,	15
5. Eight inches earthy lignite. Twelve inches yellow clay. Four inches earthy lignite.	
6. Yellow and yellowish gray sandstone, with irregular seams of clay. This bed contains many species of shells, and distinct impressions of a species of fern in a black compact clay rock, exposed,	30

One of the most interesting portions of the country occupied by the lignite deposit is in the region surrounding Fort Union, not only on account of its geological peculiarities, but also from the number and variety of its fossils. Scattered over the denuded hills on both

Platte, 18 inches to 2 feet in thickness, which has been used with success at a military station near it. It will not, however, supply sufficient heat for welding iron.

sides of the Missouri river are great quantities of the shells of mollusca in a fine state of preservation, looking very much like those strewn upon the shores of our present rivers or lakes. Silicified wood occurs everywhere in the greatest abundance, in the same perfect state of preservation before mentioned.

A vertical section of the different beds in descending order, as exposed within twenty or thirty miles of Fort Union, would be as follows:

	Feet.
1. Ferruginous marl, with arenaceous concretions, caps the hills, and is covered with angular blocks of granite; sometimes the upper part of this bed for several feet in thickness is composed of concretionary sandstone, forming ledges. Most common fossil, *Paludina trochiformis*,	20 to 30
2. Drab indurated arenaceous clay,	20
3. Impure lignite with numerous crystals of selenite, 12 inches.	
4. Gray and drab indurated clay, contains at various localities very abundant impressions of leaves of dicotyledonous trees with a species of fern,	50 to 70
5. Impure lignite with much silicified wood. One mass lay in the bed eighteen inches in diameter, and thirty feet in length, 18 inches.	
6. Gray indurated sand, with a slight mixture of clay, contains numerous freshwater mollusca, as *Paludina trochiformis, P. retusa, P. Leai, P. Leidyi, Melania Nebrascensis*, also many fragments and entire stumps of silicified trees, among the debris of which I noticed that the shells were most abundant,	30
7. Impure lignite, 4 inches.	
8. Dark gray and drab indurated sand,	20 to 30

About six miles northeast of Fort Union a local bed occurs, containing a somewhat peculiar class of fossils, of freshwater and land species, a section of which I give to show the position of the fossils.

	Feet.
1. Indurated silicious grit, variable in color and structure, sometimes light gray, drab or ferruginous, with layers of clay and concretionary sandstone, near the lower portion of the bed. The terrestrial and fluviatile shells are inclosed in a hard reddish carbonaceous matrix, thrust in between layers of the sandstone,	80 to 100
2. Impure lignite,	2
3. Yellowish gray indurated clay.	

The lower portion of bed 1 of the above section contains at this locality a profusion of land and freshwater shells, inclosed in a compact matrix, well calculated to preserve them. The bed occupies an area of only a few yards square, exposed in the channel of a little stream, and was observed nowhere else on the Missouri.

The mollusca that occur at this locality, though belonging to extinct species, are closely allied to forms now living on the land and in the little streams of the country. The species as yet described from this place are *Cyclas fragilis, C. subellipticus, C. formosa, Pupa heli-*

coides, Physa longiuscula, P. rhomboidea, P. Nebrascensis, Planorbis subumbilicatus, Ancylus minuta, Valvata parvula, Bulimus? teres, B. vermiculus. The last two species will doubtless prove to belong to the genus *Clausilia*, or to an intermediate new genus between *Bulimus* and *Clausilia*. There were also many seeds of plants in this ligneous material. The upper portion of this bed is a dark gray silicious grit, sometimes of a drab color, from the numerous particles of coaly matter which are disseminated through it. It contains numerous impressions of dicotyledonous leaves, of the same species with those found in the same bed ten miles below this point, and holding nearly the same position. But one of the most remarkable features of this bed at this locality, is the presence of myriads of spherical concretions, covering an area of several miles in extent. They vary in size from half an inch to several feet in diameter, and are formed of thin layers of sandstone, concentrically arranged about a nucleus. They contain much ferruginous matter, of a grayish color internally, but becoming of a reddish iron-rust color on exposure.

About thirty miles below the mouth of Milk river the beds of the lignite basin begin sensibly to rise above the water-level of the Missouri, by the reversed dip of the strata, and on reaching Round Butte they cap the hills, though still maintaining considerable thickness. Near the mouth of Mussel-shell river, the Cretaceous formation No. 4 occupies the country, the lignite beds having entirely disappeared. At Round Butte the lignite deposit is mostly seen in outliers in the form of denuded conical hills, scattered over the broad upland plateau, the highest about one hundred feet, resting upon No. 4 or a blending of Nos. 5 and 4, which have a thickness of two or three hundred feet. The northern outliers of the lignite basin pass off on the Cretaceous hills, presenting very similar lithological characters to those along the southern border.

The same deposit underlies the country bordering upon the Yellowstone, at least to the mouth of the Big Horn, which is the highest point to which my explorations have extended. It presents nearly the same lithological characters as on the Missouri, and most of its organic remains are specifically identical.

Near the mouth of the Yellowstone river are a series of hills, composed of variegated sands and clays, with some impure lignite and large numbers of animal and vegetable remains.

Near O'Fallon's creek, about one hundred miles by land above the mouth of the Yellowstone, is a very high rugged portion of country, called Bad Lands, which is cut through by the river, so as to expose a fine vertical section of the strata. This section will represent most of the Tertiary beds seen on the Yellowstone, but they vary much in thickness and appearance at different localities.

SECTION OF TERTIARY BEDS NEAR O'FALLON'S CREEK, ON THE YELLOWSTONE.

		Feet.
1.	Yellowish flesh-colored marl. The upper portion of the bed is a rather coarse-grained reddish sandstone, with many large Unios, too imperfect to characterize,	20 to 30
2.	Reddish drab indurated clay,	10
3.	Dark drab indurated clay,	30
4.	Earthy lignite, 2 inches, Dark drab indurated clay, 4 inches, Impure lignite, 2 inches, Yellow clay with concretions, 2 feet, Impure lignite, 2 inches, Carbonaceous clay, 3 inches, Impure lignite, 2 inches, — in all, over	3
5.	Dark drab indurated arenaceous clay,	30
6.	Lignite, quite pure, 18 inches.	
7.	Deep yellow ferruginous grit, contains a few shells, as *Paludina, Corbula,* &c., and impressions of leaves,	25
8.	Lignite, quite pure, 18 inches. Very dark carbonaceous clay, Lignite of good quality, 2 feet.	8 to 15
9.	Light gray sand, reaching to water's edge at this point, though reposing on Cretaceous formation No. 4 a few miles below, exposed,	30 to 40

In bed 9 of the above local section we find numerous argillo-calcareous concretions, containing distinct impressions of leaves of dicotyledonous trees, *Smilax*, *Acer*, *Ulmus*, &c. I think this bed holds the same position as the lowest sand-bed seen on Moreau river near Thunder hill and on Cherry creek. Plants and shells are found to some extent in all the strata of clay, especially near the lignite beds. Bed 8, a few miles down the river, becomes a solid stratum of lignite, seven feet in thickness, and is the largest bed of this material seen on the river. After passing the mouth of Powder river it diminishes in thickness and becomes more impure, and thus continues to the mouth of Big Horn river, the limit of my observations. I have no doubt, however, that, like the same beds on the Missouri, the Tertiary beds soon disappear on the high hills (the strata dipping toward the east apparently), and give place to formations of older date. In the summer of 1854, I received from intelligent traders, specimens of *Inoceramus* and *Ammonites* from a locality near Clark's fork, a branch of the Yellowstone, which is on the same parallel with Mussel-shell river, where the well-known Cretaceous formation No. 4 reaches its largest development on the Missouri.

Throughout the region of the Yellowstone, silicified wood is found in the greatest abundance, so that many portions have been called by the trappers "petrified forests." There is everywhere evidence of an exceedingly luxuriant growth of timber during the Tertiary period.

The spontaneous ignition of the lignite beds, and its influence on the contiguous strata,

is nowhere better exhibited than in the country bordering upon the Yellowstone. Often ranges of hills extending back from the river into the interior for several miles, form a series of high bluff ledges of the fused or semifused rocks, somewhat variegated, but mostly of a lively red color, giving to the country the appearance of the ruins of a large city. The light vesicular pumice-like masses have been scattered by the wind over the plateaus surrounding these hills, and are sometimes carried a mile or more from the original position. Even at the present time, I observed several places where the lignite beds were in a state of combustion, both on the Missouri and on the Yellowstone, and the atmosphere is filled with smoke, and the sulphurous smell which issues from these fires is exceedingly offensive to the traveller.

The same phenomena have been observed in the far North, in the lignite beds on Mackenzie's river. Mr. Simpson, a gentleman who travelled quite extensively in the Hudson Bay territory, from 1836 to 1839, says of the beds of that region,—"Wood-coal was in a state of combustion for several miles on both sides of the Mackenzie, and these natural fires seem to have spread considerably since last described by Dr. Richardson. The jets of smoke issuing in many places from the perpendicular face of the clayey cliffs, presented a singular spectacle. The combustion had in many places scorched the layers of unctuous earth that interstratify the coal formation, and turned their surface to a lively red color."*

In regard to the age of the lignite formations described by Mr. Simpson, we have no reliable information. It is probable that they are synchronous with those on the Upper Missouri, but some portion of them may belong to the Cretaceous period.

We will now return to the Missouri river, and trace the lignite strata westward, into the interior toward the Black hills along their southern boundaries. In latitude 46½°, longitude 100½°, near the mouth of Cannon-ball river, we have distinct indications of this formation in the numerous conical hills which have been left after denudation; and scattered around these denuded hills are many fragments of finely preserved silicified wood, with a few estuary shells. Proceeding in a southwest direction from the mouth of Cannon-ball river, we find the outliers of the lignite formation, resting upon Cretaceous bed No. 5 of the vertical section, and on reaching Grand river, eighty miles above its mouth, the Tertiary strata occupy the surface of the country, the Cretaceous beds appearing only in the channels of the streams. At Thunder Butte we have a fine section of the Tertiary beds. This is a hill left after the denudation of the surrounding country, rising above the level prairie to the height of three hundred feet. The strata are perfectly horizontal, and the following beds in descending order will show the character of the hill:

* Thomas Simpson's Journal of Discoveries on the North Coast of America, during the years 1836 to 1839; pages 97 and 98.

Feet.

1. Coarse-grained gray sandstone, very compact and hard at summit, but becoming more friable at base, ... 100 to 150
2. A variable bed of yellowish gray loose sand and clay, with here and there a small seam of lignite, and some argillo-calcareous concretions, ... 100
3. Dull reddish argillaceous lignite, 18 inches.
4. Gray ferruginous silicious grit, becoming yellow on exposure, with numerous argillo-silicious concretions, some gray, others of a reddish color. This bed contains bones of vertebrate animals and estuary shells, as *Cyrena*, &c., ... 30 to 40

Bed 4 of the above local section rests directly upon Cretaceous formation No. 5, and is of an estuary character. Wherever the superincumbent strata are denuded away, the surface of this bed is covered with fragments of bones belonging to some huge sauroid or manatoid animal. These bones are scattered very abundantly over the country about the sources of the Moreau, Grand, Cannon-ball, and Little Missouri rivers, and are for the most part much waterworn and uncharacteristic. On Cherry creek this bed attains considerable thickness, fifty to one hundred feet, capped with large ledges of sandstone, containing a species of *Cyrena* in large numbers. Near the head of the Little Missouri, an important stream, which takes its rise near the northern base of the Black hills and running a northeastern course empties into the Missouri river near long. 102°, we find another species of mollusc, *Cerithium Nebrascensis*, which further confirms the estuary character of this deposit. We can thus trace this lignite formation to the northern base of the Black hills, and observe its edges overlapping the Cretaceous beds. But to return to Thunder Butte. The summit of this hill is capped with a thick layer of sandstone, the exact position of which I could not determine satisfactorily. A similar rock is seen capping the hills at Fort Union, also in many localities along the Yellowstone, and may hold the same position in the series. On the eastern side of the hill, the bed of sandstone presents a perpendicular face, from which have been detached large fragments of the rock, that have fallen on a terrace below. This terrace is about half the way up the hill, and about one hundred yards broad at its widest part, and thickly scattered over it are huge masses of a compact bluish sandstone, which look at a distance like large granite boulders.

The extent of country occupied by this great basin I have estimated at about four hundred miles in length from east to west, and one hundred and fifty from north to south, or about sixty thousand square miles. We thus arrive at an approximate idea of the immense area covered by these lignite beds, though I am satisfied that future explorations will show that the above estimate is much too small.

I have thus given a brief and imperfect sketch of this great basin, comprising all the important facts in my possession at this time. The local sections will, I think, show the

lithological characters of the strata, and will enable the geological reader to compare them with those of other freshwater deposits in that region. I regret that I cannot yet give a complete general section of all the beds in the lignite basin, but, as I hope soon to continue my explorations in that interesting country, this desire may yet be accomplished. In a subsequent portion of this report I have reviewed in some general remarks the principal points of interest now known in connection with this deposit.

The following catalogue comprises all the fossils yet known and examined from this basin. The vertebrata and mollusca thus enumerated show quite distinctly that they represent but fragments of a large and interesting fauna, the complete discovery of which still remains to reward the future explorer. The fossil plants have not yet been described, but the collection already secured contains about fifty species, all of which are supposed to be new to science. These plants cannot represent more than a small portion of the flora of this period, and future examinations must greatly multiply the number of species.

TERTIARY SPECIES.*

VERTEBRATA.

Thespesius occidentalis, Leidy, Proc. Acad. Nat. Sci. Phila. 1856, 311, and Trans. Am. Phil. Soc. 1859, 151.
Ischyrotherium antiquum, Leidy, " " " 89, " " " 150.
Mylognathus priscus, Leidy, " " " 312, " " " 153.
Compsemys victus, Leidy, " " " 73, 312, " " " 152.
Emys obscurus, Leidy, " " " " " " " 153.

GASTEROPODA.

CERITHIADÆ.

Cerithium (Cerithidea?) Nebrascensis, M. & H. June 1860, Pr. Acad. Nat. Sci. Phila. 125.

MELANIADÆ.

Melania? Warreni, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 137.
Melania subtortuosa, M. & H. " " " 136.
Melania Nebrascensis, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 124.
Melania tenuicarinata, M. & H. May 1857, " " 137.
Melania convexa, M. & H.
Turritella convexa, M. & H. March 1856, Pr. Acad. Nat. Sci. Phila. 71.
Melania convexa, M. & H. " " " 125.
Melania sublevis, M. & H. " " " 136.
Melania? Anthonyi, M. & H. " " " 124.
Melania minitula, M. & H. June 1856, " " 123.

VIVIPARIDÆ.

Vivipara Conradi, Meek & Hayden.
Paludina Conradi, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 122.
Vivipari Conradi, M. & H. May 1860, " " 185.
Vivipara Nebrascensis, Meek & Hayden.
Paludina multilineata, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 120. (Non *P. multilineata*, Say, 1829.)
Vivipara multilineati, M. & H. May 1860, " " 185.

* The Catalogue of Invertebrata here given, is extracted from a catalogue of Nebraska fossils published by Mr. Meek and myself in the Proceedings of the Academy, in Oct. 1860.

Vivipara Leai, Meek & Hayden.
Paludina Leai, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 121.
Vivipara Leai, M. & H. May 1860, " " 185.

Vivipara vetusta, Meek & Hayden.
Paludina vetusta, M. & H. 1856, Pr. Acad. Nat. Sci. Phila. 121.

Vivipara retusa, Meek & Hayden.
Paludina retusa, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 122.
Vivipara retusa, M. & H. May 1860, " " 185.

Vivipara trochiformis, Meek & Hayden.
Paludina trochiformis, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 122.
Paludina Leidyi?, M. & H. " " " 123.
Vivipara trochiformis, M. & H. May 1860, " " 185.

VALVATIDÆ.

Valvata subumbilicata, Meek & Hayden.
Planorbis subumbilicata, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 120.
Valvata subumbilicata, M. & H. May 1860, " " 185.
Valvata parvula, M. & H. June 1856, " " 123.

HELICIDÆ.

Columna? teres, Meek & Hayden.
Bulimus? teres, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 117.

Columna? vermiculus, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 118.
Bulimus? vermiculus, M. & H. " " " 118.
Bulimus limneiformis, M. & H. " " " 118.
Bulimus Nebrascensis?, M. & H. " " " 118.

Helix Leidyi, Hall & Meek, June 1854, Mem. Am. Acad. Arts and Sci. Boston, v, N. S. 394, pl. iii, fig. 12.

Helix vetusta, Meek & Hayden.
H. vitrinoides, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 135. (Non *H. vitrinoides*, Deshayes, 1830.)
Helix obliqua, M. & H. " " " 134.
Helix Evansi, M. & H. May 1860, " " 175.

Helix (Polygyra) amplexus, Meek & Hayden.
Planorbis amplexus, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 21.
Helix (Polygyra) amplexus, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 185.

Helix Nebrascensis, Meek & Hayden.
H. occidentalis, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 135. (Non *H. occidentalis*, Recluz, 1845.)

LIMNÆIDÆ.

Limnæa (Acella) tenuicostata, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 119.

Limnæa? multistriata, Meek & Hayden.
Melania multistriata, M. & H. June 1826, Pr. Acad. Nat. Sci. Phila. 124.

Physa (Aplexus) longiuscula, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 119.
Physa (Aplexus) subelongata, M. & H. " " " 120.
Physa rhomboidea, M. & H. " " " 119.

Planorbis (Segmentina?) Nebrascensis, Evans & Shumard, August 1854, Pr. Acad. Nat. Sci. Phila. 164.

Planorbis (Segmentina?) vetulus, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 175.

Planorbis Leidyi, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 175.

Planorbis convolutus, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 120.

Planorbis planoconvexus, Meek & Hayden.
Planorbis fragilis, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 136. (Non *P. fragilis*, Dunker, 1843.)
Planorbis planoconvexus, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 185.
Ancylus (Acroloxus) minuta, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 120.

CONCHIFERA.

CORBULIDÆ.

Corbula perundata, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 116.
Corbula (Potamomya) subtrigonalis, Meek & Hayden.
Corbula subtrigonalis, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 116.
Corbula (Potamomya) mactriformis, Meek & Hayden.
Corbula mactriformis, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 117.

CYRENIDÆ.

Corbicula Moreauensis, Meek & Hayden.
Cyrena Moreauensis, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 115.
Corbicula Nebrascensis, Meek & Hayden.
Cyrena intermedia, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 116. (Non *Cyrena* (*Corbicula*) *intermedia*, Melville, 1843.)
Corbicula cytheriformis, Meek & Hayden.
Cyrena (*Corbicula?*) *cytheriformis*, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 176.
Corbicula occidentalis, Meek & Hayden.
Cyrena occidentalis, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 116.
Sphærium planum, M. & H. May 1860, " " 175.
Sphærium formosum, Meek & Hayden.
Cyclas formosa, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 115.
Cyclas fragilis, M. & H. " " " 115.
Sphærium formosum, M. & H. May 1860, " " 185.
Sphærium subellipticum, Meek & Hayden.
Cyclas subelliptica, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 115.
Sphærium subellipticum, M. & H. May 1860, Pr. Acad. Nat. Sci. Phila. 185.
Sphærium recticardinale, M. & H. " " " 176.

UNIONIDÆ.

Unio priscus, M. & H. June 1856, Pr. Acad. Nat. Sci. Phila. 117.
Unio subspatulatus, M. & H. May 1857, Pr. Acad. Nat. Sci. Phila. 146.
Unio Deweyanus, M. & H. " " " 145.
Unio Danæ, M. & H. " " " 146.

OSTREADÆ.

Ostrea subtrigonalis, Evans & Shumard, 1857, Trans. St. Louis Acad. Sci. i, 38.
Ostrea glabra, Meek & Hayden, Pr. Acad. Nat. Sci. Phila. 146.

2d. Les Mauvaises Terres, or Tertiary Basin of White and Niobrara rivers.

This most remarkable lacustrine deposit has been, comparatively speaking, but recently made known to the scientific world, wonderful not alone for its unique scenery, but also for the abundance and importance of its organic remains. Even at this time it has been but partially explored, yet it has already revealed a profusion of Mammalian and Chelonian remains belonging to species, and in many cases to genera, which though closely allied differ from all known living forms, which has now rendered it classic ground to the geologist and palæontologist. A history of the progress of its exploration up to 1853, with elaborate descriptions of the vertebrata known from this deposit up to that date, may be found in a magnificent memoir written by Prof. Joseph Leidy, and published by the Smithsonian Institution.

In its lithological characters this deposit differs very materially from the lignite basin, being composed of whitish clays and calcareous and silicious marls and grits, and entirely destitute, so far as we now know, of any vegetable remains, except very rare fragments of silicified wood. It is chiefly remarkable, however, as a vast deposit, in which were entombed immense numbers of Mammalian and Chelonian animals, for the beauty and perfection with which these remains have been preserved, and its unique rugged scenery. The few molluscous fossils which have been found in it, show most conclusively its freshwater origin, being confined to the genera *Helix*, *Planorbis*, *Limnea*, &c. I have already embodied the principal details in regard to this interesting deposit in a preceding chapter, and in a subsequent portion I will briefly state such evidence as I have been able to secure, to show that it is of Miocene age. The following vertical section comprises all the beds known up to this time, and it is not probable that future explorations will modify it materially.

VERTICAL SECTION, SHOWING THE ORDER OF SUPERPOSITION OF THE DIFFERENT BEDS OF THE TERTIARY BASIN OF WHITE AND NIOBRARA RIVERS.

	Subdivisions.	Localities.	Estimated thickness.
POST PLIOCENE.	Yellow silicious marl, similar in its character to the Loess of the Rhine, passing down into variegated indurated clays and brown and yellow fine grits; contains remains of extinct quadrupeds, mingled with those identical with recent ones; also a few mollusca, mostly identical with recent species so far as determined.	Most fully developed along the Missouri river, from the mouth of the Niobrara to St. Joseph; also in the Platte valley and on the Loup Fork; also largely exhibited in the valley of the Mississippi and in and over the Southwest.	300 to 500 feet.

VERTICAL SECTION, *continued.*

		Subdivisions.	Localities.	Estimated thickness.
PLIOCENE TERTIARY.	Bed F.	1st. Dark gray or brown sand, loose, incoherent, with remains of mastodon, elephant, &c. 2d. Sand and gravel, incoherent. 3d. Yellowish white grit, with many calcareous, arenaceous concretions. 4th. Gray sand with a greenish tinge; contains the greater part of the organic remains. 5th. Deep yellowish red arenaceous marl. 6th. Yellowish gray grit, sometimes quite calcareous, with numerous layers of concretionary limestone from two to six inches in thickness, containing freshwater and land shells, Succinea, Limnea, Paludina, Helix, &c., perhaps all identical with living species; also much wood of coniferous character.	Covers a very large area on Loup fork, from the mouth of North branch to source of Loup fork; also in the Platte valley. Most fully developed on the Niobrara river, extending from the mouth of Turtle river three hundred miles up the Niobrara. Also on Bijoux hills and Medicine hills. Thinly represented in the valley of White river. In isolated patches over a large portion of Dakota territory, west of the Coteau de Prairie.	300 to 400 feet.
MIOCENE.	Bed E.	Usually a coarse-grained sandstone, sometimes heavy-bedded and compact; sometimes loose and incoherent; varies much in different localities. Forms immense masses of conglomerate; also contains layers of tabular limestone with indistinct organic remains; very few mammalian remains detected, and those in a fragmentary condition. Passes gradually into the bed below.	Most fully developed along the upper portion of Niobrara river and in the region around Fort Laramie. Seen also on White river and on Grindstone hills.	180 to 200 feet.
	Bed D.	A dull reddish brown indurated grit, with many layers of silico-calcareous concretions, sometimes forming a heavy-bedded fine-grained sandstone; contains comparatively few organic remains.	Niobrara and Platte rivers; well developed in the region of Fort Laramie; also in the valley of White river. Conspicuous, and composing the main part of the dividing ridge between White and Niobrara rivers. Also in Green river valley.	350 to 400 feet.
	Bed C.	Very fine yellow calcareous sand, not differing very materially from bed D, with numerous layers of concretions and rarely organic remains, passing down into a variegated bed, consisting of alternate layers of dark brown clay and light gray calcareous grit, forming bands, of which I counted twenty-seven at one locality, varying from one inch to two feet in thickness.	White river, Bear creek, Ash Grove spring, head of Shyenne river. Most conspicuous near White river. Near the eastern base of the Black hills.	50 to 80 feet.
	Turtle and Oreodon Bed B.	A deep flesh-colored argillo-calcareous indurated grit; the outside, when weathered, has the appearance of a plastic clay. Passes down into a gray clay, with layers of sandstone; underlaid by a flesh-colored argillo-calcareous stratum, containing a profusion of mammalian and chelonian remains. Turtle and Oreodon Bed.	Old Woman's creek, a fork of Shyenne river; also on the head of the South fork of the Shyenne; most conspicuous on Sage and Bear creeks, and at Ash Grove spring. Well developed in numerous localities in the valley of White river.	80 to 100 feet.

VERTICAL SECTION, *continued*.

Subdivisions.			Localities.	Estimated thickness.
MIOCENE.	Titanotherium Bed A.	Light gray fine sand, with more or less calcareous matter, passing down into an ash-colored plastic clay, with large quantities of quartz grains disseminated through it, sometimes forming aggregated masses like quartzose sandstone cemented with plastic clay; then an ash-colored clay with a greenish tinge, underlaid at base by a light gray and ferruginous silicious sand and gravel, with pinkish bands. Great quantities of silex in the form of seams all through the beds. Titanotherium Bed.	Old Woman's creek; also in many localities along the valley of the South fork of Shyenne. Best development on Sage and Bear creeks. Seen at several localities in the valley of White river.	80 to 100 feet.
CRETACEOUS.	Nos. 4 and 5.	Cretaceous beds 5 and 4, with their usual lithological characters and fossils.	Exposed underneath the tertiary beds on the South fork of Shyenne and its southern branches, also in White river valley near its source.	

CATALOGUE OF ALL THE FOSSILS HITHERTO DESCRIBED, FROM THE TERTIARY FORMATIONS OF WHITE AND NIOBRARA RIVERS, WITH A TABLE SHOWING THEIR STRATIGRAPHICAL POSITION.

	Beds in ascending order. A.	B.	C.	D.	E.	F.
RUMINANTIA.						
1. *Oreodon gracilis*, Leidy,	*	*	*			
2. *Oreodon Culbertsoni*, Leidy,	*	*	*			
3. *Oreodon major*, Leidy,	*		*			
4. *Agriochœrus major*, Leidy,	*		*			
5. *Agriochœrus antiquus*, Leidy,	*		*			
6. *Poebrotherium Wilsoni*, Leidy,	*					
7. *Leptomeryx Evansi*, Leidy,	*		*			
8. *Leptauchenia decora*, Leidy,			*			
9. *Leptauchenia major*, Leidy,			*			
10. *Protomeryx Halli*, Leidy,			*			
11. *Merycodus necatus*, Leidy,						*
12. *Megalomeryx Niobrahensis*, Leidy,						*
13. *Merychochœrus proprius*, Leidy,			*			
14. *Procamelus occidentalis*, Leidy,						*
15. *Procamelus robustus*, Leidy,						*
16. *Procamelus gracilis*, Leidy,						*
17. *Merychyus elegans*, Leidy,						*
18. *Merychyus medius*, Leidy,						*
19. *Merychyus major*, Leidy,						*
20. *Cervus Warreni*, Leidy,						*

	Beds in ascending order. A.	B.	C.	D.	E.	F.
MULTUNGULA.						
21. *Chœropotamus* (*Hyopotamus*) *Americanus*, L.	*					
22. *Entelodon Mortoni*, Leidy,		*		*		
23. *Entelodon ingens*, Leidy,		*		*		
24. *Titanotherium Proutii*, Leidy,	*					
26. *Paleochœrus probus*, Leidy,		*		*		
27. *Leptochœrus spectabilis*, Leidy,		*		*		
28. *Rhinoceros occidentalis*, Leidy,		*	*	*	*	
29. *Rhinoceros* (*Hyracodon*) *Nebrascensis*, Leidy,		*	*	*	*	
30. *Rhinoceros crassus*, Leidy,						*
31. *Mastodon* (*Tetralophodon*) *merificus*, Leidy,						*
32. *Elephas* (*Euelephas*) *imperator*, Leidy,						*
SOLIDUNGULA.						
33. *Hipparion*, *S. Hippotherium occidentale*, L.						*
34. *Hipparion*, *S. Hippotherium speciosum*, L.						*
35. *Anchitherium Bairdi*, Leidy,	*					
36. *Anchitherium* (*Hypohippus*) *affinis*, Leidy,				*		
37. *Anchitherium* (*Parahippus*) *cognatus*, Leidy,				*		
38. *Merychippus insignis*, Leidy,						*
39. *Merychippus mirabilis*, Leidy,						*

	Beds in ascending order. A.	B.	C.	D.	E.	F.
40. *Equus excelsus*, Leidy,						*
41. *Equus* (*Protohippus*) *perditus*, Leidy,						*
RODENTIA.						
42. *Steneofiber Nebrascensis*, Leidy,				*	*	
43. *Ischyromys typus*, Leidy,				*	*	
44. *Palæolagus Haydeni*, Leidy,				*	*	
45. *Eumys elegans*, Leidy,				*		
46. *Hystrix* (*Hystricops*) *venustus*, Leidy,					*	*
47. *Castor* (*Eucastor*) *tortus*, Leidy,						*
CARNIVORA.						
48. *Hyænodon horridus*, Leidy,				*		
49. *Hyænodon cruentus*, Leidy,				*		
50. *Hyænodon crucians*, Leidy,				*		
51. *Amphicyon vetus*, Leidy,				*		
52. *Amphicyon gracilis*, Leidy,				*		
53. *Leptarctus primus*, Leidy,						*
54. *Deinictis felina*, Leidy,				*		
55. *Machairodus primævus*, Leidy,				*		

	Beds in ascending order. A.	B.	C.	D.	E.	F.
56. *Felis* (*Pseudælurus*) *intrepidus*, Leidy,						*
57. *Ælurodon ferox*, Leidy,						*
58. *Canis sævus*, Leidy,						*
59. *Canis temerarius*, Leidy,						*
60. *Canis vafer*, Leidy,						*
61. *Canis* (*Epicyon*) *Haydeni*, Leidy,						*
CHELONIA.						
62. *Testudo Nebrascensis*, Leidy,				*	*	* *
63. *Testudo* (*Stylemys*) *Niobrahensis*, Leidy,						*
MOLLUSCA.						
64. *Helix Leidyi*, Hall and Meek,				*		
65. *Planorbis Nebrascensis*, Evans and Shumard,					*	
66. *Lymnea diaphana*, Evans and Shumard,					*	
67. *Lymnea Nebrascensis*, Evans and Shumard,					*	
68. *Physa secalina*, Evans and Shumard,					*	
CRUSTACEA.						
69. *Cypris Leidyi*, Evans and Shumard,					*	

CHAPTER XII.

Quaternary Deposits.

Although the various superficial deposits which I include under the above caption are very fully developed in the Northwest, and exert a great influence on the external features of the country, I shall be able, in this connection, to speak of them only in a brief and general way. I propose, however, to treat the subject more thoroughly in a future official report, now in course of preparation. This division, which has been called surface geology, is by no means greatly inferior in importance or interest to the others before treated, and no country affords more suitable or more abundant material for a memoir on that subject than the Northwest. The extensive area covered by deposits of sand, gravel, water-worn boulders, and erratic blocks, the examples of the denuding and eroding power of water, which have given such unique features to much of the scenery, the river terraces, and yellow marl or bluff formation,—all these subjects will, when thoroughly studied, add very greatly to the interest felt in this department of geological research.

In Prof. Swallow's Geological Report of the State of Missouri, the Quaternary deposits as they occur along the Missouri river, from its mouth to Council bluffs, are quite fully discussed, and inasmuch as they are of a similar character where they are observed from

thence to the mountains, I shall speak of them in a similar manner, acknowledging my indebtedness to his report for several important suggestions.

Prof. Swallow makes four subdivisions of the superficial deposits of the State of Missouri, and as seen on the Upper Missouri I will add one more, namely, Erratic Block Deposit. We have therefore 1st, Drift; 2d, Yellow Marl Formation; 3d, Erratic Block Deposit; 4th, Bottom Prairie; 5th, Alluvium.

1*st. Drift.**

This deposit consists mostly of much waterworn rocks, gravel, and sand, and underlies, to a very great extent, the broad upland prairies of the Northwest. It is usually revealed in the channels of streams and varies in thickness from one to thirty feet. It is found to a greater or less extent throughout the entire country drained by the Missouri river and its tributaries, resting upon rocks of all ages, from the granite to the Tertiary inclusive, but is most largely developed in the vicinity of the mountain ranges, as the Laramie mountains, the Black hills, and the sources of the Missouri and Yellowstone. So abundant is the drift toward the sources of these rivers, that it changes their entire character. The waters of the Yellowstone at its mouth are turbid, flowing over a bed of marly clay, like those of the Missouri from Fort Union to its confluence with the Mississippi; but about fifty miles above the mouth of the Yellowstone smooth waterworn pebbles begin to appear, small in size and few in number at first, but becoming larger and increasing in quantity, and when we reach a point two hundred miles above its confluence with the Missouri, they completely pave the bed of the river, and form the greater portion of the materials which compose the river bottoms in very large areas to the depth of thirty feet and more. From this fact the waters of the Yellowstone gradually lose their turbid character, and near the mountains are clear as crystal. The waters of the Missouri also become less opaque after passing the mouth of Mussel-shell river, and near the Judith roll over a pebbly bed as clear as the mountain streams. The drift seems to underlie all the vast table-land to the northward, continually increasing in extent and thickness as we approach the base of the mountains, and oftentimes concealing the older rocks over very large areas.

Much might be said in regard to this deposit and the agencies which have operated in

* I am well aware that the term "Drift" as used in this connection has not a fixed or definite meaning. I have applied it to certain sand, gravel, pebbly clay and boulder accumulations, which are always found at the base of the Quaternary deposits of the West, filling up the inequalities of the surface of the lower rocks, and may or may not have been accumulated by a force operating over the whole continent.

its formation, but I prefer to delay until a larger number of facts can be gathered together from a more widely extended exploration.

2d. Yellow Marl or Bluff formation.

The yellow marl formation is one of great interest, inasmuch as it exerts a favorable influence on the agricultural capacities of the country where it prevails. Its general character is a light, rather pulverulent silicious marl, in most cases unstratified, containing large quantities of yellowish white concretions of limestone, varying in size from half an inch to four inches in diameter. It varies much in color, however, depending upon the amount of ferruginous matter contained in it. In the southern and southeastern portions of Kansas and Nebraska this deposit is quite largely developed, often concealing the older rocks over large areas. According to Prof. Swallow it is seen throughout that portion of the State of Missouri bordering upon the river, but reaches its highest development from the Iowa line to Booneville. From thence to St. Louis it is very thinly represented. It is also largely developed in those portions of Kansas, Nebraska, and Iowa, which border upon the Missouri river, but attains its greatest thickness between Council bluffs and Sioux city, on the Iowa side. There it is two hundred and fifty to three hundred feet in thickness, forming a range of very precipitous hills, which are so steep that vegetation is with great difficulty supported on their sides. After passing the Big Sioux this deposit begins gradually to thin out upon the summits of the hills, and after passing the mouth of the Niobrara, it cannot be said to exert much influence on the surface of the country. It is observed, however, in outliers even to the mountains, both along the Missouri and Yellowstone rivers, is quite conspicuous near the mouth of the Judith, with a thickness of one hundred feet, and containing its peculiar fossils. Wherever it occurs in the interior of the country it may be readily recognized by the more luxuriant and healthy vegetation which it supports.

About three miles above Florence the marl bluffs are cut by the waters of the Missouri so as to present the following section:

	Feet.
1. Yellow silicious marl, homogeneous in its character, containing numerous white calcareous concretions, varying in size from half an inch to several inches in diameter, ...	100 to 150
2. Yellowish sand and clay, very ferruginous, containing rounded pebbles sometimes forming a conglomerate,	3
3. Dark ash-colored clay, with a slight mixture of sand filled with small waterworn pebbles, usually of small size, seldom more than one inch in diameter, ...	2

Near the mouth of the Big Sioux there is a vertical section of the yellow marl similar to the above. All the southeastern portion of Nebraska is covered with a greater or less

thickness of this deposit, which extends a considerable distance up the Platte, Loup fork, and Niobrara rivers, and passes imperceptibly down into the Pliocene grits, which have revealed so many extinct mammalian remains. That a large portion of this formation is synchronous in age with what we have in this chapter termed the Drift deposit I have no doubt. A great thickness of waterworn pebbles often underlies the yellow marl, and the two deposits seem often to pass into each other by almost imperceptible gradations. Indeed, in many places the drift beds vary very greatly in thickness, and at others alternating with the marl, proving quite clearly that there is a distinct geographical difference in the character of the deposit, rather than a difference of age.

The fossils peculiar to the yellow marl deposit are quite numerous in species. Mingled with the remains of most of the living mammals of the plains are those of extinct quadrupeds, as *Mastodon*, *Elephant*, &c., with large quantities of fluviatile and terrestrial molluscs of the genera *Helix*, *Limnea*, *Physa*, *Paludina*, *Pupa*, *Planorbis*, *Succinea*, *Amnicola*, *Cyclas*, &c., for the most part identical with species living in the vicinity at the present time. One species, *Succinea lineata* (W. G. Binney), was first found fossil in the marl, but has since been procured in a living state from around some small lakes in the sandhills on Loup fork. Others will doubtless yet be found living when the living molluscous fauna of the Upper Missouri is more thoroughly investigated.

3*d*. *Erratic Block Deposit.*

I have given this name to a superficial deposit of rocks or boulders, which forms quite a conspicuous feature in many portions of the Northwest. It is formed of nearly or quite unworn rocks from all the formations in that country, but more especially from the metamorphic and palæozoic series. That it is more recent than the two deposits already alluded to is evident from the fact that it overlies them both wherever they are exposed. It seems to be very similar in its character, though on a much smaller scale, to that of the "Erratics" of New England, but the rocky masses are not usually so large, seldom exceeding four or five tons in weight. These rocks are far more numerous on the north side of the Missouri river, thinning out and becoming smaller in a southwesterly direction until they entirely disappear. But on the north side of the river, in Dakota and Minnesota, the whole surface of the country may be said to be covered to a greater or less extent with these erratic blocks. The hills that border the river opposite Fort Pierre are paved with them for miles, so that a person could step from block to block. Sometimes they form zones or belts with a southeasterly and northwesterly range. Near Fort Pierre these belts are from half a mile to a mile in width, on the surface of which are scattered very thickly these angular masses, while an intervening belt of land occurs whose surface is nearly destitute

of rocks. This exceedingly curious feature in the country was often pointed out to me as a mystery by the voyagers as we ascended and descended the river. The same phenomenon occurs on Pratt's creek, about fifteen miles below Bijoux hills, though on a much smaller scale, consisting of a series of local belts of land either entirely destitute or wholly covered with angular or slightly worn rocks. We have, first, a belt 15 or 20 yards wide, covered very thickly with erratic blocks; second, an interval of 150 yards almost free from rocks; third, a belt of rocks similar to the first, and so continues for several miles. These alternate belts occupy a large area in this region, having a northwest and southeast range, and show conclusively the source from whence these rocks were derived as well as the agency which transported them from their parent bed. Bijoux hills, which are from 500 to 700 feet high above the bed of the Missouri, are covered with "erratics," many of which are masses of limestone containing fossils, as *Trilobites, Crinoids, Corals,* and *Brachiopoda* of palæozoic types. The above facts show clearly the great interest which surrounds this subject, and that it is well worthy of a careful investigation.

4th. Bottom Prairie.

The broad fertile bottom prairies of the Missouri are included in the above division of the superficial deposits, and constitute a most interesting geological feature. These bottom prairies form by far the most fertile lands of the West, the vegetable soil sometimes extending downwards to the depth of twenty or thirty feet, and covered with tall sedge grass and flowering plants, with here and there a grove of gigantic cottonwood trees. These bottom lands are quite extensive along the Missouri from the mouth of the Kansas river to Council bluffs, but attain their greatest width between Council bluffs and Sioux city. On the Iowa side of the river the bottom seems to be continuous for one hundred miles, varying in width from five to thirty miles. The Vermilion prairie commences at the mouth of the Big Sioux and extends with very little interruption to Dorion's hills, a distance of sixty miles, and varies in width from one to eight or ten miles. The materials which compose the Bottom Prairies seem to have been derived to a great extent from the calcareous and silicious marls of the Tertiary, mingled with the clays of the Cretaceous strata of the Upper Missouri, and the surface is covered with a thick vegetable mould, from the annual decay of an enormous growth of vegetation.

5th. Alluvium.

The distinction between Alluvium and Bottom Prairie is very marked all along the Missouri river. It is quite evident that the latter, as restricted in the previous division of the Quaternary deposit, could not have been formed by any agencies in operation at the

present day, while the former is subject to change from year to year and even from day to day. The channel of the Missouri is continually changing from side to side, wearing away and removing alluvium, bottom prairie, or any other formation with which the current may come in contact. The materials are held in suspension in the waters and are carried down the stream to form sandbars, islands, &c. Most of the islands which so thickly dot the bed of the Missouri and much of the timber portions along the side of the river are formed of alluvium. When the main current of the water changes from one side of the bed to the other a sandbar is formed immediately, a thick growth of willows springs up, which is soon succeeded by cottonwood, which may become a fine forest before the current brings its eroding power again to bear upon it. Near the mouth of the Platte there is an island, called Pilot island, formed about fifteen years ago by the wreck of a steamer on a sandbar. The loose materials commenced accumulating upon the upper side of the broken ship, and at the present time the island covers an area of several acres with a thick growth of cottonwood trees from twelve to twenty inches in diameter. The Missouri, as well as all its tributaries, furnish countless examples of this deposit, but the land thus formed is so subject to removal that it is of comparatively little economical value to the settler farther than to furnish a moderate supply of timber. The disadvantages arising from their want of permanence are too well known to be mentioned in this connection.

I have thus presented a mere outline of my notes on the superficial deposits of the Northwest, with the view of developing the subject more fully in my future investigations. Surface geology has not yet received that attention which its importance demands, and it seems quite obvious that a clear understanding of the forces now in operation will be found to be of the highest importance in explaining the geological phenomena of the past.

River Terraces.

So well marked a feature of the valley of the Missouri and its tributaries as the river terraces should not be passed over in this connection without a brief notice. I will not at this time attempt to account for their existence, but content myself with stating a few of my observations.

All along the valley of the Missouri river, from mouth to source, these terraces are more or less conspicuous, and they are also seen in the valley of every important tributary. These phenomena are not, however, confined to the Northwest alone, but are observed to a greater or less extent all over the western portion of the continent, and such is their similarity of character, that it points to some uniform cause for their existence. In Prof. Dana's great work forming one of the Reports of the Exploring Expedition series, the subject is treated very fully from observations made by the author along the western

slope of the Rocky Mountains, and as they all indicate these western slope terraces to belong to the same great system, the remarks that will apply to one portion of the country will apply to a greater or less extent to all.

Near the sources of the larger streams as they flow from the steep sides of the mountains, these terraces form a very conspicuous feature of the valleys. There are usually from three to four of them, forming quite narrow benches, and gradually increasing in width but diminishing in height as we approach the Mississippi. For example, in the valleys of the three forks of the Missouri, there are three and four of these terraces on each side of the river-bed; first terrace near the channel of the river, three feet above water-level, varying in width from a few feet to ten or twenty yards; second terrace ten to twenty feet above the bed of the river, from ten to fifty yards wide; third terrace thirty to fifty feet high, and from twenty to forty yards wide; fourth terrace one hundred to one hundred and fifty feet high, and varying from one hundred yards to half a mile in width. As we descend the Missouri, the fourth terrace seems to be wanting, and the first, second, and third terraces vary greatly in width, often forming broad, level, plains. Near the mouth of the Yellowstone, the first terrace is from three to six feet above the water, and is on a level with the islands and sandbanks. Most of the timber grows upon this terrace; the second terrace forms what is called the bottom, and is from ten to fifteen feet in height, and from a few yards to half a mile in width; and the third terrace ascends very gradually to the foot of the bluffs, varying from one mile to five miles in width, and twenty to forty feet in height. Upon this terrace Fort Union is built, and it has never yet been known to be overflowed. It is covered with a thick deposit of marl, underlaid with small waterworn pebbles, generally to the depth of from ten to twenty feet, and then we come to the Tertiary beds. The first and second terraces are in most cases composed entirely of the more recent superficial deposits. Along the valley of the Big Shyenne and near the Black hills, we again see these terraces, forming very broad, level, beautiful plains. Near the mouth of Plum creek, the first terrace is a fine grassy bench about four feet above the bed of the stream, and the second terrace is fifteen to twenty feet in height, and the third forty to fifty feet high. This last terrace is covered with a thick deposit of pebble-stones, sand, and gravel, resting upon Cretaceous formation No. 4, which is the prevailing rock of this region. Near Fort Randall, the first terrace is composed of fine sand, clay, and pebbles, six to ten feet above the river; second terrace, stratified sand and clay, from ten to twenty feet high; third terrace is composed mostly of dark stratified indurated clay, with numerous seams of pebble-stones. It is evidently derived from the eroded materials of Cretaceous formation No. 4, and at one point forms a series of bluffs sixty feet in height, worn into ravines like bluffs on a larger scale. As we approach the settled portions in descending the Missouri, we find that most of the towns and villages

are located upon the third terrace, which is far above high water mark. Near Bellevue and Omaha city we have very fine examples of terraces, and these villages are located upon the third. In a forthcoming official report I hope to treat this subject in detail, illustrating it with numerous outline sketches. We regard this subject as one of great interest, and most intimately connected with the history of the elevation of the western portion of the continent, for we can hardly doubt that the terraces result from the gradual elevation of the Rocky mountain range.

CHAPTER XIII.

Resume of the Geology of the Missouri River and its Tributaries.

In the following chapter I desire to present a *résumé* of the geology of that portion of the Northwest under consideration, with the additional information obtained since the preceding report was written. The foregoing chapters, with very slight alterations, remain as they were prepared over two years since, inasmuch as I have not felt authorized to make any important changes on account of my relations to a subsequent expedition to the Northwest, under the command of Captain Wm. F. Reynolds, T. E., a report of which exploration is now in a state of preparation. By permission of Captain Reynolds, a summary of the principal geological results was published, which is now before the world, and from it and from other sources I hope to make a condensed statement of the leading geological discoveries up to the present time, and to harmonize some of the conflicting opinions which may have been advanced in regard to the age of the different deposits in the West. Opinions differing widely from those which Mr. Meek and the writer have advanced, derived from the personal observations of the latter, and our joint investigations of extensive collections of organic remains, have been put forth by a writer who never visited the country explored by me, which may have had a tendency in some minds to weaken the force of our statements. Without entering into any discussions I would simply say, that all of my statements have been made with a conscientious regard for the truth, and such conclusions have been derived as seemed legitimate, leaving to the future to correct that which is wrong and approve that which is right. I cannot feel satisfied, however, to have any geologist, after a brief exploration and even without any personal knowledge of the country, pronounce my observations, which have been made with great care and patience, through the toil of many years, as entirely at variance with the truth.

We may very properly separate the western portion of our continent into two divisions, mountain and prairie, and a combination of the two will form the Rocky mountain district.

This district may be said to commence as soon as we leave the Mississippi westward, the ascent being gradual but continually on the increase until we arrive at the foot of the mountains. Leaving St. Louis westward we gradually ascend, passing over a prairie region for the most part, for the distance of nearly 800 miles, when we have reached an elevation of 6000 feet and come abruptly to the lofty rugged mountain peaks which compose the upheaved ridges. To illustrate this statement, let us examine the profiles across the country from the Mississippi westward, which have been constructed by the War Department. Glancing at the general map of the country west of the Mississippi, also published by the War Department, we will observe that the immediate Rocky mountain region is not composed of merely a single lofty upheaved ridge extending across the continent, but a vast series of ridges or ranges, which taken individually do not seem to have any definite trend, but when viewed in the aggregate extend across the map in a direction nearly northwest and southeast, forming a zone or belt 500 to 1000 miles in width from east to west. From long. 96° westward to the foot of the mountain ridges the country traversed exhibits the true typical prairie, no timber being found to any extent, except that which skirts the streams. From thence to the Pacific coast we have what may be called the true mountain portion, which is composed of a vast number of ridges of elevation, interspersed with beautiful valleys, many of which are remarkable for their fertility. Some of the valleys are quite large and are surrounded by mountain ridges as by gigantic walls.

If we look at the barometrical profile constructed by Gov. Stevens, from St. Paul's, Minnesota, to the foot of the mountains westward, we find that the former locality is 828 feet above the sea. Near the mouth of the Yellowstone, 670 miles to the westward, we find that the elevation is 2010 feet above the sea, and that we have made a gradual ascent in that distance of 1172 feet. As we approach the base of the mountain ridges the ascent continues to increase, and when we reach the valley of Dearborn river, 448 miles farther west, we ascertain that this locality is 4091 feet above the sea level, and that in that distance of 448 miles we have ascended 2081 feet, or nearly 5 feet to the mile. The valley of Dearborn river is just at the foot of the mountains, and to that point the country traversed belongs to the true type of the western prairie.

Again, if we examine the profile commencing at Council bluffs on the Missouri river, we find the elevation at that point to be 1327 feet above the sea level. Thence proceeding westward to the sources of Lodge Pole creek, at the base of the Laramie range of mountains, we have made an ascent, while thus passing over the prairie region, of nearly 5000 feet. We thus see that in the distance of 550 miles we have reached an elevation 3000 feet higher than our starting point, by an ascent of 5 feet to the mile.

Again glancing at the profile extending from Fort Leavenworth westward, we observe that at the Missouri river the elevation is 904 feet above the sea. At the base of the Laramie

range of mountains, 659 miles west, the elevation is 6716 feet. To show the increased rapidity of ascent as we approach the vicinity of the upheaved ridges, we see that the elevation at the forks of the Platte is 3000 feet above the sea, making an ascent from the Missouri river to this point, a distance of 413 miles, of 2096 feet, or about 5 feet to the mile. From the forks of the Platte to the foot of the Laramie mountains, a distance of 413 miles, we find an increased elevation of 3716 feet, or 15 feet to the mile. After reaching the base of the elevated ridges, the ascent is more or less abrupt, sometimes rising to the height of 3000 to 6000 feet above the open prairie country around. We might give many more illustrations similar to those just stated, extending them over to the Pacific coast, but we reserve them for a future occasion. We have said enough, however, to indicate the beautiful unity in the physical development of the western portion of our continent. With the above brief outline of a subject which I hope to pursue much farther at some future time, I proceed to consider the geological structure of the mountain chains.

We may at once make the statement, that there appears to be two types of mountain elevations, namely, those elevations which have a granite nucleus and form long continuous lines of fracture with far less irregularity of outline, and those ranges which are composed of erupted rocks, which are very rugged in their outline and irregular in their trend. We will in the first place examine the Black hills as an illustration of the first type, which is the most eastern outline of the main mountain range. Very little was known of these mountains until they were explored in the summer of 1857, by an expedition placed by the War Department under the command of Lieut. G. K. Warren, T. E., U. S. A., to which expedition the writer was attached as geologist and naturalist. A preliminary report of the results of this exploration was presented to the War Department under the title of "Explorations in Nebraska and Dakota, in the years 1855, 6, and 7."

The Black hills lie between the 43d and 45th degrees of latitude, and the 103d and 104th degrees of longitude, and occupy an area about 80 miles in length, and from 30 to 50 miles in width. According to Lieut. Warren, the shape of the mass is elliptical, and the major axis trends about 20° west of north. The base of these hills is about 2500 to 3000 feet above the sea, and the highest peaks 6700 feet above the ocean. The whole range is clasped, as it were, by the north and south branches of the Big Shyenne river, the most important stream in this region. The north branch passes along the northern side of the range, receiving very many of its tributaries and most of its waters from it, but takes its rise far to the westward of the range, near the sources of Powder river, in the "divide" between the waters of the Yellowstone and those of the Missouri.

The south fork also rises in the same divide, flowing along the southern base of the range, and also receives numerous tributaries which have their sources in it. These two

main branches unite about thirty miles east of the Black hills, forming the Big Shyenne, which empties into the Missouri about sixty miles above Fort Pierre. The Moreau, Grand, Cannon-ball, and other rivers flowing into the Missouri north of the Shyenne and south of the Yellowstone, rise in a high Tertiary divide north of the Black hills, and are for the greater part of the season quite shallow and sometimes nearly dry, but the Little Missouri derives a portion of its waters from the Black hills through a number of small branches which flow from the northwestern slope.

We thus see that the Black hills do not give rise directly to any important stream, if we except the Little Missouri, a few branches of which flow from springs near the base of the hills, but afford a comparatively small supply of water from that source. The Shyenne is fed for the most part from the numerous small streams which issue from copious springs in the more elevated portions. It would seem, therefore, that the Black hills do not have a marked influence upon the drainage of this region.

I have already noticed the geological structure of the Black hills, but will state briefly its principal points. The nucleus or central portion is composed of a red feldspathic granite with a series of metamorphic slates and schists superimposed, and thence upon each side of the axis of elevation the various fossiliferous formations of this region follow in their order to the summits of the Cretaceous, the whole inclining against the granitoid rocks at a greater or less angle. From the above facts we draw the inference that prior to the elevation of the Black hills, which must have occurred after the deposition of the Cretaceous rocks, all these formations presented an unbroken continuity over the whole area occupied by these mountains. This is an important conclusion, and we will hereafter see its application to other ranges, and also to the Rocky mountain range taken in the aggregate.

Proceeding in a southwest direction from the Black hills along the anticlinal, we see ample evidences of the connection of these hills with the Laramie mountains. By the Laramie mountains we designate those eastern ranges which extend from the Red buttes southward to the Arkansas. This range when examined in detail is composed of a large number of smaller ranges, all, so far as I have observed, of the true granitic type. The trend of the whole group is very nearly north and south, northward as far as Fort Laramie, where they make an abrupt flexure around to the west and northwest, and gradually cease or die out at the Red buttes. From this point westward and northward, there is a space of from twenty to forty miles in width, destitute of mountain elevations, though the strata exhibit evidence of dislocation or crust movements.

Geologically the Laramie range is also composed of a granitoid nucleus, with the fossiliferous formations, Silurian, Carboniferous, Red Arenaceous beds, Jurassic, Cretaceous, and in many places Lignite Tertiary, inclining from each side of a central axis at various angles.

It is from these mountains that the numerous branches of the Platte have their sources, extending a distance of nearly four hundred miles. Again, the dynamical structure of this range warrants the inference that these rocks, in a more or less horizontal position, were continuous over the whole area at present occupied by it some time during the Tertiary period.

The minerals of economical value are quite extensive. The gold mines of Pike's Peak are in this range, and the evidence is quite conclusive that this precious metal will be found to a greater or less extent all along the eastern slope. Iron ore is found in great abundance and of the best quality, while along the North Platte and in the vicinity of Pike's Peak, lignite is known to exist in considerable quantities, and has been used for fuel.

The most important outlier of the Rocky mountains, on the eastern slope, is the Big Horn range, which, though somewhat irregular in the shape of its mass, has a general trend nearly northwest and southeast. It occupies an area about 180 miles in length and 50 in breadth. Near latitude 43½° and longitude 102° the line of fracture seems to have ceased toward the south or southeast and to have made a gradual flexure around to the west, the whole range soon losing its granitoid character and becoming entirely composed of more modern eruptive rocks. The eruptive portion continues westward until it joins on to the Wind river range near the sources of Wind river. At the southern end of the Big Horn mountains, we can trace a single low anticlinal across the prairie, connecting these mountains with the Laramie range at Red buttes on the North Platte. We also know by the position of the fossiliferous strata upheaved along the mountains, that the gradual flexure of the range to the west joins on to the eruptive portion, and thus forms a connection with the Wind river range.

The central portion of these mountains is also composed of granite and granitoid rocks, with the same series of fossiliferous formations, inclining at various angles from each side of the axis of elevation, as are seen around the Black hills and along the Laramie mountains. Some of the more lofty peaks are from 8000 to 12,000 feet above the sea, and are clothed with perpetual snow. We think that the evidence is quite clear that up to the time of the accumulation of a large portion of the Lignite Tertiary beds, all these formations, from the Silurian to the true Lignite strata inclusive, were in a horizontal position, extending continuously over the whole area occupied by the mountains, but as they were slowly elevated, the central portions were removed by the erosive action of atmospheric agencies. The eruptive portion which unites the Big Horn range with the Wind river mountains is exceedingly picturesque, presenting the appearance of a connected series of basaltic cones, and so rugged and inaccessible are they that the persevering trappers have never been able to penetrate them in their hunting explorations.

Like the Black hills, the Big Horn range does not give rise to many important sub-

hydrographical basins. The largest stream in this region, and one which gives name to the mountains, rises in the Wind river range, passes through the Big Horn mountains, and unites with the Yellowstone about seventy miles to the southward. Before reaching the mountains it takes the name of Wind river, and assumes the name of Big Horn after emerging from them. This range, however, constitutes quite an important feeder to the Yellowstone. Powder river, which rises in this range by numerous branches, drains a large area, mostly Lignite Tertiary, and pours a considerable volume of water into the Yellowstone, near lon. 105½° and lat. 46½°. Tongue river is the next most important stream, which, though not draining so great an area as Powder river, empties into the Yellowstone a much larger bulk of water.

The Medicine Bow and Sweet Water mountains appear to be of the same character, for the most part; but on the east side of the Sweet Water river the evidence of igneous action is shown on a large scale. The ancient volcanic material would seem to have been elevated to a great height in but a partially fluid condition and then to have gradually cooled, affecting to a greater or less extent the fossiliferous strata in contact.

Near the junction of the Popo Agie with Wind river, we come in full view of the Wind River mountains, which form the dividing crest of the continent, the streams on the one side flowing into the Atlantic, and those on the other into the Pacific. This range is also composed to a large extent of red and gray feldspathic granite, with the fossiliferous rocks inclining high upon its sides. After passing the sources of Wind river, the mountains appear to be composed entirely of eruptive rocks. Even the three Tetons, which raise their summits eleven thousand feet above the ocean level are formed of very compact basaltic rock. The Wasatch and Green River ranges, where we observed them, have the same igneous origin, and the mountains all along the sources of the different branches of the Columbia exhibit these rocks in their full force. In Pierre's hole, Jackson's hole, and other valleys surrounded by upheaved ridges, these ancient volcanic rocks seem to have been poured out over the country and to have cooled in layers, giving to vast thicknesses of the rocks the appearance of stratified beds.

The mountains about the sources of the Missouri and Yellowstone rivers are of eruptive origin and in the valley of the Madison fork of the Missouri are vertical walls of these ancient volcanic rocks one thousand to fifteen hundred feet in height, exhibiting the appearance of regularly stratified deposits dipping at a considerable angle. As we pass down the Madison we find some beds of feldspathic rocks and mica and clay slates beneath the eruptive layers, dipping at the same angle. After passing the divide below the three forks of the Missouri we see a number of partially detached ranges, which appear to be of the same igneous character. In the Belt, Highwood mountains, and indeed all along the eastern slope in this region, we find continual evidence of the outpouring of the fluid ma-

terial in the form of surface beds or in layers thrust between the fossiliferous strata. These igneous beds thin out rapidly as we recede from the point of effusion. A large number of these centres of protrusion may be seen along the slope of the mountains west of the Judith range. The erupted material sometimes presents a vertical wall three hundred feet high, then suddenly thins out and disappears. The Judith, Bear's Paw, and Little Rocky mountains seem to be composed for the most part of granite and other rocks, with igneous protrusions here and there. I have in a former paper expressed the opinion that the central portions of our mountain ranges are composed of feldspathic granite, and to a certain extent this is true in regard to the more eastern outliers, but more recent observations have convinced me that these rocks, which I have defined by the term eruptive, compose by far the greater portion of the mountain masses of the West.

We have already alluded to the fact that the Potsdam sandstone in its western extension, was first made known as occurring in the Black hills. It here rests upon the upturned or nearly vertical edges of the schists, clay slates, and granitoid rocks, and the inference was drawn that the same rock would be found forming an outcropping belt all along the eastern slope of the Rocky mountains. Subsequent explorations have shown that it also occurs along the margins of the Big Horn range, near the summit, holding the same relative position, and exhibiting the same lithological characters. A few thin layers of fine calcareous sandstone were observed, filled with fossils characteristic of this period. At the head of La Bonte creek in the Laramie range, I noticed a bed resting discordantly upon azoic slates, fifty to one hundred feet in thickness, holding the same position and possessing the same lithological characters which it reveals at other localities. I could discover no fossils in it at this point, but I am confident that this bed represents the Potsdam sandstone. The same bed seems to occur all along the mountains from Laramie peak to Cache la Poudre creek, underlying the well-known Carboniferous strata, and resting upon the decomposing granitoid rocks, which form the nucleus of the first or lower ridge. This rock (the Potsdam) is more or less changed by heat from beneath, but I was able to trace it continuously from the source of the Chugwater creek to the source of Cache la Poudre, a distance of over one hundred miles. It was also seen along the eastern slope of the Wind River mountains, but did not contain any organic remains.

The above facts show very clearly that in its western extension, the primordial zone of Barrande is represented only by a thin bed of sandstone, never exceeding one hundred and fifty feet in thickness, and that is seen only in a very narrow outcropping belt near the margins of the mountain crests. The stratified azoic rocks upon which it rests discordantly, so far as my observations have extended, never reach a very great thickness in the West.

On both sides of the divide of the Rocky mountains, so far as our explorations have ex-

tended, a series of calcareous, areno-calcareous, and arenaceous beds are seen, which we have referred to the Carboniferous epoch. They vary in thickness at different points. Without specifying localities, it will be sufficient to remark, that all along the margins of any of the mountain elevations in the far West, these rocks are seen in a more or less inclined position.

Sometimes they are not visible for a short distance (as between the Laramie and Platte rivers, twenty or thirty miles), but it is plain that they have either been removed by erosion, or concealed by more recent deposits. Along the Big Horn mountains there are alternate layers of sandstone, arenaceous and magnesian limestones, many of which show oblique laminæ and other indications that their deposition took place in shallow and perhaps turbulent waters. They are here developed to a thickness of one thousand to fifteen hundred feet, and incline high upon the sides of the mountains, at an angle of 50° to 70°. They contain few fossils, but these indicate rocks of the same age as those in the Black hills. Along the Laramie mountains, from the Red buttes to Pike's peak, apparently the same limestones are seen inclining against the sides of the elevated ridges, at greater or less angles; and on the opposite side of the axis sloping down to the Laramie plains, the corresponding strata are seen, though leaning at much smaller angles, usually from 9° to 15°. Along the Sweet-water and Wind River mountains, these rocks are highly developed, and incline against the sides of the ridges of elevation as heretofore described. The corresponding portions are also seen on the west slope of the main range, at the sources of Green and Snake rivers, but not as conspicuously developed, the eruptive rocks predominating. Crossing back over the dividing crest, near the sources of the Madison, Jefferson, and Gallatin forks of the Missouri, we find similar limestones largely developed, and covering a considerable area on the eastern slope. Near the junction of the three forks, and along Smith's or Kamas river, we find them reaching a thickness of eight hundred to one thousand feet, often partially changed by contact with igneous rocks beneath. They were also observed around the Judith mountains, and also about the Bear's paw and Little Rocky mountains.

Nowhere in the Rocky mountain range, so far as my observations have extended, do the Carboniferous rocks seem to abound in organic remains, and the few usually seen are generally found in a bad state of preservation, and comprise a limited number of species. The precise period to which these rocks belong, which are so persistent in all disturbed regions, is not positively known, the evidence from organic remains pointing to the age of the Coal measures, and sometimes to that of the Lower Carboniferous period; probably both members of the system occur there.

At the foot of the Big Horn mountains, near the head of Powder river, I observed at one locality a series of beds which indicated the presence of Permian rocks. These beds,

which are composed of cherty magnesian limestone, are very much like those already described in Northeastern Kansas, and contain in great abundance some of the same species of fossils, as *Myalina perattenuata*, and others. I have also seen similar limestones in other localities, but no fossils were detected, and though having a Permian appearance, they may belong to the upper portion of the Carboniferous.

The evidence is clear in many localities, that prior to the deposition of the Red Marls succeeding the supposed Permian, a very great erosion of the surface of the Carboniferous rocks took place. We find, for example, in many localities only a thin representation of the Carboniferous rocks, and again a full development, one thousand to fifteen hundred feet in thickness.

Overlying the Carboniferous rocks and equally persistent with them is a series of red arenaceous marl beds or gypsum-bearing marls, which are co-extensive with the upheaved sedimentary formations along the Rocky mountains. The largest development of these beds which I have observed, occurs on the northeastern side of the Big Horn mountains, and on the west slope of the Wind River mountains, near the source of the Gros Ventres fork of Snake river. From the Red buttes on the North Platte to Pike's Peak these beds are often removed by erosion or concealed by superficial deposits, but their appearance in numerous places shows very clearly that beneath the surface they occupy a considerable area throughout the country bordering the mountain ranges, possibly extending entirely over the eastern slope. Passing over into the Laramie plains we find that the red marls constitute the surface formation of the plain country. It has also been shown from the investigations of Messrs. Meek and Engelmann, that these beds are revealed along the Wasatch mountains, even south of Lake Utah, furnishing undoubted evidence that they belong to the same great deposit. The fact also that one thousand to fifteen hundred feet of red arenaceous beds are seen near the sources of Green river, leads to the inference that they continue southward far down the Green river valley to that portion which takes the name of Colorado, and are in fact a continuation of the extensive red deposits, described by various explorers in New Mexico.

These red beds are also seen under similar circumstances highly developed along the mountains at the sources of the Missouri. There seems to be a change in the lithological characters below the Gate of the mountains, the peculiar red deposits disappearing for the most part, and a series of irregular layers of silicious limestone with a reddish tinge, and with oblique laminæ, ripple-mark and other indications of shallow water deposition. It is through these layers of rock that the Missouri river cuts its way from the foot of the mountains to the mouth of Highwood creek, about ten miles below the falls. They are also distinctly revealed around the Judith mountains. Along the Big Horn mountains thick layers of gypsum occur, but the gypsum beds are by no means co-extensive with the red deposits, and indeed are present in but few localities. Near the head of Powder river

the aggregate thickness of the gypsum strata is about one hundred feet, while near the source of Snake river there is a thickness from fifty to eighty feet. It also occurs to a considerable extent at the foot of the mountains, on La Bonte creek, a branch of the North Platte.

At the time of writing the preceding report, no division had been made of the red beds separate from the Jurassic, because at that time there was no proof that they were distinct, no organic remains having been obtained from them. We only knew that they held a position below the well-established Jurassic rocks, and that, so far as had been observed, there was no physical break in the sequence of the strata. These red beds, however, when compared with similar red rocks in the Old World, had been often referred to the age of the Triassic or New Red Sandstone. The explorations of Dr. Newberry in New Mexico revealed quite a number of species of plants and the bones of a large saurian animal which seem to direct his mind toward the Triassic epoch. The plants discovered by Dr. Newberry in New Mexico were referred by him to the genera *Zamites*, *Pterophyllum*, &c., and regarded as similar to those of the Keuper (Upper Trias) of Europe. Though the evidence so far obtained points quite strongly toward the Triassic epoch, it is not yet considered sufficiently clear to warrant a positive opinion in regard to their age. If these red arenaceous deposits really represent a distinct geological epoch, it seems quite strange that they have as yet yielded so few organic remains. They have already been examined with considerable care over an area, in the vicinity of the Rocky mountains, extending from latitude 49° far southward into New Mexico. On the west side of the Wind River mountains we have discovered fossils beneath the red beds, which may include those in the Jurassic.

The Jurassic rocks are everywhere revealed overlying the red deposits just mentioned, and possess an equal geographical extension.

Their fullest development and most fossiliferous condition seems to be along the margins of the Black hills, where they have furnished the most satisfactory evidence of their age. Along the northeastern slope of the Big Horn mountains, this group of rocks presents its usual appearance of gray and whitish calcareous and arenaceous layers, with indurated somewhat variegated beds of more or less laminated marls, containing in great abundance *Belemnites densus*, *Pentacrinus asteriscus*, a new species of *Ostrea*, *Pecten*, &c.

At Red buttes we find a fair development of these beds with the same fossils, but as we proceed southward toward Long's Peak, the intercalated laminated marls disappear, and the whole formation seems to be reduced to a thickness of fifty to one hundred feet, with very few fossils. Along the southwest side of the Big Horn mountains and the northeast side of the Wind River mountains we have a thickness of Jurassic rocks from eight hundred to one thousand feet, containing organic remains in the greatest abundance. Crossing the Wind River mountains we observed the strata corresponding to those upon the eastern side with *Belemnites densus*, *Ostrea*, &c. Returning to the eastern slope at the sources of

the Missouri we see occasional indications of their existence, but not so conspicuous as to be readily identified. The age of this group of rocks may be now considered as thoroughly established, so great a number of fossils which appear to be of undoubted Jurassic types have been obtained.

I have remarked that the older fossiliferous beds doubtless pass beneath the more recent Cretaceous and Tertiary deposits, and occupy a greater or less area underneath the prairie country east of the "divide" of the Rocky mountains. I have made this inference from the fact that where any elevations occur the complete series of fossiliferous beds are exposed around the axis of upheaval. For the benefit of those geologists who may be constructing geological maps of this portion of the West, I would say, that I have never seen any of the older fossiliferous rocks, from the Potsdam to the Jurassic inclusive, exposed, except in narrow outcropping belts around the margins of the mountain elevations. The Carboniferous rocks occupy a belt from one to two miles wide, and the red arenaceous deposits are exposed over about the same area, while the Jurassic form a zone never more than one-fourth of a mile to three miles in width.

The following additional facts in regard to the Cretaceous rocks of the Upper Missouri were obtained during the last expedition to that region. I have preferred to allude briefly to them here, inasmuch as they will appear in detail in a forthcoming report.

The various subdivisions of the Cretaceous group in the West were observed at numerous localities. The strata in many places occupy large geographical areas, holding a horizontal position, in others forming a belt or zone of greater or less width around the mountain elevations. No. 1 is a well-marked and distinct division along the Missouri river from De Soto to a point above the mouth of the Big Sioux river in the eastern portions of Kansas and Nebraska and in the South and Southwest. But when we come into the vicinity of the mountain ranges in the Northwest its typical lithological characters are wanting, and apparently an increased development of No. 2 only is seen.* Along the Big Horn mountains, No. 2 is eight hundred to one thousand feet in thickness, composed of black plastic clay, with several layers of gray and yellowish calcareous sandstones, ten to fifty feet in thickness. Along the Laramie and Wind River mountains the same characters are shown. After leaving the Missouri near the mouth of the Niobrara river, No. 3 is never seen presenting its typical marly character. In the vicinity of the Black hills we saw a series of beds composed of alternate thin layers of arenaceous and argillaceous sediments, with *Ostrea congesta* and *Inoceramus problematicus*, which may possibly represent No. 3. Along the Big Horn mountains and from Red buttes to Cache la Poudre creek the same fossils were often found, and some other indications of its existence, but no well-marked typical beds

* We mean that the distinctive lithological characters of No. 1, as seen on the Missouri, do not appear along the mountain elevations. It is probable that Nos. 1 and 2 are merged into each other, and lithologically form one division. Further evidence is needed before we can speak positively in regard to this point.

were seen. It is now well known that *O. congesta* and *I. problematicus* range down into No. 2, so that No. 3 in the West and Southwest may give place to an increased development of No. 2. Nos. 4 and 5 are largely developed everywhere, when not concealed by the overlying Tertiary deposits, especially along the Laramie mountains and in the valley of Cache la Poudre. In the valley of Wind river all the Cretaceous rocks down to No. 2 appear to have been removed by erosion prior to the deposition of the Tertiary beds, and the characteristic fossils of No. 2 are quite abundant. As we pass over mountains, we have inclining against the western slope six to eight hundred feet of alternations of black plastic clays, arenaceous marls, and beds of sandstones and limestone, with a few seams of Carbonaceous matter passing up into calcareous and arenaceous compact rocks. In some arenaceous limestones near the middle of the series and extending upward, quite abundant fossils were observed, among them a large *Inoceramus*, two species of *Ostrea*, a large *Pinna*, four inches in length, a *Cardium*, and a number of undetermined species with fragments of silicified wood. The general dip of these rocks is about 20°. These well-marked Cretaceous beds pass up quite imperceptibly into an enormous thickness of Lignite Tertiary. Passing over the dividing crest to the head waters of the Missouri, we did not observe any indications of Cretaceous rocks until we had descended below the three forks, where we find traces left after erosion. They do not reveal themselves conspicuously until we arrive within twenty or thirty miles of Fort Benton, where the black plastic clay begins to overlap the Jurassic rocks with its characteristic fossils, and on reaching Fort Benton the plastic clay is quite homogeneous, and is developed to a thickness of eight hundred feet. As we proceed toward the mouth of the Judith river and near the Judith mountains we find quite thick beds of concretionary sandstone, which form the "Stone Walls," "Citadel," &c. It is from these beds that we have obtained a group of fossils which we have referred provisionally to No. 1, but which seem to be specifically distinct from all others in the West. It may be that when this group of beds, now referred to Nos. 1 and 2, comprising a thickness of fifteen hundred to two thousand feet in this region, are more carefully studied, that several subdivisions will be made, having equal importance with the others. During the past season our route led us along the "divide" between the Missouri and Yellowstone rivers south of the Judith mountains, so that we passed outside of any good exposures of No. 1, as well as beyond the limits of the estuary beds at the mouth of the Judith. We must await a more thorough and detailed exploration of this region before we can state with entire confidence the succession of the beds.

In describing the Tertiary deposits in the Northwest, I separated them into two divisions, but more recent investigation has added many new facts in regard to them, and rendered the following divisions necessary. 1st, Estuary deposits; 2d, True Lignite beds; 3d, Wind River valley deposits; 4th, White River Tertiary deposits.

The estuary deposits, of which the Judith basin may be regarded as the type, are quite

remarkable and of a most interesting character. Opinions of a somewhat conflicting nature have been entertained in regard to them, owing to the peculiar character of the organic remains, but recent observations have convinced me that they are all of Tertiary age, and that they are quite widely distributed throughout the far West. The lithological characters of the Judith deposit have already been sufficiently described, and it has yielded many important fossils. A thin series of beds is also found near the sources of the Moreau, Grand, and Cannon-ball rivers, and at the mouth of the Big Horn river we have a group of beds eight hundred to one thousand feet in thickness, with fossils of the same character as those occurring at the mouth of the Judith. The collections obtained by Mr. H. Engelmann, in Utah, while acting as geologist of Capt. Simpson's expedition, and subsequently investigated by Mr. Meek, have also established the existence of an estuary deposit of Tertiary age in the country bordering upon Green river,—scarcely less interesting than that of the Judith. These deposits pass up into the true lignite beds without any perceptible line of separation, gradually losing their estuary character, and ever after containing only land and freshwater shells. The lignite strata are chiefly remarkable for yielding in the greatest abundance finely preserved vegetable remains. A few fragments of leaves of Dicotyledonous trees and silicified wood, with very impure lignite beds, are formed in some of the estuary deposits, but no groups to indicate the great luxuriance of vegetation which must have existed during the accumulation of the lignite strata.

The geographical extension of the lignite deposits of the West is now a matter of the highest interest, and from what is already known, I am convinced that they will yet be found to cover a greater or less area on both sides of the main divide of the Rocky mountains, from the Arctic sea to the Isthmus of Darien. The estuary and lignite beds seem also to have partaken, equally with the older fossiliferous rocks, of the influence which elevated the mountain chains. Along the Laramie mountains, and from the Red buttes to the divide between Platte and Wind rivers, along the Big Horn mountains, the strata incline at very high angles, 40° to 80°, and in some instances are very nearly vertical. The true lignite strata seem to conform to the older fossiliferous rocks, and to have been disturbed by the same influences that elevated the mountain ranges in the vicinity. These Tertiary beds extend over all the plain country to the north and east of the Laramie mountains, far to the northward, beyond the limits of our explorations. Crossing the Wind River mountains, we find them largely developed high upon the western slope, dipping at a high angle, from the Wind River range on the one side, and the Wasatch and Green River mountains on the other.

Throughout the Wind river valley is a series of beds of great thickness, which seem to be intermediate in their character between the true lignite beds and the White river Tertiary deposits. We first observed them gently inclined near Willow springs on the North Platte, and thence westward toward the Sweet-water mountains, and near the divide be-

tween the North Platte and Wind river they reach a thickness of four hundred feet. From this divide, throughout the Wind river valley, they occupy the greater portion of the country, and though inclining in the same direction with the older strata, the beds do not dip more than 1° to 5°. They differ from the other deposits in the great predominance of arenaceous sediments, and in the absence of vegetable remains, but they contain fragments of turtles and numerous freshwater and land shells, of the genera *Helix*, *Planorbis*, *Vivipara*, &c. The entire thickness of these deposits may be estimated at from fifteen hundred to two thousand feet. From the fact that these deposits do not conform to the true lignite beds, and that detached portions are seen lying upon the sides of the mountains but slightly inclined, while the corresponding beds are shown in the valley below, we infer that they were accumulated long before the mountains were raised to their present height, or perhaps during the gradual process of elevation. This is especially shown at the upper end of the Wind river valley. Passing over the Wind River mountains, we again see them holding the same position on the western slope, and possessing the same lithological characters. While the lignite beds on the west side of the divide incline at a large angle, the more recent beds, although in some places occupying the very crest of the mountains, seldom incline more than three to five degrees.

The most interesting additional facts which we have obtained in regard to the White river Tertiary beds, are their geographical extension, and the evidence of their age in relation to the Lignite Tertiary deposits. We can now show beyond a doubt that the former must have been accumulated long since the latter. We have ascertained that they extend southward along the Laramie mountains to Willow springs, within ten miles of Cache la Poudre, that they also extend up the North Platte to the Box Elder creek, and even beyond are small outliers, showing that much has been removed by erosion. Passing over into the Laramie plains, we find at the source of the Box Elder, and extending over to the head of Bates's Fork, a large development of this Tertiary, and it also reaches far westward to the Medicine Bow mountains. We also know from the observations of Dr. Hines, that it occupies a considerable area among the Sweet-water mountains, extending over into the Green river valley. We have, along the North Platte, the overlapping of the White river beds upon the Lignite strata, thus affording the evidence of superposition for their relative age. The same fact was noticed between the north fork of the Shyenne and the head of Cherry creek, where beds of marl and limestone, containing *Planorbis*, *Limnea*, &c., the same as are seen in the Bad Lands proper, repose upon true Lignite Tertiary strata. Again, while the White river beds hold for the most part a horizontal position, those of the Lignite Tertiary are often much disturbed. Near the Black hills, the former seem to have been elevated to a considerable height by the upheaval of the mountains, but they do not, in any case, incline more than one degree, while north of the Black hills the lig-

nite beds dip five to ten degrees. Along the Platte I have seen the former inclining five degrees, especially on La Bonte creek, and about fifteen miles east of the mouth of that creek. Often the beds seem to have been raised up several hundred feet above their original position, without inclination, resting upon the upturned edges of the lignite beds, which we have before observed partook equally of the disturbing influences which have given so great an inclination to the older fossiliferous rocks. Along the Big Horn mountains and the North Platte the lignite beds sometimes incline from the foot of the mountains eighty degrees, and often the influence of the elevatory power has affected them far out into the plain country.

In the above accounts of the Tertiary deposits of the West, we have shown that the older members are clearly separable into four divisions, exclusive of the Pliocene deposits of the Niobrara. Let us examine the evidence in regard to the age of these deposits. If we study the upper portions of Cretaceous formation No. 5, when not removed by the erosive power of water to any great extent, we then observe, from the time we pass from No. 4 to No. 5, a gradual change in the sediments, and other indications of a slow approach to shallow water: arenaceous sediments begin to take the place of argillaceous, so that we have alternate thin layers of sand and clay, the sand continuing to increase until the upper part becomes a yellow, ferruginous, coarse sandstone, with most conspicuous examples of ripple-mark and oblique laminæ. As the waters of the Cretaceous sea were gradually receding, toward the Atlantic on the one side and toward the Pacific on the other, remnants were left, in the form of lakes, estuaries, &c., which now afford us the last indications of marine and brackish water deposits in the central portions of the West. In these deposits we have first a mingling of brackish and freshwater forms, gradually passing up to pure freshwater and terrestrial species, with no return to the marine condition again.

In the upper part of the Cretaceous formation No. 5, on the Moreau, we find the *Ostrea subtrigonalis*, and in the Judith deposits a form occurs in the greatest abundance which is undistinguishable from it.

We have also mentioned the fact that the fossils of the upper part of No. 5 seem to have existed upon the verge of the Tertiary period, that they sometimes present peculiar forms more closely allied to Tertiary types than Cretaceous, and were it not for the presence of the genera *Baculites*, *Ammonites*, *Inoceramus*, &c., which are everywhere supposed to have become extinct at the close of the Cretaceous epoch, we would be in doubt whether to pronounce them Tertiary or Cretaceous. These facts would seem to indicate a foreshadowing of the Tertiary era, and that the transition from one great period to the other was gradual and quiet, the change in the physical conditions being ultimately sufficient to destroy the Cretaceous fauna and bring into existence that of the Tertiary. Again, in numerous localities where No. 5 is fully developed and a large thickness of Tertiary de-

posits is superimposed, so that near some of the mountain elevations I have found it difficult to draw the line of separation, no apparent physical break occurring in the sediments.

Will not these statements go far to show that the estuary deposits ushered in the dawn of the Tertiary epoch, and induce the belief that they belong to the first part or Eocene period? This point is an important one to establish, on account of its bearing upon the history of the physical development of our western continent.

The estuary deposits soon lose their marine and brackish character and gradually pass up into the true Lignite strata, of purely freshwater origin, thence by a slight discordancy into the Wind river valley beds, which give evidence of being an intermediate deposit between the true Lignite and White river Tertiary beds. Then come the White river bone beds, which pass up into the Pliocene of the Niobrara by a slight physical break, and the latter are lost in the Yellow Marl or Loess deposits. I have estimated the entire thickness of Tertiary rocks in the Northwest at from five to six thousand feet, and their interest will be appreciated when I venture to suggest that by thorough investigation they will doubtless reveal, step by step, in a most remarkably clear manner, the history of the physical growth and development of the central portion of this continent. I shall treat this subject more fully in a future paper, and would refer to the forthcoming Report of Capt. Raynolds for the details of the facts sustaining my opinions.

We have no evidence, so far as I know, of long-continued deep-water deposits in the West, until far up in the Cretaceous period. If we examine the Potsdam sandstone we shall find that where it reaches its greatest force, the lower portion is composed of an aggregation of quartz pebbles cemented with silicious matter, and as we pass upward we find it arranged in thin layers, quite compact, with fucoidal markings, ripple-mark, &c. Everywhere are most abundant examples of oblique laminæ of deposit, and ripple- and wave-markings—evidences of shallow waters.

During the long period that elapsed between the deposition of the earliest part of the Silurian epoch and the commencement of the Carboniferous, we have reason to believe that dry land prevailed over a large portion of the West. The Carboniferous epoch commences with thin layers of arenaceous deposits, gradually passing up into homogeneous silicious and calcareous beds. The latter are never more than from twenty to fifty feet in thickness, and then the arenaceous sediments begin again to predominate, and all the proofs of shallow as well as turbulent waters are shown. We then pass up through the red arenaceous deposits and Jurassic beds, and find no rocks that indicate deep-water deposition. Cretaceous formation No. 1 commences in many places with a considerable thickness of an aggregation of water-worn pebbles, passing up into thin alternate layers of arenaceous and argillaceous sediments, with thick beds of sandstone with ripple-markings and oblique laminæ, then these indications gradually cease in No. 2, and through Nos. 2, 3

and 4, the sediments show that they were accumulated in comparatively deep and quiet waters. No. 2 is a black plastic clay, No. 3 gray marl, and No. 4 a dark indurated sometimes laminated clay, with many calcareous concretions. In No. 5 we gradually approach indications of shallow water, until dry land appears, as already stated.

It will not be possible at this time to mention in detail all the oscillations of surface and other physical changes to which we have reason for supposing the country was subjected during all these periods. It is sufficient for our present purpose to show that except during the middle Cretaceous epoch no long-continued periods of quiet water prevailed in these ancient western seas.

The evidence appears to me to point to the conclusion that a much milder climate prevailed throughout the western portions of our continent, during a greater part of the Tertiary period than that which exists in the same latitudes at the present time. The organic remains appear to indicate a subtropical climate, or one similar to that of our Gulf States. Near the close of the Cretaceous epoch the waters of the great Cretaceous sea receded toward the present position of the Atlantic on the one side and toward that of the Pacific on the other, leaving large areas in the central portions of the West, dry land. These areas were of course in close proximity to the sea, and comparatively but slightly elevated above the ocean waters. In regard to the Mollusca which have been found quite abundantly entombed in the Lignite-bearing strata, it is an interesting fact that the most nearly allied living representatives of many of these species are now found inhabiting the streams of Southern Africa, Asia, China and Siam, apparently indicating the existence of a tropical climate in these latitudes at as late a period as the Tertiary epoch.

Again, the luxuriance of the flora, which has been so perfectly preserved in the Lignite strata of the West, point to the same conclusion. It is true that until recently no forms have been found which belong exclusively to a tropical vegetation, but during our last expedition we obtained a species of true fan palm, very closely allied to *Sabal lamononis*, figured by Dr. Heer in his "Flora Tertiaria Helvetiæ." "The most northern limit of palms is that of *Chamærops palmetto*, in North America, in lat. 34°–36°, and of *Chamærops humilis* in Europe, near Nice, in 43°–44° N. lat."* The true palms of our present day are considered as having their native land within the tropics. That this or a similar condition of climate continued throughout the accumulation of the Wind river valley deposits may be inferred from their Molluscan remains, which are more nearly allied to tropical forms.

Again, we have in this region, as before mentioned, a vast area occupied by the Lignite-bearing strata. There are from thirty to fifty beds of Lignite, varying in thickness from

* Lindley's Vegetable Kingdom, p. 136.

one inch to seven feet. Over all this great district there are at the present time no large forests, no timber except that which skirts the streams. We now know that during the Tertiary period vast forests of timber must have covered many portions of the far West, from the abundance and variety of the vegetable remains preserved in the rocks. Silicified trunks of trees, fifty to one hundred feet in length and two to four feet in diameter, and stumps which indicate gigantic forest trees, occur abundantly over hundreds of square miles along the Missouri and Yellowstone rivers. Prof. Henry and other meteorologists have arrived at the conclusion, from a large number of well-authenticated facts, that the absence of forest trees on the great prairies of the far West is due to the want of moisture, which is well known to prevail all along the eastern slope of the Rocky mountains. The prevailing winds are now known to come from the west, and as the currents of air ladened with moisture from the Pacific ascend the western slope of the mountains, become condensed and deposit their burdens for the most part before reaching the eastern slope.

Prof. Henry, in his paper on Climatology, contributed to the Patent Office Report for 1856, says: "The return westerly current, sweeping over the Pacific Ocean, and consequently charged with moisture, will impinge on the Coast Range of mountains of Oregon and California, and, in ascending its slopes, deposit moisture on the western declivity, giving fertility and a healthful climate to a narrow strip of country bordering on the ocean, and sterility to the eastern slope. All the moisture, however, will not be deposited in the passage over the first range, but a portion will be precipitated on the western side of the next, until it reaches the eastern elevated ridge of the Rocky mountain system, when, we think, it will be nearly if not quite exhausted." We are now supposing that the climatic conditions—winds, currents of air, &c., did not differ to any great extent during the Tertiary epoch from those which prevail in the same latitudes at the present day. We therefore venture the suggestion that up to the time of the accumulation of the middle Tertiary deposits the lofty barrier of the Rocky mountains did not exist.

CHAPTER XIV.

MINERALS AND GEOLOGICAL SPECIMENS.

I. IGNEOUS AND METAMORPHIC ROCKS.

1. Gneiss ferruginous, . . .	12 m. N.W. Ft. Lar.
2. Mica slate, ...	do. do.
3. Mica, more micaceous, . . .	do. do.
4. Granite, coarse, ...	Laramie peak.
5. Mica slate, with silvery mica,	4 m. N. Ft. Laramie.
6. Granite, pulverulent, . . .	Rawhide butte.
7. Felspar, flesh-colored from No. 6, .	Rawhide butte.
8. Granite, fine-grained, micaceous, .	do.
9. Granite, gray, ...	Laramie hills.
10. Quartz, white, ...	do.
11. Hornblende slate, . . .	do.
12. Hornblende rock, ...	do.

MINERALS AND GEOLOGICAL SPECIMENS, *continued.*

13. Mica slate, ... Laramie hills.
14. Hornblende rock in granite, . . . do.
15. Red felspar from No. 14, . . . do.
16. Crystalline quartz from No. 14, . . do.
17. Flesh-colored felspar from No. 14, . . do.
18. Mica slate, with garnets, ... do.
19. Mica slate, with garnets, ... do.
20. Mica, containing iron, ... do.
21. Flesh-colored felspar in large crystals, . do.
22. Chlorite slate, ... do.
23. Mica slate, ... do.
24. Granite, coarse, over No. 23, . . . do.
25. Felspathic granite, pink, . . . do.
26. Quartz veins in No. 25, ... do.
27. Hornblende rock, masses in granite, . do.
28. Granite, fine-grained, ... do.
29. Hornblende rock, ... do.
30. Hornblendic granite, ... do.
31. Hornblende, with crystals of felspar, . do.
32. Mica slate, hornblendic, ... do.
33. Mica slate, hornblendic, ... do.
34. Mica slate, with large plates of mica, . do.
35. Granite, white felspathic, ... do.
36. Quartz, veins in No. 35, ... do.
37. Silicious limestone, Silurian or Devonian, . do.
38. do. highly crystalline, . . do.
39. do. do. . . do.
39½. Syenite, pink, under No. 39, . . . do.
40. Metamorphic silicious limestone, . . Rawhide butte.
41. do. do. purplish, . do.
42. Quartz, in granite, ... do.
43. Metamorphic limestone, gray, . . . do.
44. Mica slate, ... do.
45. Micaceous granite, ... do.
46. do. . . . . do.
47. Mica slate, fine-grained, ... do.
48. Metamorphic limestone, crystalline, . . do.
49. do. purplish, . . do.
50. Metamorphic limestone, similar to No. 48, Rawhide butte.
51. Talcose slate, ... do.
52. Felspathic granite, flesh-colored, . . do.
53. Mica slate, with garnets, ... do.
54. do. very fine-grained, . . . do.
55. Talcose slate, dark, ... do.
56. do. light, ... do.
57. Porphyritic trap, ... Black hills.
58. Hornblende slate, ... do.
59. Felspathic granite, pink, ... do.
60. Plates of mica from No. 59, . . . do.
61. Quartz vein in chlorite slate, . . . do.
62. Chlorite slate, ... do.
63. Trachyte, ... do.
64. Quartz veins in No. 63, ... do.
65. do. . . . . do.
66. Chlorite slate, ... Rawhide butte, W. side.
67. Hornblende rock, underlying Tertiary, . do.
68. Schorl in quartz from clay slate, . . Black hills.
69. do. do. . . do.
70. Augite, ... do.
71. Quartz, with felspar, ... Laramie hills.
72. Porphyritic trap, columnar, . . . Stone butte, Black hills.
73. do. do. . . . do. do.
74. do. do. . . . do. do.
75. Trachyte, ... do. do.
76. Vesicular trap, ... do. do.
77. Trachyte, ... do. do.
78. Silicious limestone, ... Rawhide butte.
79. Porphyritic trachyte, ... Stone butte, Black hills.
80. Compact trachyte, with scales of mica, . Bear peak, do.
81. do. do. do. . do. do.
82. Gray basaltic trap, ... do. do.
83. Porphyritic trachyte, ... do. do.
84. do. . . . . do. do.
85. Quartzite, ... do. do.
86. Gray trachyte, ... do. do.
87. Metamorphic sandstone, ... do. do.

II. SEDIMENTARY ROCKS.

Silurian and Devonian.

89. Potsdam sandstone, red, with *Lingula antiqua* Bear peak.
90. do. gray, fine, with *Obolus*, do.
91. do. porous, with Trilobites, do.
92. Metamorphic, conglomerate over granite, . Laramie hills.
93. do. with cherty pebbles, . . do.
94. do. do. . . do.
95. Argillaceous limestone, Devonian, . . Laramie hills.
96. Metamorphic conglomerate, . . . do.

Carboniferous.

97. Limestone, with spirifer, ... Black hills.
98. Blue cherty limestone, with *Athyris subtilita*, do.
99. do. with corals, . . do.

MINERALS AND GEOLOGICAL SPECIMENS, *continued.*

100. Blue cherty limestone, with *Spirifer lineatus*, Black hills.
101. do. with *Rhynconella Mormoni*, do.
102. do. with *Cyathophyllum*, do.
103. do. with *Zaphrentis*, . do.
104. do. with *Syringapora*, . do.
105. do. *Porites*, . . . do.
106. Yellowish do. over No. 98, with *Spirifer rockymontana*, do.
107. do. do. with *Spirifers cameratus* and *lineatus*, . . . do.
108. Cherty nodules in No. 98, . . . do.
109. *Arragonite*, in No. 98, ... do.
110. Coarse, granular limestone, with crinoidal columns, ... Fort Laramie.
111. Blue, compact, limestone, with *Productus* and *Athyris subtilita*, do.
112. do. with corals, . do.
113. do. with *Spirifer lineatus*, do.
114. Yellowish cherty limestone, with *Productus*, { Warm spring near Ft. Laramie.
115. White limestone, with *Spirifer rockymontana*, Near Ft. Laramie.
116. *Athyris subtilita*, from No. 110, . .
117. *Panopœa*, ... Near Tecama, Neb.
118. *Allorisma*, ... Bellevue, Neb.
119. *Productus*, ... do.
120. *Spirifer cameratus*, ... do.
121. *Athyris subtilita*, ... do.
122. *Bellerophon*, ... do.
123. *Chonetes*, ... do.
124. *Chætetes*, ... do.

PERMO-CARBONIFEROUS AND PERMIAN.

125. Arenaceous limestone, foliated with *Bakevellia* Black hills.
126. Red sandstone, soft, very fine grain, under No. 125, ... do.
127. Pink sandstone, over No. 126, . . . do.
128. Limestone, No. 125, with *Orthoceratite*, . do.
129. do. with *Bellerophon*, . do.
130. do. with *Pleurotomaria*, . do.
131. do. with *Spirifer*, . . do.
132. do. with *Allorisma*, . Big Blue, K. T.
133. Yellow magnesian limestone, with *Nautilus*, *Monotis*, *Bakevellia*, *Myalina*, Smoky Hill fork.
134. do. compact, with *Mytilus*, . . { Banks of Mo., S. line of Neb.
135. Magnesian limestone, with *Monotis*, . . Big Cottonwood.
136. do. with *Avicula*, . . 12 m. W. Big Blue.
137. Chertz rock, gray, with *Avicula* and *Myalina*, Black hills.
138. Chertz rock (Burch stone), with crinoidal columns, ... Black hills.
139. Saccharoid gypsum, over No. 133, . . Smoky Hill fork.
140. *Monotis* from No. 136, ... do.
141. Blue limestone, porous, with fenestella, . Big Blue.
142. Cellular calcareous rock, ... Smoky Hill fork.
143. do. more compact, . . do.
144. do. with spherical cavities, do.
145. do. more argillaceous, . { Near Cottonwood creek.

JURASSIC.

146. Arenaceous limestone, light brown, with *Avicula tenuicostata*, Black hills.
147. do. bluish, over No. 146, with *Avicula*, do.
148. Ferruginous limestone, with *Cypricardia*, do.
149. do. red, with *Avicula*, . do.
150. Yellow arenaceous limestone, with *Serpula*, do.
151. Limestone, bored with lithophagous mollusks, do.
152. Red marl, over No. 141, containing snowy gypsum, ... do.
153. Snowy gypsum from No. 152, . . . do.
154. Crystalline gypsum from seams in No. 152, do.
155. Fibrous gypsum do. do. . . do.
156. Blue compact limestone (freshwater), in No. 158, containing *Unio nucalis* and *Planorbis*, ... do.
157. Arenaceous limestone, same as No. 150, containing pentacrinus, with serpula and ostrea attached to surfaces, . . . do.
158. Yellowish argillo-arenaceous limestone, with ostrea, Upper Jurassic, . . . do.
159. Gray shell limestone, containing *Ammonites*, *Belemnites*, &c., interstratified with No. 158, do.
160. Snowy gypsum, with no stains, equivalent of No. 153, ... Big Horn river.
161. Gypsum, with crystals of selenite, . . do.
162. Snowy gypsum, ... { Near sources of Yellowstone.

CRETACEOUS.

Formation No. 1.

163. Conglomerate and sandstone, with *Unios*, . Bad lands of Judith
164. Conglomerate, ... do.
165. do. fine, with *Melanias* and *Cyclas*, do.
166. Gray arenaceous limestone, with *Melania* and *Helix*, ... do.
167. Conglomerate, same as No. 165, . . do.

MINERALS AND GEOLOGICAL SPECIMENS, *continued.*

168. Arenaceous limestone (No. 166), with leaves of *Credneria, Melanias*, &c., . Bad lands of Judith
169. Indurated ferruginous clay, with *Melanias*, do.
170. Ferruginous sand, with *Unio danai*, . do.
171. Indurated clay, with *Melanias* and scales of Lepidotus above No. 166, . . do.
172. Shell limestone, containing *Melanias*, . do.
173. Impure sandy lignite (stratum D of section), do.
174. Shell limestone, same as No. 172, . . do.
175. Cream-colored shale, burnt from over lignite beds, ... do.
176. Compact argillaceous limestone, with *Cytherea Oweni* (marine), beneath fresh-water beds, ... do.
177. Ferruginous sandstone, with *Tellina subtortuosa*, ... do.
178. Rough, gray, limestone, with *Ostrea glabra*, do.
179. Ferruginous sandstone, with *Inoceramus pertenuis*, upper marine strata, . . do.
180. Lignite, over No. 179, ... do.
181. Carbonaceous sand from decomposition of lignite bed over No. 179, . . . { Rocky mountain creek.
182. Impure shaly lignite, with selenite, . . Near Ammel's Is.
183. Limestone, with *Cypris*, lower part of formation No. 1, ... Black hills, E. base.
184. Silicified wood, ferruginous, . . . do.
185. do. coniferous, . . . do.
186. Bone of saurian, ... do.
187. do. or cetacean, . . . do.
188. Dense ferruginous sandstone, . . . Black hills, W. base
189. Quartzose sandstone, bluish, . . . do.
191. Conglomerate from junction of cretaceous and carboniferous rocks, . . . Platte valley.
192. Coarse ferruginous sandstone, with pebbles, over No. 199, ... do.
193. Dark ferruginous sandstone, over No. 192, do.
194. do. containing much iron, do.
195. do. do. do.
196. Ferruginous sandstone, ... Blackbird hill.
197. do. fine-grained, . . Mouth of Elk Horn.
198. Dark, coarse, sandstone, very ferruginous, do.
199. Red, ferruginous sandstone, with many species of dicotyledonous leaves, Black hills.
200. do. do.
201. Light gray quartzose sandstone, with balls of sulphate of iron over No. 199, do.
202. do. with dicotyledonous leaves, do.
203. Whitish pulverulent sandstone, over No. 199, Sioux city.
204. do. fine-grained under No. 199, Blackbird hill.
205. Indurated clay, bluish, ... do.
206. do. yellow, ... Decatur.
207. do. do. . . . . do.
208. Ferruginous sandstone, with striated bivalves, and *Cytherea arenaria*, . . Big Sioux.
209. Indurated clay, with dicotyledonous leaves, do.
210. do. sand, fine, yellow, with leaves of salix, ... do.
211. Ferruginous sandstone, ... { Mouth of Iowa creek.
212. do. do. fine-grained, with impressions of dicotyledonous leaves, Mouth Big Sioux.
213. do. with *Solen Dacotaensis*, . do.
214. Lignite under No. 209, ... do.
215. Silicified wood, bored by teredo, . . Big Sioux.
216. do. do. . . Blackbird hills.
217. do. do. . . Smoky hill fork.
218. do. do. . . Republican fork.
219. Coarse, ferruginous sandstone, with leaves of *Credneria*, ... Smoky hill.
220. Sandstone, very ferruginous, . . . do.
221. Cellular, ferruginous, rock, . . . do.

Formation No. 2.

222. Masses of sulphuret iron, with sulphate, . Mouth of Vermi-
223. Crystallized do. do. . do. [lion.
224. do. gypsum, ... do.
225. do. do. . . . . do.
226. do. in plates, ... do.
227. Large crystals selenite, in black clay, . do.
228. do. do. do. . do.
229. Ferruginous shale, with remains of fishes, . do.
230. do. shell limestone, . . do.
231. Yellow clay, with gypsum, . . . do.
232. Conglomerate, with green silicious pebbles, do.
233. do. with shark's teeth, . do.
234. Gray arenaceous limestone, with *Cytherea orbiculata*. do.
235. do. do. with fish-scales. do.
236. Dark gray indurated clay, with fish scales, Black hills, E. base.
237. Arenaceous limestone (No. 234), with *Serpula*, ... Dixon's bluffs.
238. Conglomerate, with fish teeth, . . . do.
239. Arenaceous limestone, gray, with *Inoceramus problematicus*, ... Black hills, W. base

MINERALS AND GEOLOGICAL SPECIMENS, *continued.*

Formation No. 3.

240. Soft yellow limestone, with *Inoceramus problematicus*, ... Big Sioux.
241. Gray marl, with *Ostrea congesta*, and fish remains (base of No. 3), . . . Mouth Jamesriver.
242. do. do. . . . do.
243. Scale of *Cyclocladus* in No. 242, . . do.
244. Fibrous carbonate of lime, with *Ostrea congesta* attached to surface, . . . Dorion's hills.
245. Yellow marl, ... do.
246. do. . . . . Bijoux hills.
247. do. lighter, ... do.
248. Crystalline carbonate of lime, seams in marl, do.
249. do. do. greenish in marl, do.
250. Black plastic clay, upper part of No. 3, . Near Bijoux hills.
251. Shale, argillaceous, with fish remains over No. 250, do.
252. do. calcined by combustion of No. 250, ... do.

Formation No. 4.

253. Blue clay, with *Ptychoceras Mortoni*, . Great bend of Miss.
254. Yellow clay, with crystals of gypsum, . do.
255. Whitish alum clay, seams in No. 253. . Bijoux hills.
256. Hyd. silicate of magnesia, masses in formation No. 4, ... do.
257. Crystals sulphate baryta, ... do.
258. White aluminous earth in seams, . . do.
259. Aluminous clay (No. 255), . . . do.
260. Ferruginous concretions throughout F. No. 4, do.
261. Crystalline argillaceous limestone (Cone in cone), ... Shyenne river.
262. Crystals of selenite in clay beds, . . Fort Pierre.
263. Selenite and fibrous carbonate lime, . . Mouth Shyenne.
264. Yellow clay, with selenite, . . . 12 m. ab. Ft. Pierre.
265. Dark, argillaceous, shale, with *Inoceramus*, { Mouth of Cannon-ball river.
266. Blue concretionary limestone, with *Rostellaria*, ... Long lake, Miss.
267. Indurated clay, ... do.
268. Decomposed shale (No. 253), . . . Fort Pierre.
269. Brown hematite, ... Big Shyenne.
270. do. more earthy, . . do.
271. Dog-tooth spar, ... Mussel-shell river.
272. Gray arenaceous limestone, . . . Milk river.
273. do. with carbonized matter and shells, ... Cannon-ball river.
274. Soft argillaceous shale, ... Yellowstone river.
275. Concretions of compact blue limestone, containing great numbers of fossils, do.
276. do. containing large crustacean (undescribed), ... do.
277. Crystallized carbonate of lime, yellow, forming nucleus of concretions, . . . Forks of Shyenne.
278. Crystals of selenite, ... do.
279. Blue indurated clay, with fibrous gypsum, do.
280. Dove-colored laminated shale, . . . Grand river.
281. Petrified wood, bored by *Teredo bisinuata*,
282. "Cone in cone" (No. 241), . . . Cannon-ball river.
283. Indurated clay, with shells, . . . Grand river.
284. Soft micaceous sandstone, thin seams in clay bed, ... Fort Pierre.
285. Vertebra of *Mososaurus*, ... do.
286. Wood bored by *Xylophaga Stimpsoni*, . Mussel-shell river.
287. White aluminous clay, ... Fort Lookout.

Formation No. 5.

288. Yellow arenaceous limestone, with *Venus*, Head of Little Mo.
289. do. softer, ... do.
290. Yellowish calcareous sandstone, with *Cyprina* Cannon-ball river.
291. do. do. decomposed, do.
292. Soft fine sandstone, with *Rostellaria*, . do.
293. Ferruginous sandstone, with Cytherea, . do.
294. Silicified wood, with bark, . . . Long lake.
295. do. bored by *Teredo globosa*, do.

TERTIARY.

A. Lignite Basin.

296. Yellow arenaceous clay on Cretaceous rocks,
297. Yellowish indurated clay, with freshwater shells over No. 296, ... Long lake.
298. Gray sand, fine, over No. 297, . . . do.
299. Coarse, gray, calcareous sandstone, w'h fossils, Top of Square butte
300. Soft argillo calcareous shale, w'h fossil shells, Thunder butte.
301. Ferruginous shale, with coniferous plants, do.
302. Dove-colored sandstone, with silicified wood, do.
303. Yellow indurated sand, with estuary shell of genus *Cyrena*, ... Cherry creek.
304. Light colored indurated clay, base of section, Fort Clark.
305. Dark carbonaceous clay, over No. 304, . do.
306. Lignite, over No. 305, ... do.
307. Dark argillaceous shale, over No. 306, .

MINERALS AND GEOLOGICAL SPECIMENS, *continued.*

308. Yellow indurated sand, with *Paludina* and *Melania*, ...
309. Grayish indurated sand, ...
310. Dove-colored calcareous shale, with *Unios* and other freshwater shells, . . . Red spring.
311. Argillaceous limestone, with fossil plants, Fort Berthold.
312. Fine light-colored marl, under lignite bed, do.
313. Lignite, bright and compact, ... do.
314. Drab indurated clay, ... { High butte, Little Missouri.
315. Light-colored marl, with impressions of dicotyledonous leaves, ... Fort Union.
316. Earthy lignite, ... do.
317. Lignite, ... Yellowstone.
318. do. more impure, . . . do.
319. Concretions sulphuret iron, common throughout Tertiary series, ... do.
320. Septaria, spherical, ... Fort Union.
321. Carbonaceous indurated clay, charged with vegetable remains, freshwater and land shells, *Bulimus*, *Physa*, *Pupa*, &c., . do.
322. Mineralized wood, ... do.
323. Carbonized wood from lignite bed, . . do.
324. Light sandy marl, ... do.
325. Shell marl, containing freshwater shells, . do.
326. Impure lignite, ... do.
327. Light-colored fine clay, under lignite bed, do.
328. Brown shale, with vegetable impressions, . Milk river.
329. Silicious shale, containing much vegetable matter, ... do.
330. Gray shell limestone, soft, ... do.
331. Carbonaceous clay, with *Unio*, *Paludina*, &c., Yellowstone.
332. Coarse gray shell limestone, . . . Elk Horn prairie.
333. Compact bluish limestone, with freshwater shells, ... Red spring.
334. Gray calcareous sandstone, with *Unio*, *Paludina*, &c., ... Yellowstone.
335. Soft argillaceous limestone, with *Paludina trochiformis*, ... Powder river.
336. Crystallized carbonate of lime in concretions, Fort Union.
337. Dove-colored argillaceous limestone, with impressions of ferns, over No. 315, . do.
338. Brown calcareous shale, with *Taxites*, . Yellowstone.
339. Silicified wood, ... do.
340. do. partially carbonized, . . do.
341. do. do. . . . do.
342. do. do. . . . do.
343. Silicified wood, partially carbonized, . Yellowstone.
344. do. cavities lined with drusy quartz, Fort Union.
345. Dove-colored clay, metamorphosed by burning out of lignite beds, . . . Mussel-shell river.
346. Brownish shale, do. do. . do.
347. Scoria, black, formed by do. do. . Yellowstone.
348. do. yellowish do. do. . do.
349. do. black compact do. . do.
350. do. green vitreous do. . do.
351. do. do. do. do. . do.
352. do. red, very porous do. . do.
353. do. brown, very porous do. . do.
354. Shale burned red, with vegetable impressions, do.
355. do. bright red, do. . . do.
356. do. vermilion, with gypsum, . do.
356½. Shale, burned black, ferruginous, . . do.
357. Calcareous pumice from burning of limestone do.

B. White River Basin.

Bed A.

358. Red sandy clay, containing pebbles, base of *Titanotherium* bed, ... On Shyenne river.
359. Teeth of *Titanotherium Prouti*, . . Old Woman's fork.
360. Coarse whitish sandstone, above No. 358, Shyenne river.
361. do. concretionary, . . . do.
362. Soft whitish calcareous sandstone, with scales of mica, ... do.
363. Greenish plastic clay, ... do.
364. do. upper part, . . Sage creek.
365. Plates of chalcedony, ... Bear creek.
366. do. . . . . do.
367. do. . . . . do.
368. Fibrous carbonate of lime, . . . do.
369. Dark chalcedony, ... do.
370. Magnesite, ... do.
371. Calcareous concretion separating bed *a* from bed *b*, ... do.

Bed B.

372. Pinkish indurated marl, ... do.
373. Whitish do. from over No. 372, do.
374. Pinkish calcareous concretion, . . . do.
375. Decomposed marl from Nos. 372 and 373, do.
376. do. do. with *Oreodon*, . do.

Bed D.

377. Cream-colored marl, ... White river.
378. Silicious limestone, with freshwater shells, *Planorbis*, *Limnea*, &c., . . . do

MINERALS AND GEOLOGICAL SPECIMENS, *continued.*

379. Tufaceous, concretionary limestone, . . White river.
380. Cream-colored marl, containing *Oreodon*, . do.

Bed E.

381. Soft white grit, ... do.
382. Conglomerate, above No. 381, ... do.
383. do. with granitic pebbles, . do.
384. Soft white sandstone, with *Oreodon*, . do.
385. Calcareous conglomerate, . . . Fort Laramie.
386. Conglomerate, ... Bijoux hills.
387. Calcareous concretions in marl, under No. 386, ... do.
388. Sulphate baryta, foliated crystals in No. 387, do.
389. Green silicious concretions in limestone, containing freshwater shells, Medicine hills.
390. do. do. do. do.
391. Coarse, whitish, sandstone, . . . Bad Land creek.
392. Conglomerate, ... Grindstone hill.
393. Quartzose conglomerate, ... do.
394. White infusorial earth, base of bed *e*, local, Running water.
395. do. do. do. Loup fork.
397. Indurated marl, white, ... Warren's fork.
398. Silicious tufa, ... Niobrara river.
399. White marl, ... Loup fork.
400. Whitish cherty limestone, . . . do.
401. White foliated limestone, ... Niobrara river.
403. White tufaceous marl, containing freshwater shells, ... Loup fork.
404. Silicified wood, ... Running water.
405. do. . . . . do.
406. Silicious sinter, ... Sage creek.
407. Carbonate of lime, ... Bear peak.
408. Ferruginous conglomerate, . . . Yellowstone river.
409. Micaceous granite, ... do.
410. Hornblendic rock, ... do.
411. Limestone, with corals, ... do.
412. do. with *Spirifer*, . . . do.
413. do. with *Orthoceratite*, . . do.
414. do. with *Syringopora*, . . do.
415. Chalcedony, ... do.
416. Silicified wood, ... do.
417. Limestone, with red chert, . . . do.
418. Concretions from yellow marl, . . . Big Sioux.
419. Silicious sinter from springs, . . . Black hills.
420. Sand from sand hills, ... do.
421. Very fine gray sand, from sand dune, . Powder river.
422. Prismatic iron ore, ... Mouth Big Horn.
423. Efflorescence on soil, ... Cannon-ball river.
424. Compact basalt, protruded, . . . Bad lands of Judith
425. Trachyte, ... do.
426. Bed pipe-stone, Catlinite, obtained by Maj. H. Day, U. S. A., from near source of Big Sioux, viz. Nicollet, p. 16, . .

Upper Silurian.

427. Yellowish gray silicious limestone, with *Favosites*, collected by Mr. Drexler, . { Near South Pass Rocky Mts.
428. Yellowish limestone, with undetermined corals, ... do.
429. Chalcedony from limestone, . . . do.
430. Cherty limestone, with *Syringopora*, . do.
431. do. with *Halysites escharoides*, do.
432. do. with *Streptalasma*? . do.

Carboniferous and Permian.

433. Impure coal, slaty, ... { Near mouth of Platte river.
434. Compact cherty limestone, . . . Fort Leavenworth.
435. Blue cherty limestone, ... do.
436. Dark, argillaceous, shaly limestone, . . do.
437. Impure coal, laminated, ... { 12 m. beyond Ft. Leavenworth on Ft. Riley road.
438. Yellowish magnesian limestone, with *Mytilina*, ... Deep creek, K. T.
439. Dark indurated clay, ... do.
440. Nodular chert, ... Fort Riley.
441. Fine yellow clay, ... Cottonwood creek.
442. Yellowish gray magnesian limestone, with spines of *Archeocidaris*, . . . do.
443. Blue cherty limestone with *Monotis*, . . do.
444. "Cone in cone" overlying coal bed, . . { Near Fort Leavenworth.
445. Fibrous carbonate of lime in thin layers with *Ostrea congesta* attached, Cretaceous formation No. 3, ... } Bryan's fork of Little Blue river, K. T.

PART III.

ZOOLOGY AND BOTANY.

CHAPTER XV.

Mammals.

The mammals of the Upper Missouri collections have been identified and described by Prof. S. F. Baird in his general report, which forms Vol. 8 of the P. R. R. Surveys. The collection comprises skins, skeletons, and skulls of nearly all the larger quadrupeds of the plains, with a large number of specimens of most of the smaller ones. From the following catalogue some idea may be obtained of their geographical distribution in the Northwest, though several species, which are well known in that country, are not included, from the fact that they are not in the collection. The Wolverine (*Gulo luscus*, Sabine) has been killed in the vicinity of Fort Benton, and is not unfrequently seen along the eastern base of the mountains, though none were observed by our party. The little Black Mink (*Putorius nigrescens*) was obtained by Lieut. Couch at Fort Leavenworth, Kansas Territory, and a skin of the black-footed ferret was procured at Fort Laramie by Mr. Alexander Culbertson. This specimen, from which the species was described by Audubon and Bachman, is the only one ever known. Prof. Baird says, "It is a little remarkable that so conspicuous and well-marked a species should have eluded the notice of all the recent explorers in the Platte region."

The Black Bear (*Ursus Americanus*) is said to occur in the region ot Council bluffs. An individual was killed near the mouth of the Vermilion in the autumn of 1856. I cannot ascertain that it has ever been observed above that point along the Missouri. I saw the common Striped Squirrel (*Tamias striatus*) quite abundant at Bellevue, Nebraska, but was unable to obtain a specimen. They do not pass above the mouth of the Niobrara; very few are seen above Council bluffs. One or more species of Flying Squirrel occur in Nebraska, but were not observed by me during my explorations. A species of Mouse (*Perognathus fasciatus* Pr. Max.) was described by the Prince of Neuwied, from Fort Union, near the mouth of the Yellowstone. We were unable to rediscover this interesting species, but it holds a place in the fauna of that region. The Moose (*Alce Americanus*) can scarcely be considered as belonging to the fauna of the Upper Missouri, though several have been killed in that region. One was shot in the valley of the Shyenne river, a second near Milk river. These must have strayed down from the North, as they are not recog-

nized as frequenting any portion of the country drained by the Missouri and its tributaries.

Several species of quadrupeds represented in the collection do not pass above certain limits on the Missouri river.

The *Scalops argentatus* has not yet been observed above the mouth of Big Sioux river, and it is not probable that it will be seen above the rich bottom lands which extend only to the Niobrara; and the mouth of White river may be considered the most northern limit of *Geomys bursarius;* the *Thomomys rufescens*, which has not occurred before, seeming to take its place from thence to the mountains. The Gray and Black Squirrel (*Sciurus Carolinensis*) has not yet passed above the mouth of Big Sioux river, and the *S. Ludovicianus*, or Fox Squirrel, reaches its most northern limit near the mouth of White river. This is doubtless owing to the absence of trees which bear their favorite food. Although a single Otter was taken by our party on the Niobrara river, and is not unfrequently caught near the mouth of Big Sioux, it is very seldom, if ever, seen above Fort Pierre. The Fisher (*Mustela Pennantii*) is somewhat abundant along the rivers and streams flowing from the north into the Missouri, and the Muskrat (*Fiber zibethicus*) is very common around Council bluffs, and gradually ceases before reaching the Niobrara. I have been told by the traders that this animal is occasionally seen along the Missouri near Fort Union and on the Yellowstone, but I have never known of any skins being preserved to authenticate the statements.

Sorex Haydeni, Baird.

Hayden's Shrew. Baird, General Report on Mammals, 1857, p. 29.

This small species of Shrew must be quite rare in Nebraska. During all my examinations of that country, I have been able to secure but three specimens, and these are the only ones at present known. A single specimen was caught near Fort Pierre, a second one at Fort Union, and a third was found dead along the shore of the Missouri river, near the mouth of Cannon-ball river, so that as far as we at present know its range is along the Missouri from latitude 44° 20′ to 48°. Specific character: Head less than eight-tenths of an inch; acutely attenuated. Body about 1 75 hundredths of an inch; vertebræ of tail 1.25. Tail very thick and swollen; hind feet four-tenths of an inch; teeth pitchy chestnut. Color above, grayish chestnut brown; beneath, whitish; upper premolar not imbricated; 3d and 4th equal and decidedly less than the two anterior.

Blarina brevicauda, Gray.

Short-tailed Shrew. Baird, General Report on Mammals, 1857, p. 42.

The only specimen of the above species in our Nebraska collection was discovered near Fort Berthold, on the Missouri river, in latitude 47½°, longitude 102°. Very rare.

Scalops argentatus, Aud. & Bach.

Silvery Mole. Baird, General Report on Mammals, 1857, p. 63.

Very little is yet known of the habits of this beautiful mole, though it has been known to naturalists for several years. It was first discovered on the prairies in Michigan, and described by Audubon and Bachman in their work on Quadrupeds of North America. Though abundant on the rich bottoms along the Lower Missouri, it is seldom, if ever, seen above longitude 98°. A single specimen was caught near the mouth of the Big Sioux in the autumn of 1856. If this animal existed in large numbers, its fine glossy, silky, silvery fur would render it an important object of pursuit for economical purposes. Range: Detroit to mouth of Big Sioux river, and south to Prairie Mer Rouge? It was also obtained by Mr. Wood twenty miles west of Fort Riley, in Kansas Territory.

Lynx rufus, Raf.

Wild Cat. Baird, General Report on Mammals, 1857, p. 90.

Though seldom seen by the traveller, this animal is not rare in any part of the country drained by the Missouri and its tributaries. It is very often caught in the traps which the traders set for wolves. The flesh of the wild cat is not unfrequently used for food by the Indians, and its skin for ornamental purposes. In the month of January, 1855, I attempted to cross the prairie from Pinau's spring to the Fur Company's trading-houses near the forks of the Shyenne river, a distance of about thirty miles. Losing my course, I wandered for two days without food among the innumerable ravines of the tributaries of that river, and on the third day came to a lodge of Sioux Indians, who had separated from their band, and were subsisting on the products of each day's hunt. The old chief offered me kindly the hospitality of his hut, which I gladly accepted, and on entering the lodge found the inmates quietly watching the carcass of a large wild cat, which was roasting before the fire. As soon as the meat was cooked, the Indians ate of it with a keen relish, and placed a portion before me, and though almost famished with hunger, one mouthful was sufficient to satisfy me, and I gladly turned to the more palatable meat of Black-tailed Deer. These animals are caught every year to a greater or less extent at Fort Pierre, Fort Clark, Fort Union, Fort Benton, and on the Yellowstone. Lieut. Warren killed two young wild cats near the "Big Bend" of the Missouri in the autumn of 1856. The skins were preserved and added to our collection. We also obtained the skin of a very large individual near the mouth of Big Sioux river on the Missouri. Range: Atlantic to Pacific. Upper Missouri to Gila river. Not on the Rio Grande? The Canada Lynx (*Lynx Canadensis*) has been seen in many portions of the Upper Missouri country by Indians and traders, but no skins were obtained by our party.

CANIS OCCIDENTALIS, *var.* GRISEO-ALBUS.

WHITE AND GRAY WOLF.

C. OCCIDENTALIS, *var.* NUBILUS.

DUSKY WOLF. Baird, General Report on Mammals, 1857, p. 104.

This animal varies so much in color that the traders on the Upper Missouri suppose that there are four or five species. I have seen them differing in color from an almost snowy whiteness to a dark brown or black, and was at first inclined to attribute this difference to age and sex, but Mr. Zephyr, an intelligent trader, informed me that he had noticed the same variations of color in all ages. It is found more or less numerous throughout the country, though more abundant in those portions where the buffalo range. Countless numbers are seen in the valley of the Yellowstone, and along the Missouri above Fort Union, and woe to any poor buffalo, elk, or deer, which may have been so unfortunate as to have been wounded by the hunter, or to be in the decline of life. Descending the Yellowstone river in an open boat, in the summer of 1854, we passed an old bull lying upon the bank, and evidently alive, surrounded with wolves, who had already deprived him of his nose and tail. He had evidently yielded to his fate, but pitying the poor animal, we hallooed and fired a charge of shot among the wolves, which dispersed them. The old bull revived, started down the bank, and swam across the river to a sandbar, where he fell exhausted. Before we were out of sight, the wolves had surrounded him again, and undoubtedly nothing was left of him in a few hours but a parcel of bones distributed over the prairie. I have never heard of their attacking the settlers and Indians. Their skins are made a considerable article of trade, usually bringing one dollar apiece. Range: Missouri river to the Pacific.

CANIS LATRANS, Say.

COYOTE, PRAIRIE WOLF. Baird, General Report on Mammals, 1857, p. 113.

In the Prairie or Barking Wolf, or as called by the Indians, Medicine Wolf, there is but little variation in color or appearance. It is much more abundant on the Upper Missouri than the large wolf, and collects in larger bands, which seem to act in concert in taking their prey. They are said to station themselves, when in pursuit of the antelope, in such a manner, that when one becomes wearied, a fresh one appears and takes up the chase, until the antelope is captured. They are also said to be very expert in cutting the hamstrings of buffalo, deer, and not unfrequently of horses. They are great enemies of the prairie dog. Multitudes may be seen at all times in their villages, waiting patiently for the dogs to make their appearance. At night, they fill the air with their terrible music. With the Indians, their barking at night always forebodes evil of some kind, and the voyager is reminded of a lurking enemy. At first, one of them will commence a

strain, then another will take it up in some other direction, and so on, until the traveller is convinced that he is surrounded by all the wolves in the country. Their barking sounds much like that of a small dog. Range: From Missouri river to the Pacific, south to the Rio Grande of Texas.

Vulpes macrourus, Baird.

Prairie Fox. Baird, General Report on Mammals, 1857, p. 130.

This beautiful animal is found quite abundantly throughout the Upper Missouri country, where its fur is considered quite valuable. It presents all the different varieties of the common red fox, cross, silver, and black, the fur of which is also very highly prized. I have known the skin of the silver variety to sell for one hundred dollars. In the spring of 1855, I purchased a young prairie fox of the Sioux Indians, near Fort Pierre, and kept him for some months. The troops soon took possession of Fort Pierre, and the fox passed into other hands, and I considered him lost, but on the return of our party to Fort Pierre from the Yellowstone, in the autumn of 1856, I was presented with the identical fox, which I had purchased nearly two years before. He had become quite tame, readily recognized his name, and seemed quite contented in his confinement. We brought him on to Washington, where he was much admired for his beauty, and after a sojourn of a few months in the metropolis, he made his escape, and if now living, doubtless forms a part of the fauna of the Atlantic coast. Range: Upper Missouri to the Plains of Columbia, Oregon Territory.

Vulpes velox, Aud. & Bach.

Kit Fox, Swift Fox, p. 133.

This little Fox is often caught in the traps which the employees of the Fur Company set for wolves. From fifty to one hundred are caught every winter, in the immediate vicinity of each of the trading forts on the Missouri. Its skin is not considered very valuable, bringing only twenty-five cents apiece. Like the prairie wolf, it is found very abundantly about the villages of the prairie dog, and is, I suppose, another of the enemies of that little animal. For what reason it has been called "Swift Fox," I cannot tell, for its speed is less than any other species of fox with which I am acquainted. It is quite abundant all through the Northwest, extending down into Western Iowa. Range: Plains west of the Missouri to the Cascade mountains of Oregon.

Putorius longicauda, Rich.

Long-tailed Weasel. Baird, General Report on Mammals, 1857, p. 169.

Not uncommon throughout the Northwest, though seldom seen by the traveller. Its skin is highly prized by the Indians, who use it for making articles of dress, tobacco

pouches, and for other ornamental purposes. Range: Upper Missouri and Platte rivers. (Carlton House, H. B. T. Rich.)

Lutra Canadensis, Sab.

American Otter. Baird, General Report on Mammals, 1857, p. 184.

Not uncommon along the streams that flow from the north into the Missouri. I cannot ascertain that it has been seen above the mouth of the Niobrara on the Missouri. The only specimen obtained by our party, was taken in a trap set for beaver, on the Niobrara, eighty miles above its mouth. Otter skins are imported into the country every year by the traders, and are prized very highly by the Indians for ornamental purposes. Range: Northern part of the United States to Florida, and west to the Rocky mountains.

Mephites mephitica.

Common Skunk. Baird, General Report on Mammals, 1857, p. 195.

Abundant throughout the country drained by the Missouri river and its tributaries. There seems to be some doubt whether the Upper Missouri *Mephites* is specifically identical with the one in the Atlantic States, but the habits of each appear to be alike in all respects. They are equally as troublesome, not unfrequently entering the houses during the night, or destroying the chickens about the forts, and committing other depredations. Range: United States, east of the Missouri plains, and north of Texas.

Taxidea Americana, Waterh.

Missouri Badger. Baird, General Report on Mammals, 1857, p. 202.

Generally diffused throughout the Upper Missouri country. Of very little economical value, though used for food by the starving Indian. It is also a great foe to the prairie dog, haunting its villages, and extracting the little inhabitants from their deepest recesses. Range: Iowa and Wisconsin to the Pacific coast, and from Arkansas to 49° north latitude (to 58° north latitude, Rich).

Procyon lotor, Storr.

Common Raccoon. Baird, General Report on Mammals, 1857, p. 209.

Has not yet been observed above White river on the Missouri. In the autumn of 1854, while descending the Missouri in a skiff, I killed one of these animals near the edge of the river, about forty miles above the mouth of the Niobrara. It was in a fine condition and furnished me several excellent meals. At Council bluffs and mouth of Big Sioux it is quite numerous, and the Indians carry on a considerable trade in the skins. Range: Massachusetts to Florida, and west to Fort Kearney. Not in Southern Texas?

URSUS HORRIBILIS, Ord.

GRIZZLY BEAR. Baird, General Report on Mammals, 1857, p. 219.

This formidable animal is still quite abundant toward the sources of the Missouri. It lives for the most part upon vegetable food; is fond of the root of *Psoralia esculenta*, of cherries, plums, bulberries, &c., which grow in great abundance throughout the West. It seldom attacks a man unless wounded, when it becomes very fierce, and has not unfrequently destroyed the hunter. At the present time it is very seldom seen below Fort Pierre. I have heard of the common black bear being killed near the mouth of the Vermilion, though I have never seen it, yet am inclined to think it should be included in the Missouri fauna. Range: Plains of the Upper Missouri to the Rocky mountains and along their base, thence to the coast of California. (Not of Oregon and Washington?)

SCIURUS LUDOVICIANUS, Custis.

WESTERN FOX SQUIRREL. Baird, General Report on Mammals, 1857, p. 251.

Very abundant about Council bluffs, gradually becomes rare as we ascend the Missouri, until it ceases to appear near the mouth of White river, in latitude 43¾°, longitude 99½°. Range: Mississippi valley.

SCIURUS CAROLINENSIS, Gm.

GRAY SQUIRREL. BLACK SQUIRREL. Baird, General Report on Mammals, 1857, p. 263.

Two specimens of this Squirrel were taken, one near Fort Leavenworth, K. T., and the other near the mouth of the Platte, N. T. It is seldom if ever seen above this point. Range: Eastern United States to the Missouri river.

SCIURUS FREMONTII, Towns.

MOUNTAIN GRAY SQUIRREL Baird, General Report on Mammals, 1857, p. 272.

A specimen obtained at Laramie peak is supposed to belong to this species; seems to be restricted to the mountains.

SCIURUS HUDSONIUS, Pallas.

RED SQUIRREL. CHICKAREE. Baird, General Report on Mammals, 1857, p. 260.

During the summer and autumn of 1857 I noticed this little Squirrel quite frequently in and around the Black hills. It was most abundant among the oak trees, which were quite numerous, especially on the eastern side of the Black hills. Its habits did not differ from those of the common Red Squirrel of the States, which is familiar to every one. Range: Labrador (latitude 56°) to Mississippi; and in the United States from the Atlantic to the Missouri river.

TAMIAS QUADRIVITTATUS, Rich.

MISSOURI STRIPED SQUIRREL. Baird, General Report on Mammals, 1857, p. 297.

Very common in the "Bad Lands" and rugged portions of the Upper Missouri. It is an active little animal, lives on roots and the seeds of various plants, and is similar in its habits to the common Striped Squirrel of the States. Range: Upper Missouri to Rocky mountains, and west to the Cascade range. Along the Rocky mountains as far south as Fort Staunton, New Mexico.

SPERMOPHILUS FRANKLINI, Rich.

GRAY GOPHER. Baird, General Report on Mammals, 1857, p. 314.

One specimen of the above species was taken near the mouth of Loup fork. Very rare in Nebraska territory. Range: Northern Illinois and Wisconsin, and to Minnesota and Saskatchewan.

SPERMOPHILUS TRIDECEM-LINEATUS, Aud. & Bach.

STRIPED GOPHER. PRAIRIE SQUIRREL. Baird, General Report on Mammals, 1857, p. 316.

Abundant on all the open prairies of the Northwest; similar in its habits and actions to the prairie dog, though not gregarious; lives on vegetable food entirely, as roots and grass. Range: Eastern Michigan to the plains of the Missouri, and south to Red river, Arkansas, and Fort Thorn, New Mexico.

SPERMOPHILUS TOWNSENDII, Bachman.

TOWNSEND'S SPERMOPHILE. Baird, General Report on Mammals, 1857, p. 326.

A few specimens of the above species were collected near Fort Laramie, and does not differ in its habits from the *S. tridecem-lineatus*. Range: Rocky mountains to the North.

CYNOMYS LUDOVICIANUS.

PRAIRIE DOG. Baird, General Report on Mammals, 1857, p. 331.

The first village met with in ascending the Missouri is about ten miles below the mouth of the Niobrara, on the left side. The largest one I have ever seen is near the Black hills, north of the Big Shyenne river. This village, though sometimes interrupted by high ridges or hills, is connected, and covers an area of over fifty square miles. The holes are usually about ten or fifteen feet apart, sometimes fifty feet, and are connected by well-trodden paths, which cross and recross each other like the streets of a city. At the head of the Little Missouri river is a village extending about eight miles in every direction. Much has been said about the owl and rattlesnake living in harmony with these animals. Both species are almost invariably seen about the villages. The owls find the deserted holes a convenient place of retreat, and the rattlesnakes doubtless find the dogs to be very palatable food. The snakes have been killed with a full-grown dog in the stomach, and in

some cases they have depopulated whole villages. Range: Milk river and Upper Missouri; west to the Rocky mountains, south to Red river, southwest to the Upper Rio Grande.

ARCTOMYS FLAVIVENTER, Bachman.

YELLOW-FOOTED MARMOT. Baird, General Report on Mammals, 1857, p. 335.

This animal seems to be very rare, but one specimen having been obtained on the Upper Missouri. But two specimens of this species are in the museum of the Smithsonian Institution. Black hills, Nebraska.

CASTOR CANADENSIS, Kuhl.

AMERICAN BEAVER. Baird, General Report on Mammals, 1857, p. 355.

The Beaver is one of the most interesting and abundant animals in the West. All the little streams from Council bluffs to the mountains are occupied to a greater or less extent with the indications of their existence. The Yellowstone river, from mouth to source, as well as its tributaries, contain myriads, so that they consume literally acres of the small cottonwood trees which skirt the streams. These animals are usually quiet during the day, but in the far West, they are not unfrequently seen swimming about in the water quite unconcerned. The streams that issue from the Black hills are favorite resorts of them, and I have often known them to strip the streams of all the timber which skirted their borders. On the Yellowstone I saw a cottonwood tree eighteen inches in diameter that had been cut down by them. The tree had lodged; they then took off a length of two feet. Mr. Weld, a trader who has spent many years in the West, informed me that he has known the Beaver to cut down trees thirty inches in diameter. On Manuel's creek, below the mouth of the Niobrara, a small stream about ten yards wide, I saw five dams within the space of a few miles, one of which produced a fall of four feet. They vary somewhat in color, sometimes nearly white. One was caught in the Mussel-shell river in the Blackfoot country that was a perfect cream color, with red eyes, an albino; another from the Big Horn river spotted on the belly like a fawn, and yellowish brown on the back. A tributary of Bear river near Great Salt lake is called Black Beaver creek, because all the Beaver taken from it are of jet black color. Their skins bring at the present time from three to five dollars each. Range: Throughout the entire area of North America.

GEOMYS BURSARIUS, Rich.

POUCHED OR POCKET GOPHER. Baird, General Report on Mammals, 1857, p. 372.

Very abundant on the rich bottoms of the Missouri, where they are exceedingly troublesome to the farmer. One specimen was obtained near the mouth of Vermilion river, and a second was caught near our camp fire on the Niobrara. This last-mentioned one was

taken alive, but all efforts to domesticate it were fruitless. It died after three days' confinement. Range: Missouri to Minnesota and Nebraska.

THOMOMYS RUFESCENS, Maxim.

FORT UNION GOPHER. Baird, General Report on Mammals, 1857, p. 397.

This Gopher seems to take the place of the *Geomys bursarius*, from Fort Pierre to the mountains, but is similar in its habits. Two specimens were taken at Fort Union, and one at Fort Randall.

JACULUS HUDSONIUS.

JUMPING MOUSE. Baird, General Report on Mammals, 1857, p. 430.

Only two specimens of this species were taken during the exploration, and they were collected near Fort Union. Range: Nova Scotia to Southern Pennsylvania, and west to the Pacific Ocean.

PEROGNATHUS FLAVUS, Baird.

Baird, General Report on Mammals, 1857, p. 423.

Collected on the Loup fork, during the summer of 1857. Range: Upper Missouri, along eastern slopes of Rocky mountains to Sonora and Chihuahua, and along the Rio Grande to Matamoras.

DIPODOMYS ORDII, Woodh.

KANGAROO RAT. Baird, General Report on Mammals, 1857, p. 410.

A single specimen of the above species was taken on the Niobrara river. Range: Platte river, along the eastern slope of the Rocky mountains, into Durango and Coahuila, Mexico.

MUS MUSCULUS, Linn. p. 443.

Already quite abundant and troublesome at all the Fur Trading Posts on the Missouri. *Mus rattus*, or Common Rat, has also been introduced.

HESPEROMYS SONORIENSIS, Leconte.

Baird, General Report on Mammals, 1857, p. 474.

Very abundant near Fort Union and along the Yellowstone Twenty-five specimens were collected. Range: Upper Missouri and Rocky mountains to El Paso and Sonora.

HESPEROMYS LEUCOGASTER.

MISSOURI MOUSE. Baird, General Report on Mammals, 1857, p. 480.

Very rare; but two specimens secured; one near Bijoux hills, the other on Vermilion prairie, and are the only specimens in the Musuem of the Smithsonian Institution. Very little is known of its habits, and it has been observed only on the Upper Missouri.

Neotoma cinerea.

Rocky Mountain Rat. Baird, General Report on Mammals, 1857, p. 499.

Not rare, but seldom taken; usually found among the dry trees on the river bottoms. The only specimen secured was captured at Fort Sarpy, near the mouth of the Big Horn river, on the Yellowstone, in the summer of 1854. Range: Eastern slope of Northern Rocky mountains and Upper Missouri.

Arvicola Haydeni, Baird.

Baird, General Report on Mammals, 1857, p. 543.

But one specimen of this species has ever been detected. Fort Pierre, Nebraska.

Lepus campestris, Bachm.

Prairie Hare. Baird, General Report on Mammals, 1857, p. 585.

I found the Prairie Hare diffused throughout the Upper Missouri country, west and north of Big Sioux river, though never very abundant. It is confined entirely to the prairie, and from that fact derives its name. Its flesh is used for food to some extent, but is not considered a delicacy. It turns white in winter. Range: Upper Missouri, and Saskatchewan plains to the Cascade range of Oregon.

Lepus sylvaticus, Bach.

Gray Rabbit. Baird, General Report on Mammals, 1857, p. 597.

This little rabbit is exceedingly abundant all along the Missouri in the bottoms, where its favorite resort is among the thick willows, upon which it subsists to a great extent. It is most abundant as far up the river as the mouth of the Niobrara, but passing that point, is begins to become rare, and is found only on the willow bottoms skirting the Missouri. Its flesh is very delicate, and affords a most delicious meal to the hungry voyager. Range: From Massachusetts throughout the United States, and west as far as Fort Union, Nebraska.

Lepus artemisia, Bach.

Sage Hare. Baird, General Report on Mammals, 1857, p. 602.

Unlike the *L. sylvaticus*, the Sage Hare is seldom seen in the vicinity of streams, but is mostly confined to the hills and "Bad Lands," where it finds abundant hiding-places to escape from its numerous foes. As we approach the mountains, it becomes very plenty, seeming to take the place of *L. sylvaticus*. It is also abundant on the Sage plains, where the thick sage hedges afford it excellent hiding-places. Range: Region west of the Missouri to the Rocky mountains, and to the Cascade mountains of Oregon, along the Columbia in the north, and to the city of Chihuahua in the south.

Erethizon epixanthus, Brandt.

Yellow-haired Porcupine. Baird, General Report on Mammals, 1857, p. 569.

Occurs rarely throughout the Upper Missouri country. Its quills are much used by the Indian women for ornamental purposes. Range: Upper Missouri, whole of the Pacific coast.

Cervus Canadensis, Eixl.

American Elk. Baird, General Report on Mammals, 1857, p. 638.

Much might be said in regard to the habits of this noble animal, but they are now so well known, that I need not dwell on them here. At the present time, the Elk is most abundant on the Upper Missouri, above Fort Union, and in the valley of the Yellowstone. Though rather rare, it is not unfrequently seen below Fort Pierre, throughout Western Iowa. Range: Northern portion of the United States to Upper Missouri, and west to the Pacific. Found in the Alleghanies of Pennsylvania and Virginia.

Cervus leucurus, Douglass.

White-tailed Deer. Baird, General Report on Mammals, 1857, p. 649.

The Wood Deer, or White-tailed Deer as it is called by the Indians, is rather common along the timbered streams. Formerly, these animals were very abundant below Fort Pierre to Big Sioux and Council bluffs, but the severity of the cold during the winter of 1855 to 1856 destroyed them so, that at the present time they are very seldom seen. A female was killed near Fort Pierre, with six young in utero. Range: Upper Missouri and Platte to the Columbia river and Washington Territory, Western Texas, and New Mexico?

Cervus macrotis, Say.

Mule or Black-tailed Deer. Baird, General Report on Mammals, 1857, p. 656.

This is the most abundant animal of the Deer kind in the West. In the interminable ravines that border the rivers, it is found in the greatest abundance. Though very shy, its peculiar haunt is very favorable for the hunter. In the valley of Sage creek and in the Bad Lands these animals are found by hundreds. The valley of the Shyenne is also a favorite haunt for them. They are very seldom found in the prairie, but confined for the most part to the more rugged hills along the streams. They are very prolific, usually producing two, often three, and sometimes four or five young at a birth. The flesh of the Black-tailed Deer, *Sin-ta-sa-pa* in the Sioux language, is very delicate, and more so than that of the *C. leucurus*. I have never seen this Deer below the mouth of the Niobrara. Range: Upper Missouri and Platte to the Cascade range (head of Des Chutes river), Oregon Territory; not extending to the Pacific; head-waters of the Arkansas.

Antilocapra Americana, Ord.

Prong-horned Antelope; Cabrec. Baird, General Report on Mammals, 1857, p. 666.

The Antelope is frequently, but erroneously, called a goat by the mountaineers, who have given it that name to distinguish it from the Mountain Sheep. Very few of these animals are seen below Fort Pierre, none below the mouth of Niobrara river. Near the Bad Lands, Black hills, valley of the Yellowstone, and in the Blackfoot country they are very abundant, but, like the Buffalo, are annually on the decrease. They seem to live mostly in the open prairie, being very seldom seen in the timbered land. In the beginning of winter they may be seen for days following each other in files (if not disturbed) on their way towards the Northwest, leaving the prairie for the more rugged portions of the country near the Black hills or the foot of the mountains. In the spring, usually about March, they may be seen returning again, and distributing themselves over the open prairie. The deep snow and severe cold winter often proves fatal to them, rendering them an easy prey to the myriads of starving wolves. The Antelope usually brings forth two young, less often one and three. Range: Plains west of the Missouri, from the Lower Rio Grande to the Saskatchewan, and west to the Cascade and Coast range of the Pacific slope.

Ovis montana, Cuvier.

Bighorn; Mountain Sheep. Baird, General Report on Mammals, 1857, p. 673.

Confined entirely to the Bad Lands and mountainous portions of the Upper Missouri. They occur in large herds in the Bad Lands or broken country bordering upon the Yellowstone and Missouri rivers above Fort Union. In the vicinity of the mouth of the Judith, the stone walls, &c., are noted places for them. They are the surest footed of all the animals in this country. The meat of the female is much like that of our domestic sheep, but that of the male is usually too highly flavored. They bring forth their young in May or June, most commonly but one at a birth. Range: Broken ground on the Upper Missouri and Platte; Rocky mountains generally, as far west at least as the Coast and Cascade mountains of the Pacific slope.

Bos Americanus, Gmelin.

American Buffalo. Baird, General Report on Mammals, 1857, p. 682.

The Buffalo are confined to the country bordering upon the eastern slope of the Rocky mountains. They occur in large bands in the valley of the Yellowstone river, and also in the Blackfoot country, but their numbers are annually decreasing at a rapid rate. Descending the Yellowstone in the summer of 1854 from the Crow country, we were not out of sight of large bands for a distance of 400 miles. In 1850 they were seen as low down the Missouri river as the mouth of the Vermilion, and in 1854 a few were killed near

Fort Pierre. But at the present time they seldom pass below the 47th parallel on the Missouri. Every year as we ascend the river, we can observe that they are retiring nearer and nearer the mountainous portions. In Kansas they are found at this time at certain seasons of the year in immense droves on the Smoky Hill fork of the Kansas, within 60 or 70 miles of Fort Riley, and from there to the South Pass they are distributed to a greater or less extent. It is true that these animals are at all times on the move, and frequent different portions of the West at different seasons of the year, or as they are driven by the hunters and Indians; but there are certain parts of the country over which they formerly roamed in immense herds, but are never or rarely seen at the present time. The area over which the Buffalo graze is annually contracting its geographical limits. As near as I could ascertain, about 250,000 individuals are destroyed every year, about 100,000 being killed for robes. At the present time, the number of males to the females seems to be in the ratio of ten to one, and this fact is readily accounted for from the fact that the males are seldom killed when the cows can be obtained. Skins of females only are used for robes, and are preferred for food. Beside the robes which are traded to the whites by the Indians, each man, woman, and child requires from one to three robes a year for clothing. A large quantity are employed in the manufacture of lodges, and an immense number of the animals, which it would be difficult to estimate, are annually destroyed by wolves and by accidents. The Buffaloes vary in color, white, cream, gray, sometimes spotted with white, with white feet and legs, &c. These varieties are called by the Indians "Medicine Buffaloes," and are regarded of the greatest value, often bringing several hundred dollars. About one in 50,000 is an albino, while one robe in 100,000 is called by the traders a silk robe, and is usually valued at from one to two hundred dollars. Range: Formerly found throughout nearly the whole of North America, east of the Rocky mountains; now confined to the plains west of the Missouri and along the slopes of the Rocky mountains.

VESPERTILIO PRUINOSUS, Say. All over the United States east of the Rocky mountains.

VESPERTILIO NOCTIVAGANS, Leconte. Common throughout the country east of the Rocky mountains.

VESPERTILIO NOVEBORACENSIS, Gmelin.

CHAPTER XVI.

BIRDS.

CATHARTES AURA, Illig.

TURKEY BUZZARD. Baird, General Report on Birds, p. 4.

Very abundant throughout the Northwest generally.

FALCO ANATUM, Bonaparte.

DUCK HAWK. Baird, General Report on Birds, p. 7.

This very rare bird in the West was killed on the Vermilion river in the autumn of 1856. No other specimen was obtained by our Expedition, and the above locality is the most western range yet known of this bird.

HYPOTRIORCHIS COLUMBARIUS, Gr.

PIGEON HAWK. Baird, General Report on Birds, p. 9.

One of the most common and abundant birds in the Northwest. It is usually found along the woody bottoms of streams, where it may be seen in large numbers perched upon the dry limbs of trees apparently watching for its prey.

FALCO POLYAGRUS, Cassin.

PRAIRIE FALCON. Baird, General Report on Birds, p. 12.

Is found at various localities along the Missouri, though not abundant. It also occurs on the Platte.

TINNUNCULUS SPARVERIUS, Vieill.

SPARROW HAWK. Baird, General Report on Birds, p. 13.

One of the most abundant birds on the Upper Missouri. It is very common along the woody bottoms of the Missouri and Yellowstone, where it may be seen at all hours of the day darting from tree to tree or sitting upon some dry limbs almost motionless watching for its prey. It is an exceedingly noisy and saucy bird, often provoking a shot from the hunter when silence would have enabled it to have escaped unnoticed.

ACCIPITER MEXICANUS, Swains.

BLUE-BACKED HAWK. Baird, General Report on Birds, p. 17.

Not abundant on the Missouri generally, though found quite numerous on the Yellowstone river. It seems to be confined to Western North America. Three specimens were obtained by our party.

BUTEO SWAINSONI, Bonap.

SWAINSON'S HAWK. Baird, General Report on Birds, p. 19.

We were enabled to secure four specimens of this rare and interesting hawk. It seems to be confined to the sources of the Missouri and Yellowstone.

BUTEO BAIRDII, Hoy.

BAIRD'S HAWK. Baird, General Report on Birds, p. 21.

This, also, like the last, is quite rare and interesting to ornithologists, of which three specimens are included in our collection. Its range is Northern and Western North America.

BUTEO BOREALIS, Vieill.

RED-TAILED HAWK. Baird, General Report on Birds, p. 25.

This hawk is not uncommon throughout the prairie country of the Northwest. It may be seen about sunset hovering quietly over the tall grass of the prairie; sometimes sailing along as if without an effort; again, poised almost motionless, with head directed toward the ground as if intently searching for its prey. When thus engaged in searching for its food, it will fly very near the hunter, and often presents itself a fine mark for the gun. Its range seems to be, according to Prof. Baird, Eastern North America, Fur countries, &c. Three specimens are included in our collection.

ARCHIBUTEO FERRUGINEUS, Gray.

SQUIRREL HAWK. Baird, General Report on Birds, p. 34.

This is one of the largest and most beautiful of the hawk kind. It is very rare in the Northwest. The only specimen obtained in all our explorations was killed by Lieut. Warren, in the summer of 1856, on the Little Missouri or Teton river, Nebraska. It is confined to Western North America.

CIRCUS HUDSONIUS, Vieillot.

MARSH HAWK. Baird, General Report on Birds, p. 38.

A very common hawk throughout the Northwest. Its range is given as all of North America and Cuba. Four specimens in our collection.

HALIAETUS LEUCOCEPHALUS, Savigny.

BALD EAGLE. Baird, General Report on Birds, p. 43.

This bird was not unfrequently observed during our explorations, and it seems to be generally distributed throughout the Northwest. A number of specimens were secured, mostly in a young condition. It occurs throughout North America.

BUBO VIRGINIANUS, Bonap.

GREAT HORNED OWL. Baird, General Report on Birds, p. 49.

Is very common throughout the prairie country of the Northwest. In the winter it becomes white, and is often seen by the voyageur of the prairie perched upon some conical hill. When the prairie has been burned over by the autumn fires, this bird presents quite a conspicuous appearance at a distance from contrast, and may sometimes be mistaken for a bleached buffalo skull. It is distributed throughout the whole of North America.

OTUS WILSONIANUS, Lesson.

LONG-EARED OWL. Baird, General Report on Birds, p. 53.

Not uncommon throughout the Northwest. It was not an unfrequent visitor near our

camp-fires at night, where it would have been welcome but for its ominous notes, which were anything but agreeable. It is distributed throughout all temperate North America.

Brachyotus Cassinii, Brewer.

Short-eared Owl. Baird, General Report on Birds, p. 54.

This owl must certainly be very rare on the Upper Missouri. We were able to secure but two specimens during our explorations, and these were taken on White river and near the Bad Lands. I think I have seen the same species at other localities, but quite rarely. Generally diffused.

Syrnium nebulosum, Gray.

Barred Owl. Baird, General Report on Birds, p. 56.

Quite rare, but one specimen secured. Prof. Baird says of this bird: "Though of frequent occurrence in the States of the Atlantic, this species has not yet been observed in the countries west of the Rocky mountains. The only specimen in the present collection is from the Territory of Nebraska, and is of especial interest, as demonstrating the most western locality yet determined of this bird.

Athene hypugaea, Bonap.

Prairie Owl. Baird, General Report on Birds, p. 59.

I do not now remember that I have ever seen a prairie dog village in the Northwest that was not inhabited by one or more pairs of this interesting and somewhat peculiar bird. It does not appear to live with the dogs, but to take possession of the deserted holes, where it retires on the least approach of danger. It is not confined, however, to the villages of the prairie dog, but is often seen near the deserted holes of wolves, foxes, and other burrowing animals of the prairie. It probably consumes no nobler prey than insects or small mice. Its range is from the Mississippi to the Rocky mountains.

Conurus Carolinensis, Kuhl.

Parakeet. Baird, General Report on Birds, p. 67.

Very abundant in the Mississippi valley, along the thickly wooded bottoms as far up the Missouri as Fort Leavenworth, possibly as high as the mouth of the Platte, but never seen above that point. Mostly confined to the South and Southwestern States.

Coccygus Americanus, Bonap.

Yellow-billed Cuckoo. Baird, General Report on Birds, p. 76.

Quite common along the wooded bottoms of streams in the Northwest. Its range is Eastern United States to the Missouri plains.

COCCYGUS ERYTHROPHTHALMUS, Bp.

BLACK-BILLED CUCKOO. Baird, General Report on Birds, p. 77.

Six specimens of this and the preceding bird are included in our Nebraska collection. The habits of both species are much alike, and their geographical distribution much the same.

PICUS VILLOSUS, Linn.

HAIRY WOODPECKER. Baird, General Report on Birds, p. 84.

Not uncommon on the dry trees of the river bottoms of the Northwest. Six specimens were secured. It ranges throughout the Northern and Western regions.

PICUS PUBESCENS, Linn.

DOWNY WOODPECKER. Baird, General Report on Birds, p. 89.

Seems to have habits and geographical distribution similar to the preceding, though, perhaps, less abundant.

PICOIDES DORSALIS, Baird.

STRIPED THREE-TOED WOODPECKER. Baird, General Report on Birds, p. 100.

The only specimen we observed of this species was taken near Laramie peak, and is one of the novelties secured in our explorations. In regard to its habits, I know nothing. The locality from which this species was obtained would well reward a more extended examination, for I have never known a region which seemed to promise so many novelties to the ornithologist. We were able to spend but two days in this vicinity, yet in that period we secured, in addition to fine collections in other departments, thirty-five specimens of birds, most of them rare; one species, entirely new to science, and a second, of which but one specimen had been obtained previously.

SPHYROPICUS VARIUS, Baird.

YELLOW-BELLIED WOODPECKER. Baird, General Report on Birds, p. 103.

Very abundant along the wooded bottoms of the Missouri. It ranges from the Atlantic Ocean to the eastern slopes of the Rocky mountains, and occurs in Greenland.

SPHYROPICUS THYROIDEUS, Baird.

BROWN-HEADED WOODPECKER. Baird, General Report on Birds, p. 106.

This rare bird forms another of the results of our visit to Laramie peak. But three specimens are contained in the collections of the Smithsonian Institution. It seems to be confined to the region of the Rocky mountains.

HYLOTOMUS PILEATUS, Baird.

BLACK WOODPECKER. Baird, General Report on Birds, p. 107.

Though no specimens of the above species is contained in our Nebraska collections, we

often met with it along the wooded bottoms of the Missouri, especially in the State of Missouri, and in Kansas and Iowa. It is very rarely seen as high up the Missouri river as Fort Randall, near latitude 43°, longitude 99°, but it is never seen on the Upper Missouri.

CENTURUS CAROLINUS, Bonap.

RED-BELLIED WOODPECKER. Baird, General Report on Birds, p. 109.

Quite rare in the Northwest. Ranges from the Atlantic coast to the eastern slope of the Rocky mountains.

MELANERPES ERYTHROCEPHALUS, Sw.

RED-HEADED WOODPECKER. Baird, General Report on Birds, p. 113.

This is one of the most abundant birds in the Northwest. Scarcely a dry tree is seen along the wooded bottoms of the Missouri or its tributaries, that is not the abode of one or more pairs of this beautiful species.

MELANERPES TORQUATUS, Bonap.

LEWIS'S WOODPECKER. Baird, General Report on Birds, p. 115.

This bird seems to be confined to the immediate vicinity of the mountains. I first observed it associated with the preceding in March, 1855, near the Black hills, and at Laramie peak we met with it in great numbers. It seems to be common to both sides of the Rocky mountain range.

COLAPTES AURATUS, Swainson.

YELLOW-SHAFTED FLICKER. Baird, General Report on Birds, p. 118.

Abundant along the wooded bottoms of the Missouri and its tributaries.

COLAPTES MEXICANUS, Swains.

RED-SHAFTED FLICKER. Baird, General Report on Birds, p. 120.

Unlike the last, this species is seldom seen along the valleys of streams, but is most abundant in the wooded ravines of the Bad Lands, high up towards the sources of the Missouri. Range: From the Black hills to the Pacific.

COLAPTES HYBRIDUS, Baird.

HYBRID WOODPECKER. Baird, General Report on Birds, p. 122.

Under the above name, Professor Baird includes a remarkable species of woodpecker, from the Upper Missouri and Yellowstone, which seems to be a hybrid between the two preceding. Twenty-one specimens were obtained in our explorations.

CHAETURA PELASGIA, Steph.

CHIMNEY SWALLOW. Baird, General Report on Birds, p. 144.

Quite rare on the Upper Missouri. But one specimen was secured, and that was taken

near Bijoux hills. Other parties have obtained it from Independence, on the Missouri river. Its range is Eastern United States to the slopes of the Rocky mountains.

ANTROSTOMUS VOCIFERUS, Bonap.

WHIP-POOR-WILL. Baird, General Report on Birds, p. 148.

Though no specimens of the above species were obtained by us, we have heard its well-known notes every spring in ascending the Missouri, near the mouth of Big Sioux river. I do not think that it is found on the Upper Missouri.

ANTROSTOMUS NUTTALLI, Cassin.

POOR-WILL. Baird, General Report on Birds, p. 149.

Though rarely seen, this bird seems to be distributed throughout the Upper Missouri country. It is usually found on the Sage plains, and rises up quickly from the ground before the traveller, flies a short distance with great rapidity, and then settles down again in some concealed place. I think I have never seen more than six or eight individuals in a single season, but its familiar notes "poor-will" are often heard about dusk, and continue until late at night. It is found on the high central plains to the Pacific.

CHORDEILES POPETUE, Baird.

NIGHT HAWK. Baird, General Report on Birds, p. 151.

Very abundant throughout the Northwest.

CERYLE ALCYON, Boie.

BELTED KINGFISHER. Baird, General Report on Birds, p. 159.

This bird, though not common, is seen occasionally along all the streams of the Northwest. It usually makes its appearance about the first of May. It is universally distributed over North America.

TYRANNUS CAROLINENSIS, Baird.

KING BIRD; BEE BIRD. Baird, General Report on Birds, p. 171.

Very abundant, especially along the Lower Missouri, but found more or less numerous throughout the Northwest. It ranges over Eastern North America to the Rocky mountains.

TYRANNUS VERTICALIS, Say.

ARKANSAS FLYCATCHER. Baird, General Report on Birds, p. 173.

The two species of the genus *Tyrannus* which occur in the Northwest, seem to have habits very much alike, and are often found together, so much so that I at first, with my slight knowledge of ornithology, regarded them as male and female of the same species. The yellow-breasted Tyrannus does not make its appearance, however, until we reach a

point about 100 miles below Fort Pierre, and from there to the mountains. The *T. Carolinensis* diminishes in numbers, while the *T. verticalis* becomes exceedingly abundant, occurring in vast numbers along the wooded bottoms of streams. It is peculiarly a Western bird, ranging from the high central plains to the Pacific.

SAYORNIS FUSCUS, Baird.

PEWEE. Baird, General Report on Birds, p. 184.

Quite rare along the Missouri river, though not unfrequently seen on the lower portion; gradually diminishes in numbers as we approach the mountains. It occurs to a greater or less extent throughout Eastern North America.

SAYORNIS SAYUS, Baird.

SAY'S FLYCATCHER. Baird, General Report on Birds, p. 185.

Seems to be peculiar to the West or Rocky mountain region. It is quite rare, almost always occurring solitary among the ravines of the Bad Lands. I do not think I have ever seen more than fifteen or twenty individuals.

CONTOPUS RICHARDSONII, Baird.

SHORT-LEGGED PEWEE. Baird, General Report on Birds, p. 189.

Distributed throughout the Northwest, though rarely seen. But two specimens are included in our collection.

EMPIDONAX MINIMUS, Baird.

LEAST FLYCATCHER. Baird, General Report on Birds, p. 195.

Occasionally seen throughout the Northwest, though not abundant. Six specimens were obtained in our explorations.

TURDUS MUSTELINUS, Gm.

WOOD THRUSH. Baird, General Report on Birds, p. 212.

Quite abundant along the wooded bottoms of the Missouri to the mountains.

TURDUS FUSCESCENS, Stephens.

WILSON'S THRUSH. Baird, General Report on Birds, p. 214.

Observed along the wooded bottoms of the Lower Missouri. Not very abundant. Its range: Eastern North America and the Fur countries north.

TURDUS SWAINSONII, Cab.

OLIVE-BACKED THRUSH. Baird, General Report on Birds, p. 216.

More abundant and more widely distributed than the preceding species, being occasionally observed throughout the Northwest. It is also found at Fort Laramie and Fort Bridger.

TURDUS ALICIAE, Baird.

GRAY-CHEEKED THRUSH. Baird, General Report on Birds, p. 217.

Was not observed above the mouth of Niobrara river on the Missouri. Most abundant along the wooded bottoms of the Mississippi and the Lower Missouri.

TURDUS MIGRATORIUS, Linn.

ROBIN. Baird, General Report on Birds, p. 218.

I have seen this common and widely distributed bird at different seasons of the year throughout the Northwest. In the autumn it appears on the Yellowstone and the sources of the Missouri in vast numbers, especially when the autumn fruits ripen. It arrives at Fort Pierre about the middle of April; and though I have seen it at all seasons of the year I have never heard its song.

SIALIA SIALIS, Baird.

BLUE BIRD. Baird, General Report on Birds, p. 222.

Not uncommon throughout the Northwest; also in the vicinity of Fort Laramie.

SIALIA ARCTICA, Swains.

ROCKY MOUNTAIN BLUE BIRD. Baird, General Report on Birds, p. 224.

Very abundant in the vicinity of the mountains. At Laramie peak and from thence to the Black hills it was one of the most abundant birds noticed. Its range is Upper Missouri to the Rocky mountains, and south to Mexico; rare on the coast of California.

REGULUS CALENDULA, Licht.

RUBY-CROWNED WREN. Baird, General Report on Birds, p. 226.

Found somewhat rarely along the broad bottoms of the Lower Missouri. Range: From the Atlantic to the Pacific.

ANTHUS LUDOVICIANUS, Licht.

TIT-LARK. Baird, General Report on Birds, p. 232.

This species must be very rare on the Upper Missouri, inasmuch as but a single specimen was secured, and that was observed near the Black hills. It is found throughout North America generally.

MNIOTILTA VARIA, Vieill.

BLACK-AND-WHITE CREEPER. Baird, General Report on Birds, p. 235.

Very abundant along the willow bottoms of the Missouri, as high up as Fort Pierre at least. Six specimens were obtained by our party.

PARULA AMERICANA, Bonap.

BLUE YELLOW-BACK. Baird, General Report on Birds, p. 238.

This small bird is very abundant in the months of May and June along the wooded

bottoms of the Missouri. Its minute size and rapid flight from limb to limb among the tallest branches of the lofty cottonwoods renders it a somewhat difficult bird to secure. It is most abundant on the Lower Missouri below Fort Pierre.

GEOTHLYPIS TRICHAS, Cab.

MARYLAND YELLOW-THROAT. Baird, General Report on Birds, p. 241.

A very abundant little bird, inhabiting the thick willow bottoms of the different streams along the Missouri, from the mouth to the source, in the mountains. Seven specimens were collected.

ICTERIA LONGICAUDA, Lawr.

LONG-TAILED CHAT. Baird, General Report on Birds, p. 249.

Very abundant among the low bushes of the bottom prairies along the Missouri. It conceals itself among the foliage, so that it is seldom seen, and seems to rival the mocking bird in the rapidity and variety of its notes. Its range is confined to the west of the Mississippi.

HELMINTHOPHAGA CELATA, Baird.

ORANGE-CROWNED WARBLER. Baird, General Report on Birds, p. 257.

Two specimens of the above species were collected by our party; one near the mouth of the Big Sioux river, and the other on Bon Homme island. Whether it occurs high up on the Missouri we do not know, but it has been found in Oregon and other contiguous territories. We infer that it will be observed in other portions of Nebraska.

SEIURUS AUROCAPILLUS, Sw.

GOLDEN-CROWNED THRUSH. Baird, General Report on Birds, p. 260.

A common, quiet bird, hopping about on the ground under the thick bushes or trees of the Missouri bottoms, below Fort Pierre. It was not observed above that point.

SEIURUS NOVEBORACENSIS, Nutt.

WATER THRUSH. Baird, General Report on Birds, p. 261.

Less abundant than the last, and noticed very near the mouth of Vermilion river, where two specimens were secured.

DENDROICA CORONATA, Gray.

YELLOW-RUMP WARBLER. Baird, General Report on Birds, p. 272.

Very abundant along the wooded bottoms of the Missouri and its tributaries. Somewhat rare above Fort Pierre.

DENDROICA AUDUBONII, Baird.

AUDUBON'S WARBLER. Baird, General Report on Birds, p. 273.

The only specimen of this species observed was collected in the Laramie mountains near Fort Laramie. It is probably quite rare on the Missouri.

DENDROICA PENNSYLVANICA, Baird.

CHESTNUT-SIDED WARBLER. Baird, General Report on Birds, p. 279.

Observed only at the mouth of the Platte, and is, I think, quite rare. But one specimen was taken.

DENDROICA STRIATA, Baird.

BLACK POLL WARBLER. Baird, General Report on Birds, p. 280.

Abundant along the wooded bottoms and on the islands of the Lower Missouri, below Fort Pierre.

DENDROICA ÆSTIVA, Baird.

YELLOW WARBLER. Baird, General Report on Birds, p. 282.

Distributed throughout the valleys of the Missouri and its tributaries. Very abundant. Fifteen specimens were collected.

DENDROICA MACULOSA, Baird.

BLACK AND YELLOW WARBLER. Baird, General Report on Birds, p. 284.

The whole series of Warblers seem to be peculiar to the wooded margins of streams, and are usually quite abundant during the months of May and June.

SETOPHAGA RUTICILLA, Sw.

REDSTART. Baird, General Report on Birds, p. 297.

This beautiful little species is not uncommon along the wooded bottoms of the Missouri and its tributaries, though most abundant on the Lower Missouri. Its range is over the Eastern United States to the Rocky mountains, south and west to Fort Bridger.

PYRANGA LUDOVICIANA, Bonap.

LOUISIANA TANAGER. Baird, General Report on Birds, p. 303.

But two specimens of this species were obtained, and these were from the Black hills and Laramie peak. Dr. Cooper collected it near Fort Laramie. It ranges from the Black hills to the Pacific, and south to Mexico.

HIRUNDO HORREORUM, Barton.

BARN SWALLOW. Baird, General Report on Birds, p. 308.

Builds its nests on the vertical sides of the bluffs along the Missouri, in countless numbers.

HIRUNDO LUNIFRONS, Say.

CLIFF SWALLOW. Baird, General Report on Birds, p. 309.

This species is very abundant along the Missouri, often covering the vertical sides of the river bluffs with their nests. Near the mouth of the Niobrara river, the chalk bluffs, and

Cretaceous formation No. 3, form lofty vertical walls, which are sometimes completely covered with their nests. A single shot is usually sufficient to supply one with all the specimens he could desire.

COTYLE RIPARIA, Boie.

BANK SWALLOW. Baird, General Report on Birds, p. 313.

The vertical banks of yellow marl which are so conspicuous from the mouth of the Platte to the Niobrara, furnish excellent places of resort for this bird. Not unfrequently, this and the preceding species will be associated in the same cliff, the *C. riparia* in the surface deposit of yellow marl, while the *H. lunifrons* attaches its nest to the harder rocks below. Both this and the preceding species are universally diffused throughout North America.

PROGNE PURPUREA, Boie.

PURPLE MARTIN. Baird, General Report on Birds, p. 314.

Most abundant throughout the Northwest, along the wooded bottoms of streams, where the dry trees are its favorite breeding-places. They do not usually remain longer than the months of May and June.

AMPELIS CEDRORUM, Baird.

CEDAR BIRD. Baird, General Report on Birds, p. 318.

Abundant everywhere in the Northwest. A second species, *A. garrulus*, will doubtless be found in great numbers in the mountains, as it occurs so abundantly near Fort Bridger.

MYIADESTES TOWNSENDII, Cab.

TOWNSEND'S FLYCATCHER. Baird, General Report on Birds, p. 321.

Seems to be confined, as far as our observations extended, to the vicinity of the mountain ranges. Specimens were obtained at Laramie peak and the Black hills.

COLLYRIO BOREALIS, Baird.

GREAT NORTHERN SHRIKE. Baird, General Report on Birds, p. 324.

Not uncommon from Council bluffs to Fort Pierre, especially during the winter. Lieut. Warren collected one specimen near Fort Pierre, and had it been abundant above that point, our party would have obtained other specimens.

COLLYRIO EXCUBITOROIDES, Baird.

WHITE-RUMPED SHRIKE. Baird, General Report on Birds, p. 327.

This species, unlike the preceding, seems to be quite abundant, especially along the Platte to the Laramie mountains, Black hills, and Bad Lands. It is very abundant in the hills about Fort Laramie.

VIREO GILVUS, Bonap.

WARBLING FLYCATCHER. Baird, General Report on Birds, p. 335.

Abundant along the wooded bottoms of the Missouri.

VIREO SOLITARIUS, Vieill.

BLUE-HEADED FLYCATCHER. Baird, General Report on Birds, p. 340.

With the preceding species.

MIMUS CAROLINENSIS, Gray.

CAT BIRD. Baird, General Report on Birds, p. 346.

Abundant throughout the Northwest, from the mouth of the Missouri to the mountains.

OREOSCOPTES MONTANUS, Baird.

MOUNTAIN MOCKING-BIRD. Baird, General Report on Birds, p. 347.

A single specimen of the above species was obtained in the Black hills. Dr. Cooper collected it near Fort Laramie.

HARPORHYNCHUS RUFUS, Cab.

BROWN THRUSH. Baird, General Report on Birds, p. 353.

Distributed throughout the Northwest to a greater or less extent. Six specimens are included in the Nebraska collection.

SALPINCTES OBSOLETUS, Cab.

ROCK WREN. Baird, General Report on Birds, p. 357.

This somewhat peculiar bird is very abundant in the rugged, inaccessible portions, called the "Bad Lands," of the Northwest. It seems to build its nest among the rocks, where it sets up an impertinent chattering at the approach of a human being, but retires to hiding-places at the first indication of danger. Its range seems to cover the eastern slope of the Rocky mountains to the Cascade range, also in California. Six specimens were secured at various localities along the Missouri.

CISTOTHORUS PALUSTRIS, Cab.

LONG-BILLED MARSH WREN. Baird, General Report on Birds, p. 364.

Quite rare, though seen occasionally around the marshy places on the broad bottoms of the Missouri near Council bluffs and Big Sioux.

CISTOTHORUS STELLARIS, Cab.

SHORT-BILLED MARSH WREN. Baird, General Report on Birds, p. 365.

Same as preceding.

TROGLODYTES AEDON, Vieill.

HOUSE WREN. Baird, General Report on Birds, p. 367.

Not rare as high up the Missouri as the settlements extend; seldom, if ever, seen on the Upper Missouri. A single specimen was secured in the summer of 1857, near the mouth of Loup fork.

TROGLODYTES PARKMANNI, Aud.

PARKMAN'S WREN. Baird, General Report on Birds, p. 367.

This small species we found to be very abundant throughout the Northwest. Thirteen specimens were obtained in our explorations. It seems to be peculiarly a Western species, ranging from the Rocky mountains to the Pacific.

SITTA CANADENSIS, Linn.

RED-BELLIED NUTHATCH. Baird, General Report on Birds, p. 376.

Quite rare in the Northwest. Seems to frequent for the most part, the wooded ravines of the Bad Lands, and along streams. We were able to secure but three specimens, from two localities, Cedar island on Missouri river, and Black hills.

POLIOPTILA CAERULEA, Sclat.

BLUE-GRAY GNATCATCHER. Baird, General Report on Birds, p. 380.

We were able to obtain but one specimen of this species, and therefore suppose it to be quite rare. This was found near Bald island, Nebraska. It also occurs in Kansas near Fort Riley.

LOPHOPHANES BICOLOR, Bonap.

TUFTED TITMOUSE. Baird, General Report on Birds, p. 384.

Must be very rare in the Northwest, inasmuch as but one specimen was secured by our party. It was not observed above St. Joseph on the Missouri.

PARUS SEPTENTRIONALIS, Harris.

LONG-TAILED CHICKADEE. Baird, General Report on Birds, p. 389.

Very abundant in the willow bottoms along streams throughout the Northwest. Four specimens were secured.

EREMOPHILA CORNUTA, Boie.

SKY LARK. Baird, General Report on Birds, p. 403.

Large numbers of this beautiful species are found throughout the prairie country of the Northwest. It seems to be gregarious, and to have a special fondness for the villages of the prairie dog, where they may be seen in large flocks. Twelve specimens are included in our collection.

CARPODACUS PURPUREUS, Gray.

PURPLE FINCH. Baird, General Report on Birds, p. 412.

Seems to be quite rare, as but one specimen was obtained by our party. The only locality where we observed it was near the mouth of the Vermilion river on the Missouri, and I suspect that it does not occur on the Upper Missouri.

CHRYSOMITRIS TRISTIS, Bonap.

YELLOW BIRD. Baird, General Report on Birds, p. 421.

Very abundant throughout the Northwest. Common from the Atlantic to the Pacific.

CHRYSOMITRIS PINUS, Bonap.

PINE FINCH. Baird, General Report on Birds, p. 425.

This species was observed in but one locality on the Missouri, and that was between Fort Union and Fort Benton.

CURVIROSTRA AMERICANA, Wils.

RED CROSSBILL. Baird, General Report on Birds, p. 426.

Quite abundant in the mountain ranges, where it feeds upon the seeds of the different kinds of Pine cones.

CURVIROSTRA LEUCOPTERA, Wils.

WHITE-WINGED CROSSBILL. Baird, General Report on Birds, p. 427.

Associated with the preceding species, with habits quite similar. Abundant in the Laramie range of mountains.

PLECTROPHANES ORNATUS, Towns.

CHESTNUT-COLLARED BUNTING. Baird, General Report on Birds, p. 435.

This species seems to be peculiar to the prairie country of the Upper Missouri, and is quite abundant. Five specimens were collected.

PLECTROPHANES MELANOMUS, Baird.

BLACK-SHOULDERED LONGSPUR. Baird, General Report on Birds, p. 436.

This bird has a much wider range, extending along the eastern slope of the Rocky mountains to Mexico. It is not abundant along the Missouri. Two specimens were collected in the Black hills, and one on the Niobrara river.

PLECTROPHANES MACCOWNII, Lawr.

MACCOWN'S LONGSPUR. Baird, General Report on Birds, p. 437.

Ranges like the preceding species over a large area of the West. We did not observe it along the Missouri. But three specimens were collected near the Black hills.

PASSERCULUS SAVANNA, Bonap.

SAVANNAH SPARROW. Baird, General Report on Birds, p. 442.

Very abundant on the Western prairies.

POOECETES GRAMINEUS, Baird.

GRASS FINCH. Baird, General Report on Birds, p. 447.

Abundant on the broad upland prairies of the far West. It is diffused over Kansas and Nebraska.

COTURNICULUS PASSERINUS, Bonap.

YELLOW-WINGED SPARROW. Baird, General Report on Birds, p. 450.

Abundant along the valley of the Platte river. We secured twelve specimens along the Loup fork, a branch of the Platte.

COTURNICULUS HENSLOWI, Bonap.

HENSLOW'S BUNTING. Baird, General Report on Birds, p. 451.

One specimen of the above species was obtained in the Platte valley, in 1857. Doubtless rare.

CHONDESTES GRAMMACA, Bonap.

LARK FINCH. Baird, General Report on Birds, p. 456.

Occurs in great numbers throughout the prairie country of the Northwest. Nineteen specimens are included in our collection.

ZONOTRICHIA LEUCOPHRYS, Sw.

WHITE-CROWNED SPARROW. Baird, General Report on Birds, p. 458.

Belongs to a species of sparrows which are very abundant throughout the prairie country of the Northwest. Ranges throughout northern North America.

ZONOTRICHIA GAMBELII, Gambel.

GAMBEL'S FINCH. Baird, General Report on Birds, p. 460.

Not quite as abundant as the preceding species, though associated with it. Peculiar to the Western prairie countries.

ZONOTRICHIA QUERULA, Gamb.

HARRIS'S FINCH. Baird, General Report on Birds, p. 462.

Same as preceding. Confined to the West, and so far as we yet know, to the country bordering on the Lower Missouri.

ZONOTRICHIA ALBICOLLIS, Bonap.

WHITE-THROATED SPARROW. Baird, General Report on Birds, p. 463.

Very abundant throughout the Northwest. Thirteen specimens were collected at different localities.

JUNCO OREGONUS, Sclat.

OREGON SNOW BIRD. Baird, General Report on Birds, p. 467.

Rather rare along the Missouri, but two specimens having been secured by our party. Its range, according to Prof. Baird, is from the Pacific coast of the United States to the eastern side of the Rocky mountains. Wanders as far east as Fort Leavenworth in winter, and Great Bend of Missouri.

JUNCO CANICEPS, Baird.

GRAY-HEADED SNOW BIRD. Baird, General Report on Birds, p. 468.

Rare along the Missouri, if it occurs at all. The only individuals observed by our party were collected near Laramie peak. Peculiar to the Rocky mountain region.

JUNCO HYEMALIS, Sclat.

BLACK SNOW BIRD. Baird, General Report on Birds, p. 468.

Not uncommon throughout the Northwest.

SPIZELLA MONTICOLA, Baird.

TREE SPARROW. Baird, General Report on Birds, p. 472.

Not rare along the Missouri and other portions of the West. It is also common in the Atlantic States.

SPIZELLA PUSILLA, Bonap.

FIELD SPARROW. Baird, General Report on Birds, p. 473.

The broad prairie country of the West seems to be the favorite resort for a great variety of the sparrows. The above species is quite common throughout the Northwest.

SPIZELLA SOCIALIS, Bonap.

CHIPPING SPARROW. Baird, General Report on Birds, p. 473.

Same as preceding species. Ranges throughout North America from Atlantic to Pacific.

SPIZELLA PALLIDA, Bonap.

CLAY-COLORED BUNTING. Baird, General Report on Birds, p. 474.

Not rare throughout the Prairie country of the Northwest. A species peculiar to the West.

MELOSPIZA MELODIA, Baird.

SONG SPARROW. Baird, General Report on Birds, p. 477.

Not abundant in the Northwest, though common in the Atlantic States.

MELOSPIZA LINCOLNII, Baird.

LINCOLN'S FINCH. Baird, General Report on Birds, p. 482.

Abundant throughout the Northwest. We collected nine specimens at various localities.

MELOSPIZA PALUSTRIS, Baird.

SWAMP SPARROW. Baird, General Report on Birds, p. 483.

Quite rare; probably confined to the country along the Lower Missouri.

CALAMOSPIZA BICOLOR, Bonap.

LARK BUNTING. Baird, General Report on Birds, p. 492.

A species peculiar to the Western plains, and quite abundant in the Northwest.

EUSPIZA AMERICANA, Bonap.

BLACK-THROATED BUNTING. Baird, General Report on Birds, p. 494.

Very abundant along the Missouri river and its tributaries. We secured seventeen specimens of this bird.

GUIRACA LUDOVICIANA, Sw.

ROSE-BREASTED GROSBEAK. Baird, General Report on Birds, p. 497.

Abundant along the wooded bottoms of the Missouri, also Eastern United States.

GUIRACA MELANOCEPHALA, Sw.

BLACK-HEADED GROSBEAK. Baird, General Report on Birds, p. 498.

This beautiful and somewhat peculiar bird seems to be confined to the Western countries. Its usual places of resort are the wooded bottoms of streams, but it builds its nest in the thickets among the hills.

GUIRACA CAERULEA, Sw.

BLUE GROSBEAK. Baird, General Report on Birds, p. 499.

Like the preceding, this species is very attractive on account of its color, being a glossy blue. I have never seen it in but one locality, the Loup fork of the Platte, and therefore suspect that it is rare in the West.

CYANOSPIZA AMOENA, Baird.

LAZULI FINCH. Baird, General Report on Birds, p. 504.

This beautiful little bird is quite abundant in the wooded portions of the Missouri river country. It is also peculiarly Western in its range.

CARDINALIS VIRGINIANUS, Bonap.

RED BIRD. Baird, General Report on Birds, p. 509.

Very common throughout the State of Missouri, where I have seen it in January. It does not occur above Fort Pierre on the Missouri.

PIPILO ERYTHROPHTHALMUS, Vieill.

GROUND ROBIN; TOWHEE. Baird, General Report on Birds, p. 512.

This species is quite abundant on the wooded bottoms of the Missouri, until we reach a point about latitude 43°, when it seems to be replaced to a certain extent by the succeeding species.

PIPILO ARCTICUS, Sw.

ARCTIC TOWHEE. Baird, General Report on Birds, p. 514.

Near the mouth of Niobrara river this species begins to make its appearance in great numbers, and is found from thence throughout the Northwest. It is peculiarly a Western bird.

PIPILO CHLORURA, Baird.

GREEN-TAILED FINCH. Baird, General Report on Birds, p. 519.

This species must be quite rare in the Western plains. We observed it in but one locality, Laramie peak, where we obtained three specimens. It is also peculiar to the West.

DOLICHONYX ORYZIVORUS, Sw.

BOBOLINK; REED BIRD. Baird, General Report on Birds, p. 532.

One of the most abundant birds on the Western prairies. It is very common at Fort Pierre, though I have never observed it high up toward the sources of the Missouri.

MOLOTHRUS PECORIS, Sw.

COW BIRD. Baird, General Report on Birds, p. 524.

Abundant everywhere throughout the Northwest, visiting our herds of mules and horses, when in camp, by thousands.

AGELAIUS PHOENICEUS, Vieill.

RED-WINGED BLACKBIRD. Baird, General Report on Birds, p. 526.

Like the preceding bird this species is common throughout the Northwest. Nine specimens are included in our Nebraska collection, from different localities.

XANTHOCEPHALUS ICTEROCEPHALUS.

YELLOW-HEADED BLACKBIRD. Baird, General Report on Birds, p. 531.

This species seems to be for the most part a Western bird. It is quite common throughout the Northwest, being found about the marshy lakes on the prairies.

STURNELLA MAGNA, Sw.

MEADOW LARK. Baird, General Report on Birds, p. 535.

I suspect this species does not go above latitude 43° on the Missouri, but is there replaced by an allied species, *S. neglecta*. The only specimens we have seen, were obtained on the Loup fork of the Platte, during the summer of 1857.

STURNELLA NEGLECTA, Aud.

WESTERN LARK. Baird, General Report on Birds, p. 537.

This is one of the most abundant birds on the broad prairie country of the Northwest. It appears early in the spring, and remains late in the fall, greeting the eye of the traveller by its presence, and charming him with its song. It occurs very abundantly in the sage plains, where it finds its choicest places for building its nest and rearing its young. Twenty-two specimens were obtained by our party.

ICTERUS SPURIUS, Bonap.

ORCHARD ORIOLE. Baird, General Report on Birds, p. 547.

Very abundant throughout the Northwest, especially along the wooded bottoms of the

Missouri. We were able to secure twelve specimens at various localities. It is quite widely diffused throughout the United States, from the Atlantic to the Rocky mountains.

ICTERUS BALTIMORE, Daudin.

BALTIMORE ORIOLE. Baird, General Report on Birds, p. 548.

Like the preceding species this beautiful and attractive bird is quite abundant throughout the wooded portions of the Missouri country. It is more common on the numerous islands in the river, from the mouth to Fort Union. It is widely distributed like the preceding.

ICTERUS BULLOCKII, Bonap.

BULLOCK'S ORIOLE. Baird, General Report on Birds, p. 549.

This bird is quite rare, but one specimen having been taken in all our explorations. I think, however, that it occurs occasionally along the Lower Missouri, but seldom passes above Fort Pierre. Has also a wide distribution.

SCOLECOPHAGUS FERRUGINEUS, Sw.

RUSTY BLACKBIRD. Baird, General Report on Birds, p. 551.

I do not think this species is common on the Lower Missouri, and I suspect it is seldom or never seen on the Upper Missouri. We were able to secure but one specimen, and that was observed about twenty miles below Sioux city. It ranges from the Atlantic coast to the Missouri.

SCOLECOPHAGUS CYANOCEPHALUS.

BREWER'S BLACKBIRD. Baird, General Report on Birds, p. 552.

Seems to be widely diffused throughout the Western country. It is not uncommon along the Missouri and its tributaries.

QUISCALUS VERSICOLOR, Vieill.

CROW BLACKBIRD. Baird, General Report on Birds, p. 555.

Not rare along the Missouri. Ranges from the Atlantic to the Rocky mountains.

CORVUS CARNIVORUS, Bartram.

AMERICAN RAVEN. Baird, General Report on Birds, p. 560.

Very abundant throughout the Northwest. Indeed it seems to be the favorite place of resort, on account of the great quantities of game of various kinds which furnish them food. These birds are always seen in the vicinity of large herds of buffalo, and have learned to follow the hunters for hours at a time. In the lonely desert or Bad Lands they will often hover over the traveller, and by their lugubrious croaking conjure up all manner of unpleasant impressions.

Corvus Americanus, Aud.

Common Crow. Baird, General Report on Birds, p. 566.

Very abundant throughout the Northwest. It is confined mostly to the marshy places of the interior, or along the watercourses. Quite widely diffused throughout the North American continent.

Picicorvus Columbianus, Bonap.

Clark's Crow. Baird, General Report on Birds, p. 573.

I have never seen this bird immediately along the Missouri, though it was obtained by Dr. Suckley high up near Milk river. In passing up the valley of the Platte in the summer of 1857, we began to meet with it near Fort Laramie, and found it very abundant in the Laramie range of mountains. From thence to the Black hills and also in the Bad Lands we met with it frequently. It is evidently confined, for the most part, to the rugged and almost inaccessible portions of the West.

Pica Hudsonica, Bonap.

Magpie. Baird, General Report on Birds, p. 576.

One of the most common and familiar birds which the traveller meets with in the far West. I have never observed them below Council bluffs, and from thence to the mountains they increase in numbers. The buffalo country is their favorite region, where they live upon the meat of the buffalo and other game, that may chance to die by the agency of hunters or other causes. I think their favorite breeding-places are in the "Bad Lands" and the small outliers of the Rocky mountains. I think it is confined to the regions west of the Mississippi.

Cyanura macrolophus, Baird.

Long-crested Jay. Baird, General Report on Birds, p. 582.

This fine species of Jay is quite common in the Laramie range of mountains, but quite difficult to obtain. I observed it in only one locality, and with considerable labor collected two specimens. It is always moving, and must be shot on the wing. Confined to the mountain regions of the West.

Perisoreus Canadensis, Bonap.

Canada Jay. Baird, General Report on Birds, p. 590.

We observed this bird only in the mountain regions, but in those localities, very abundant and accessible. In the Laramie range and Black hills are myriads of them. It is quite extensively distributed over the north portion of North America.

Ectopistes migratoria, Sw.

Wild Pigeon. Baird, General Report on Birds, p. 600.

Although occasionally seen throughout the Northwest, I do not think this bird can be

regarded as having a far Western range. On the Lower Missouri it is quite abundant, but on the Upper Missouri it does not meet with its peculiar and favorite food. I have seen small flocks high up on the Yellowstone when the wild berries, which grow there in great abundance, were ripe, but I do not think I have ever seen more than a hundred individuals in a single season. It is doubtless a straggler in the far West.

ZENAIDURA CAROLINENSIS, Bonap.

COMMON DOVE. Baird, General Report on Birds, p. 604.

Is quite common throughout the Northwest. The islands of the Missouri are its favorite breeding-places. A nest on Cedar island was found built without care on the ground in a depression; a second was observed on a tree about ten feet above the ground, constructed with very little care, of a few spires of grass. Distributed throughout the United States from the Atlantic to the Pacific.

TETRAO OBSCURUS, Say.

DUSKY GROUSE. Baird, General Report on Birds, p. 620.

I have seen this fine bird in but one locality, the Laramie range of mountains. We there saw several flocks, from which we managed to shoot a dozen or more. Its flesh is white and exceedingly delicate for food. I am told that it lives in the Black hills, though it was not observed by any of the members of our party. Its range is from the Laramie mountains to the Cascade mountains of Oregon and Washington.

CENTROCERCUS UROPHASIANUS, Sw.

SAGE COCK. Baird, General Report on Birds, p. 624.

This species seems to be confined to the Sage plains of the West. I have never seen it in great abundance. In my wanderings in the valley of the Yellowstone river, during the summer of 1854, I saw but one flock, of about a dozen individuals, and I do not think I have seen more than eighty or a hundred in all. It is said to occur in large numbers in the Green river country. It is confined mostly to the vicinity of the mountains, and seems to be decreasing annually.

PEDIOECETES PHASIANELLUS, Baird.

SHARP-TAILED GROUSE. Baird, General Report on Birds, p. 626.

This bird is seldom seen below Council bluffs. From thence to the mountains it is very abundant, and often supplies the hungry voyager with a delicious meal. In the winter season it may be seen in great numbers sitting upon trees, apparently motionless, and thus they permit the hunter to approach very near them.

CUPIDONIA CUPIDO, Baird.

PRAIRIE HEN. Baird, General Report on Birds, p. 628.

The highest point on the Missouri that I have observed this bird, is the mouth of the

Niobrara river. It may pass up as high as the mouth of White river, though rarely. In the vicinity of Council bluffs it occurs in flocks of myriads, sometimes doing considerable injury to fields of corn.

ORTYX VIRGINIANUS, Bonap.

PARTRIDGE; QUAIL. Baird, General Report on Birds, p. 640.

Like the preceding the Quail does not pass far up the Missouri. I think it may occasionally be seen as high up as the mouth of White river, though seldom, and never above that point. Around Council bluffs, Big Sioux, Vermilion and James rivers, &c., it is quite abundant.

GRUS CANADENSIS, Temm.

SAND-HILL CRANE. Baird, General Report on Birds, p. 655.

Not rare, especially in the sand-hills of Nebraska.

ARDEA HERODIAS, Linn.

GREAT BLUE HERON. Baird, General Report on Birds, p. 668.

Generally distributed throughout the West, along the watercourses.

BOTAURUS LENTIGINOSUS, Steph.

BITTERN; STAKE DRIVER. Baird, General Report on Birds, p. 674.

Not uncommon where marshes or lakes are found in the West.

CHARADRIUS VIRGINICUS, Borck.

GOLDEN PLOVER. Baird, General Report on Birds, p. 690.

Abundant anywhere on the upland prairies of the West, from Fort Pierre to the mountains.

AEGIALITIS VOCIFERUS, Cassin.

KILLDEER. Baird, General Report on Birds, p. 692.

Also abundant throughout the country drained by the Missouri river and its tributaries.

AEGIALITIS MONTANUS, Cassin.

MOUNTAIN PLOVER. Baird, General Report on Birds, p. 693.

Quite abundant in the vicinity of the mountains, where it occurs in large flocks.

AEGIALITIS MELODUS, Cab.

PIPING PLOVER. Baird, General Report on Birds, p. 695.

Very abundant on the sand-bars in the broad, shoal channel of the Platte river. I saw them in no other portion of the West.

RECURVIROSTRA AMERICANA, Gm.

AMERICAN AVOSET. Baird, General Report on Birds, p. 703.

This seems to be a rare bird in the West; but two specimens were observed: one of them was killed on the Yellowstone, the other on the Platte.

PHALAROPUS WILSONII, Sab.

WILSON'S PHALAROPE. Baird, General Report on Birds, p. 705.

Quite abundant during the spring months, along the marshy bottoms and lakes of the Lower Missouri.

PHILOHELA MINOR, Gray.

AMERICAN WOODCOCK. Baird, General Report on Birds, p. 709.

Very rare south of the Missouri, though not uncommon near Council bluffs in the Northwest. We obtained one specimen near the mouth of Loup fork.

GALLINAGO WILSONII, Bonap.

ENGLISH SNIPE. Baird, General Report on Birds, p. 710.

We saw this well-known bird quite rarely. A few were killed in low, marshy places, near the mouth of Loup fork, others in the Black hills.

TRINGA WILSONII, Nuttall.

LEAST SANDPIPER. Baird, General Report on Birds, p. 721.

Observed in the Platte valley. Probably rare.

TRINGA BONAPARTII, Schlegel.

BONAPARTE'S SANDPIPER. Baird, General Report on Birds, p. 722.

More or less abundant throughout the watercourses of the Northwest.

EREUNETES PETRIFICATUS, Ill.

SEMIPALMATED SANDPIPER. Baird, General Report on Birds, p. 724.

Three specimens of the above species were collected along the Loup fork, and one near Bijoux hills on the Missouri river.

GAMBETTA MELANOLEUCA, Bonap.

TELL-TALE; STONE SNIPE. Baird, General Report on Birds, p. 731.

More or less common along the watercourses of the West.

RHYACOPHILUS SOLITARIUS, Bonap.

SOLITARY SANDPIPER. Baird, General Report on Birds, p. 733.

Abundant along the Missouri river and its tributaries.

TRINGOIDES MACULARIUS, Gray.

SPOTTED SANDPIPER. Baird, General Report on Birds, p. 735.

Abundant along the watercourses in the West.

ACTITURUS BARTRAMIUS, Bonap.

FIELD PLOVER. Baird, General Report on Birds, p. 737.

This bird is met with all over the high plains of the West, oftentimes at a great distance from any of the principal watercourses. It also rears its young on the upland prairies.

LIMOSA FEDOA, Ord.

MARBLED GODWIT. Baird, General Report on Birds, p. 740.

Not very common in the West, as far as our observations extended. Two specimens were taken by us, one at Council bluffs, and the other at Fort Union, Nebraska.

NUMENIUS BOREALIS, Latham.

ESQUIMAUX CURLEW. Baird, General Report on Birds, p. 744.

Not uncommon high up toward the sources of the Missouri. Our specimens were taken near Fort Union.

NUMENIUS LONGIROSTRIS, Wilson.

LONG-BILLED CURLEW. Baird, General Report on Birds, p. 743.

Very abundant on the upland prairies of the far West, where it feeds in considerable numbers.

PORZANA CAROLINA, Vieill.

COMMON RAIL. Baird, General Report on Birds, p. 749.

One specimen was secured near Durion's hills, below Niobrara river. Very rare.

FULICA AMERICANA, Gmelin.

COOT. Baird, General Report on Birds, p. 751.

Not uncommon throughout the Northwest.

CYGNUS BUCCINATOR, Rich.

TRUMPETER SWAN. Baird, General Report on Birds, p. 758.

Seen at certain seasons of the year in large flocks throughout the Northwest. A few breed in the valley of the Yellowstone.

BERNICLA CANADENSIS, Boie.

CANADA GOOSE. Baird, General Report on Birds, p. 764.

Abundant on the Yellowstone in the spring and autumn. A few breed along that river.

ANAS BOSCHAS, Linn.

MALLARD. Baird, General Report on Birds, p. 774.

Abundant along the Missouri and its tributaries.

DAFILA ACUTA, Jenyns.

SPRIG-TAIL; PIN-TAIL. Baird, General Report on Birds, p. 776.

Generally diffused throughout the West.

NETTION CAROLINENSIS.

GREEN-WINGED TEAL. Baird, General Report on Birds, p. 778.

Very abundant throughout the valleys of the Missouri and its larger tributaries.

QUERQUEDULA DISCORS, Steph.

BLUE-WINGED TEAL. Baird, General Report on Birds, p. 779.

Distribution same as last.

SPATULA CLYPEATA, Boie.

SHOVELLER. Baird, General Report on Birds, p. 781.

One specimen only collected, near the mouth of Iowa creek. Very rare.

MARECA AMERICANA, Stephens.

BALDPATE. Baird, General Report on Birds, p. 783.

Quite rare. One specimen taken in the Missouri river near Bijoux hills.

AIX SPONSA, Boie.

SUMMER DUCK. Baird, General Report on Birds, p. 785.

Abundant throughout the West.

ERISMATURA RUBIDA, Bonap.

RUDDY DUCK. Baird, General Report on Birds, p. 811.

Collected near mouth of the Platte and in the valley of White river. Not abundant.

MERGUS AMERICANUS, Cass.

SHELDRAKE. Baird, General Report on Birds, p. 813.

More or less abundant throughout the Upper Missouri country.

LOPHODYTES CUCULLATUS, Reich.

HOODED MERGANSER. Baird, General Report on Birds, p. 816.

One specimen was collected from the Yellowstone river.

LARUS DELAWARENSIS, Ord.

RING-BILLED GULL. Baird, General Report on Birds, p. 846.

Very rare, but one specimen secured.

STERNA FRENATA, Gambel.

LEAST TERN. Baird, General Report on Birds, p. 864.

Not abundant, though widely distributed along the Western streams. We collected it from the Platte and Yellowstone valleys.

HYDROCHELIDON PLUMBEA, Wils.

SHORT-TAILED TERN. Baird, General Report on Birds, p. 864.

One specimen collected on the Loup fork.

PODICEPS CALIFORNICUS, Heermann.

CALIFORNIA GREBE. Baird, General Report on Birds, p. 896.

Quite rare. Two specimens collected in 1856, between Fort Union and Fort Berthold.

CHAPTER XVII.

REPTILES, FISHES, AND RECENT SHELLS.

A. Reptiles.

TESTUDINATA.	
Trionyx,	Yellowstone river.
Emys elegans,	" "
Emys,	Mouth of Powder river.
Cistudo,	" " "
OPHIDIA.	
Gaudisona Lecontei, Cope,	Yellowstone river.
Crotalus tergeminus, Say,	" "
Thamnophis sirtalis var. parietalis, B. & G.,	Loup fork.
Thamnophis Haydeni, Cope,	Sand hills.
Tropidonotus sipedon,	Yellowstone river.
Heterodon nasicus, B. & G.,	Sand hills of Loup fork.
Pityophis Sayi, B. & G.,	" " "
Lampropeltis multistriata, Kenn.,	Fort Benton on the Missouri.
Lampropeltis Sayi, Cope,	Missouri river.
Natrix obsoleta, Cope,	Missouri river to valley of the Platte.
Natrix rhinomegas, Cope,	" " " "
Bascanium flaviventris, B. & G.,	Head of Loup fork.
Liopeltis venalis, B. & G.,	Yellowstone river.
SAURIA.	
Sceloporus consobrinus, B. & G.,	Sand hills, valley of the Platte.
Sceloporus graciosus, B. & G.,	" " "
Holbrookia maculata, Girard,	" " "
Holbrookia Douglasii,	" " "
Cnemidophorus sexlineatus, Dum., Bibr.,	" " "
Plestiodon leptogrammus, Baird,	" " "
Plestiodon multivirgatus, Hallow.,	" " "
Plestiodon inornatus, Baird,	" " "
Plestiodon septentrionalis, Baird,	" " "
BATRACHIA.	
Rana halecina, Kalm,	
Helecetes triseriatus, Max.,	Mouth of Yellowstone.
Bufo Americanus, Lec.,	Along the Missouri river.
Bufo cognatus, Say,	" " "

Bufo Woodhousei, Grd.,	Along the Missouri river.
Siredon lichenoides,	Sand hills, valley of the Platte.
Amblystoma luridum, Baird,	" " "

B. Fishes.

PERCOIDS.	
Stizostedion boreus, Girard,	Fort Union, Missouri river.
SCIAENOIDS.	
Haploidonotus grunniens, Raf.,	Milk river.
GASTERASTEOIDS.	
Apeltes inconstans, Gill.,	Yellowstone river.
CYPRINOIDS.	
Pimephales fasciatus, Girard,	Milk river, Upper Missouri.
Hybognathus argyrites, Girard,	" " "
Hybognathus Evansi, Girard,	Fort Pierre.
Rhinichthys dulcis, Gill,	Sweetwater river.
Platygobio (Pogonichthys, Girard) communis, Gill,	Milk river.
Gobio gelidus, Girard,	"
Leucosomus dissimilis, Girard,	"
Leucosomus macrocephalus, Girard,	Fort Pierre.
Nocomis Nebrascensis, Girard,	Sweetwater river.
Semotilus speciosus, Girard,	Platte river.
Plargyrus Bowmani, Girard,	Sweetwater river.
CATASTOMOIDS.	
Catastomus Sucklii, Girard,	Milk river.
Acomus lactarius, Girard,	"
Acomus grisens, Girard,	Platte river.
Ptychostomus Haydeni, Girard,	Yellowstone river.
Carpiodes damalis, Girard,	Fort Pierre.
HYODONTOIDS.	
Hyodon tergisus, Lesueur,	Fort Sarpy, Yellowstone.
SILUROIDS.	
Ictalurus olivaceus, Gill,	Yellowstone river.
Noturus flavus, Raf.,	" "
ACIPENSEROIDS.	
Scaphyrhynchops platyrhynchus, Gill (Scaphyrhynchus Rafinesquii, Heckel),	Upper Missouri.
POLYODONTOIDS.	
Polyodon folium, Lac.,	Fort Pierre.

C. Recent Mollusca.

Recent shells are not abundant on the Missouri except in the streams that flow from the North. Terrestrial shells seldom occur above the mouth of the Niobrara river in a living condition. The waters of the Missouri to a point above the mouth of Milk river are so turbid that molluscous life does not exist, but in the little streams that issue from the mountains, a few *Unios* are found. The rivers that flow from the north, James, Vermilion and Big Sioux, abound with *Unionidæ*, and other freshwater shells. Vast numbers of shells are found in the alluvial deposits throughout the Northwest. In the bank of a little stream about two miles below the mouth of the Big Sioux, called Clay creek, there is a bed of shells about fifteen feet above the bed of the creek and six feet below the surface, three feet in thickness, composed almost entirely of different species of freshwater mollusca, *Unio*, *Paludina*, *Physa*, *Cyclas*, *Pupa*, very finely preserved, many of them delicate and friable, but as perfect as when living. In the alluvial just above the shells, are great numbers of bones, probably belonging to the buffalo, and over these are growing large forest trees, elm, black walnut, oak, &c. Throughout the great thickness of yellow marl, which has been deposited along the Missouri, from the Niobrara to the mouth of the former river, are disseminated large quantities of terrestrial and fluviatile shells, so far as is yet known, mostly identical with recent species. Near Fort Berthold, the fine vegetable material washed on the shores of the river contains myriads of minute *Helices*, *Pupas*, &c. From my collections in this region, Mr. Binney has described two new species of *Pupa*, *P. Nebraskana*, and *P. Blandi*. In the Black hills very few living shells were observed, but the alluvial soil composing the banks of the little streams is filled with freshwater and land shells, from which a new species, *Helix Cooperi*, was described by Mr. Binney. The freshwater shells were kindly examined by Mr. Lea of Philadelphia, and in regard to the above collection and a series obtained by Mr. Kennicott from the Red river of the North, Mr. Lea made the following remarks before the Philadelphia Academy.

"It is not to be understood that either of these collections, made under adverse circumstances, and at times of great personal danger, should be full representatives of this branch of the fauna of these countries. But they are sufficient to prove that zoological life, so far as represented by molluscs, is nearly, if not quite the same, as that of the Ohio river basin, as well as that of the Missouri river and a part of the Lower Mississippi and Red river of the South. The knowledge of a part of the species from these remote districts proves to us the wide-spread distribution of the same species, as we find every one of them in the Ohio river at Cincinnati, Marietta, and Pittsburg, and this is the more remarkable, as the waters of the Red river of the North are embraced in a different system of drainage, flowing as they do into Hudson's bay at about 52° north latitude. Here is seen an immense

area of country producing in its waters nearly the same life as regards the molluscs, a fact highly interesting to the zoologist."

To Mr. W. G. Binney were transmitted the land shells, which were examined by him with great care. I quote the following remarks from his letter: "These shells are all of value, as they form the first contribution to our knowledge of the species found in those regions. They are, however, for the most part alluvial. *Succinea Haydeni* is the only perfectly fresh species, the animal being preserved in alcohol.

"*Helix costata* was found in myriads, probably the contribution of many small streams above. Of the previously known species it is the most interesting, having been noticed previously in few localities and in small numbers. If any argument were needed to establish the point of *H. minuta* (Say), being identical with the European *H. pulchella* (Mull.), it might be found in the fact of the ribbed variety being also found in this country."

The following catalogue comprises all the freshwater and land shells known to us on the Upper Missouri:

FLUVIATILE SHELLS.

1. UNIO ALATUS, Say,	Big Sioux river.
2. UNIO LEVISSISSIMUS, Lea,	" "
3. UNIO LUTEOLUS, Lam.,	" "
4. UNIO ASPERIMUS, Lea,	" "
5. UNIO RECTUS, Lea,	" "
6. UNIO ELEGANS, Lea,	James river.
7. UNIO ZIGZAG, Lea,	White-earth river.
8. UNIO ANADONTOIDES, Lea,	James river.
9. MAGARITANA COMPLANATA, Lea,	Fort Clark, in Missouri.
10. ANADONTA FERUSSACIANA, Lea,	White river, Nebraska.
11. LYMNEA ELODES, Say,	Mouth of Big Sioux river.
12. LYMNEA NUTTALLIANA, Lea,	" " "
13. LYMNEA HUMILIS, Say,	" " "
14. LYMNEA HAYDENI, Lea,	" " "
15. LYMNEA KIRTLANDIANA, Lea,	" " "
16. LYMNEA UMBROSA, Say,	Grindstone creek, Nebraska Territory.
17. LYMNEA LUBRICOIDES, Lea,	" " " "
18. LYMNEA PHILADELPHICA, Lea,	" " " "
19. PLANORBIS BICARINATUS, Say,	Mouth of Big Sioux river.
20. PLANORBIS TRIVOLVIS, Say,	" " "
21. PLANORBIS LENTUS, Say,	" " "
22. PLANORBIS PARVUS, Say,	" " "

23. PLANORBIS CAMPANULATUS, Say,	Mouth of Big Sioux river.
24. PHYSA HETEROSTROPHA,	" " "
25. PHYSA INTEGRA? Hald.,	" " "
26. PHYSA ELONGATA, Say,	" " "
27. PHYSA AMPULARIA, Say,	" " "
28. PSIDIUM—?	Grindstone creek.
29. CYCLAS—?	" "
30. CYCLAS—?	" "
31. AMNICOLA PORATA, Say,	Fort Berthold.
32. AMNICOLA LAPIDARIA, Say,	"

LAND SHELLS.

33. HELIX MINUSCULA, Binney,	Council bluffs, Nebraska Territory.
34. HELIX LINEATA, Say,	" " "
35. HELIX STRIATELLA, Anthony,	" " "
36. HELIX INFLECTA, Say,	" " "
37. HELIX HIRSUTA, Say,	" " "
38. HELIX SOLITARIA, Say,	" " "
39. HELIX ALTERNATA, Say,	" " "
40. HELIX ELEVATA, Say,	" " "
41. HELIX FALLAX, Say,	" " "
42. HELIX CONCAVA, Say,	" " "
43. HELIX LIGERA, Say,	" " "
44. HELIX PROFUNDA, Say,	Near Fort Leavenworth, Kansas Territory.
45. HELIX MULTILINEATA, Say,	" " "
46. HELIX MONODON, Rackett,	" " "
47. HELIX PULCHELLA, Mull.,	" " "
48. HELIX COSTATA, Mull.,	" " "
49. HELIX ARBOREA, Say,	Drift on the Missouri near Fort Berthold.
50. HELIX CHERESINA, Say,	" " "
51. HELIX ELECTRINA, Gould,	" " "
52. HELIX COOPERI, Binney,	Black hills, Nebraska Territory.
53. PUPA NEBRASKANA, W. G. Binney,	Fort Berthold, Nebraska Ter.
54. PUPA BLANDI, W. G. Binney,	" "
55. PUPA ARMIGERA, Say,	" "
56. PUPA PENTODON, Say,	Council bluffs, "
57. PUPA MODESTA, Say,	" "
58. PUPA BADIA, Adams,	" "

59. BULIMUS LUBRICUS, Mull.,	Fort Berthold, on Missouri.
60. SUCCINEA VENUSTA, Say,	Yellowstone.
61. SUCCINEA RETUSA, Lea,	"
62. SUCCINEA HAYDENI, W. G. Binney,	"
63. SUCCINEA LINEATA, W. G. Binney,	Fort Union and Yellowstone.
64. SUCCINEA NUTTALLIANA, Lea,	Fort Union.
65. SUCCINEA OBLIQUA, Say,	Fort Berthold, Nebraska Ter.

CHAPTER XVIII.

BOTANY.

BY GEORGE ENGELMANN, M.D.

RANUNCULACEÆ.

Clematis Virginiana, Linn. Very abundant from the mouth of the Missouri river to Council bluffs.

Clematis ligusticifolia, Nutt. Fort Pierre to the mountains. Very abundant about Fort Union, Fort Laramie, and head of the Platte.

Pulsatilla patens, D. C. This plant is called by the Indians the harbinger of spring. I saw it on the south side of Bear Peak, March 9, 1855, just coming into bloom. It is found quite abundantly in the White river valley; also in the sandhills of Loup fork.

Anemone Pennsylvanica, Linn. Abundant from the mouth of the Missouri to the mountains, though most common below latitude 43°.

Anemone Caroliniana, Walt. Quite common around Council bluffs to Niobrara river.

Anemone cylindrica, Gray. This plant is quite rare; only a few individuals were seen near the mouth of the Big Sioux river, and on Loup fork.

Ranunculus repens var. *Marylandicus*, Torr. & Gray. Low, wet places on the Upper Missouri.

Ranunculus Pennsylvanicus, Linn. Council bluffs, Niobrara, Platte valley.

Ranunculus recurvatus, Poir. Mouth of the Missouri to Niobrara river; also sparingly in White river valley.

Ranunculus abortivus, Linn. Wet and sandy places to Niobrara; sparingly to the mountains.

Ranunculus sceleratus, Linn. Not rare throughout the Upper Missouri country.

Ranunculus glaberrimus, Hook. The only locality in which I ever saw this plant was at Grindstone hills, near Bad Lands, where it was in bloom on the 9th of April.

Ranunculus cymbalaria, Pursh. Seen on the Yellowstone and Missouri.

Ranunculus aquatilis, Linn. Very abundant in the White river valley, in the streams, and little lakes.

Myosurus minimus, Linn. Missouri bottoms, opposite St. Joseph's; also on the upland prairie near Fort Pierre.

Aquilegia Canadensis, Linn. Does not extend above Council bluffs or the Big Sioux.

Isopyrum biternatum, Torr. & Gray. Seen sparingly as far up the Missouri as the mouth of the Platte.

Delphinium tricorne, Mich. Extends to the mouth of the Big Sioux; range to Niobrara, in latitude 43°.

Delphinium azureum, Mich. Abundant on the open prairies to the mountains.

Delphinium virescens, Nutt. Fort Pierre.

Thalictrum cornuti, Linn. Not rare to mountains.

Thalictrum dioicum, Linn. Abundant to Niobrara river.

Hydrastis Canadensis, Linn. Found only in the carboniferous limestone region to Council bluffs; perhaps rarely to Big Sioux river.

Actea rubra, Bigelow. Council bluffs.

Aconitum napellus, Linn. Laramie mountains, August 24th.

MAGNOLIACEÆ.

Liriodendron tulipifera, Linn. In Eastern Kansas.

ANONACEÆ.

Asimina triloba, Dunal. Common Papaw. Extends up the Missouri to the mouth of the Big Sioux river.

MENISPERMACEÆ.

Menispermum Canadensis, Linn. Most abundant in the limestone regions to Council bluffs; seen rarely on wooded banks to the Yellowstone.

BERBERIDACEÆ.

Berberis aquifolium, Pursh. A very abundant shrub in the Laramie range of hills and Black hills.

Podophyllum peltatum, Linn. Abundant along the lower part of the Missouri river, gradually ceasing at the mouth of the Platte.

NELUMBIACEÆ.

Nelumbeum luteum, Willd. Lower portion of the valley of the Platte, and on the broad, wet bottoms about Omaha city. It is now quite rare, on account of the great use of both roots and seeds for food by the Omaha, Otoe, and Pawnee Indians.

NYMPHEACEÆ.

Nymphea odorata, Ait. Found by Dr. Cooper in Kansas.

PAPAVERACEÆ.

Argemone Mexicana, Linn. Found only at Bellevue, Neb. Ter.; fine yellow flowers.

Argemone hispida, Gray. Bad Lands, White river, Loup fork, Fort Laramie.

Sanguinaria Canadensis, Linn. Rich woods about Council bluffs.

FUMARIACEÆ.

Corydalos aurea, Willd. Not seen on the bottoms to mountains.

Dicentra cucullaria, D. C. In shady woods to mouth of Big Sioux.

CRUCIFERÆ.

Nasturtium palustre, D. C. Not uncommon to mountains.

Nasturtium obtusum, Nutt. On the Upper Missouri and Yellowstone.

Nasturtium sinuatum, Nutt. Fort Clark, Upper Missouri.

Nasturtium sesiliflorum, Nutt. Along Missouri.

Nasturtium limosum, Nutt. Along low bottoms near to Council bluffs.

Nasturtium calycinum,* Engelmann. N. sp. Annuum erectum seu diffusum, hirsutulum; foliis caulinis anguste oblongis sinuatis seu subpinnatifidis basi auriculata arcte sessilibus vel semi amplexicaulibus; racemis confertifloris demum elongatis; pedicellis flore flavido et silicula ovoidea acuta parva hispidula cum stylo gracilis vix longioribus; calyce persistente. In aspect as well as in the style (fully a line long on a silicle 1½ line in length), this species resembles some *Vesicariae*, but the numerous seeds are those of a *Nasturtium*. The stem is about a foot high, often much branched and diffuse. The ovate lanceolate acutish sepals commonly persist until the valves of the pod have fallen. The pubescence of the pod consists of very short and pointed thick-based simple hairs. (A. Gray.) Sandy bottoms of the Yellowstone river; Fort Sarpy to Fort Union.

Arabis Canadensis, Linn. Common along the Missouri to Fort Union.

Arabis hirsuta, Scop. Fort Union and Bad Lands.

Arabis laevigata, D. C. Shady woods to mouth of Platte.

Arabis dentata, Torr. and Gray. Council bluffs.

Sisymbrium canescens, Nutt. Fort Pierre and the Yellowstone.

Dentaria laciniata, Muhl. Shady woods around Council bluffs.

Erysimum asperum, D. C. Abundant on the high prairies to Fort Pierre and Fort Union.

Erysimum cheiranthoides, Linn. Yellowstone and Bad Lands.

Stanleya pinnatifida, Nutt. Abundant on the marl banks near Niobrara River, Fort Pierre, rarely on the Yellowstone.

Stanleya integrifolia, James. Dr. Gray thinks it is a different form of last species.

* First published in Preliminary Report of Explorations in Nebraska and Dakota, 1855, '6, and '7; Lieut. G. K. Warren, T. E. Catalogue of Plants.

Vesicaria ludoviciana, D. C. Sterile hills, Fort Pierre and Yellowstone.

Vesicaria alpina, Nutt. Same as preceding.

Vesicaria didymocarpa, Hook. Bad Lands.

Sinapis nigra, Linn. About old houses and cultivated fields, Council bluffs and Fort Pierre.

Capsella bursa-pastoris, Linn. Same as preceding.

Draba micrantha, Nutt. Bad Lands.

Draba Caroliniana, Walt. Council bluffs.

Draba brachycarpa, Nutt. Lower Missouri.

Lepidium ruderale, Linn. Along Missouri to mountains.

Lepidium Virginicum, Linn. Fort Pierre and Yellowstone.

Lepidium intermedium, Gray. Bad Lands of the Judith, Blackfoot country.

Thelypodium integrifolium. Very abundant near saline lakes in sand hills of Loup fork.

CAPPARIDACEÆ.

Cleome integrifolia, Torr. and Gray. Bad Lands, Fort Union, Yellowstone, Bad Lands of Judith, Platte valley, Fort Laramie. Not a generally diffused plant, but growing abundantly in localities.

Polanisia uniglandulosa, Gray. First seen on gravelly hills about Fort Pierre; also on Loup fork.

Cristatella Jamesii, Torr. and Gray. Gravelly hills on Loup fork, August 1st.

VIOLACEÆ.

Viola palmata, Linn. Fort Pierre.

Viola cucullata, Sit. Fort Pierre.

Viola Nuttallii, Pursh. Bad Lands.

Viola Canadensis, Linn. Fort Pierre.

Viola tricolor, Linn. Council bluffs.

Viola delphinifolia, Nutt. Prairies around Council bluffs.

CISTACEÆ.

Helianthemum Canadense, Michx. Black hills, August 24th.

Lechea major, Michx. Sand hills, Loup fork.

Lechea minor, Lam. " "

CARYOPHYLLACEÆ.

Silene Drummondi, Hook. Loup fork.

Silene antirrhina, Linn. Council bluffs.

Silene stellata, Ait. Dixon's bluffs.

Alsine Michauxi, Fenzl. Mouth Big Sioux.

Cerastium nutans, Raf. White river, Bad Lands.

Cerastium arvense, Linn. Council bluffs.

Moehringia lateriflora, Linn. Along Missouri to Council bluffs.

Paronychia sessiliflora, Nutt. Fort Union, Laramie peak, Black hills.

Stellaria longipes, Goldie. Council bluffs.

Arenaria Franklini, Douglass. Laramie mountains, August 24th.

Paronychia sessiliflora, Nutt. Elkhorn prairie, Bad Lands of the Judith, Blackfoot country, August 22d.

Paronychia Jamesii, Torr. Black hills, September 15th.

PORTULACACEÆ.

Portulaca oleracea, Linn. On saline clay soil, Teton river, near Fort Pierre; also near base of Black hills (indigenous).

Claytonia Virginica, Linn. Rocky woods, as high up the Missouri as Council bluffs.

Talinum parviflorum, Nutt. Sand hills on Loup fork.

MALVACEÆ.

Abutilon Avicennae, Gaertn. Naturalized near Council bluffs.

Malvastrum coccineum, Gray. Makes its appearance on the Missouri about latitude 43°, and continues to the mountains.

Callirhoe macrorhiza, Gray. Loup fork, July 22d.

Callirhoe involucrata, Gray. Platte river.

TILIACEÆ.

Tilia Americana, Linn. Abundant to Big Sioux; seen sparingly to mouth of Niobrara river, where it ceases.

LINACEÆ.

Linum rigidum, Pursh. Throughout the prairie portion of the Upper Missouri.

Linum perenne, Linn. Fort Pierre and Fort Union.

Linum Bootti, Planchon. Found by Dr. Cooper in Kansas.

GERANIACEÆ.

Geranium caespitosum, James. Black hills and Laramie mountains.

Geranium maculatum, Linn. Common to Niobrara.

Geranium Carolinianum, Linn. Mouth of Big Sioux.

OXALIDACEÆ.

Oxalis stricta, Linn. Generally diffused.

Oxalis violacea, Linn. Rich prairies and cultivated fields around Council bluffs; seen nearly as high as Niobrara in full bloom, June 20th, 1857.

Oxalis corniculata, Linn. Upper Missouri.

BALSAMINACEÆ.

Impatiens pallida, Nutt. Shady woods to mountains.

Impatiens fulva, Nutt. Council bluffs and Big Sioux.

RUTACEÆ.

Xanthoxylum Americanum, Mill. Woody bottoms and islands of the Missouri, to Fort Pierre.

Ptelia trifoliata, Linn. Around Council bluffs.

ANACARDIACEÆ.

Rhus glabra, Linn. Council bluffs, White river valley.

Rhus copallina, Linn. Abundant in Missouri and Kansas.

Rhus toxicodendron, Linn. Abundant in woody places to the mountains.

Rhus aromatica, Ait. Along Missouri.

Rhus trilobata, Nutt. First makes its appearance about latitude 43°, and occurs abundantly on sterile hills to the mountains.

VITACEÆ.

Vitis cordifolia, Michx.

Vitis riparia, Michx. Banks of Missouri, Bellevue, N. T.

Vitis indivisa, Willd. Big Sioux river.

Ampelopsis quinquefolia, Michx. Very common in woody bottoms throughout the country, but grows most luxuriant in the rich woods from the mouth of the Missouri to Big Sioux, where it often so clothes old dry trees that they seem still alive.

RHAMNACEÆ.

Ceanothus Fendleri. Laramie mountains.

Ceanothus velutinus, Douglas. Black hills.

Ceanothus sanguineus, Pursh. Mouth of White river.

Ceanothus ovalis, Bigelow, var. *pubescens*. Common on the cretaceous hills below Fort Pierre; also in the sand hills of Loup fork, on the Niobrara river.

Rhamnus lanceolatus, Pursh. Council bluffs.

CELASTRACEÆ.

Celastrus scandens, Linn. Along Missouri to Fort Union.

Euonymus atropurpureus, Jacq. Woody bottoms to Fort Union.

Euonymus Americanus, Linn. Mouth of Platte.

SAPINDACEÆ.

Staphylea trifolia, Linn. Council bluffs.

Aesculus glabra, Willd. Missouri bottoms to Big Sioux river.

Acer glabrum, Torr. Laramie mountains, August 24th.

Acer dasycarpum, Ehrhart. Bellevue, Nebraska.

Acer rubrum, Linn. Highest limit on Missouri, latitude 42°.

Acer saccharinum, Wang. Limestone regions of Kansas and southern portion of Nebraska.

Negundo aceroides, Moench. One of the few trees which extend to the mountains.

POLYGALACEÆ.

Polygala alba, Nutt. On sterile hills to Fort Union.

Polygala verticillata, Linn. Moist places on prairies, Fort Pierre, Bad Lands.

Polygala senega, Linn. Council bluffs.

LEGUMINOSÆ.

Vicia Americana, Muhl. Upper Missouri generally.

Lathyrus linearis, Nutt. Upper Missouri generally.

Lathyrus polymorphus, Nutt. White river valley.

Lathyrus venosus, Muhl. Rich bottoms, Big Sioux.

Phaseolus pauciflorus, Benth. Bad Lands.

Amphicarpæa monoica, Nutt. White river valley, Fort Clark.

Apios tuberosa, Moench. Along sandy woody bottoms of Missouri. A species of mouse gathers large numbers of the tubers of this plant for his winter store. These "cachés" (as they are called) are eagerly sought by the squaws, and the tubers taken and used as food. I have seen several bushels of the roots in a single lodge. Cooked with buffalo meat they make a very palatable dish.

Glycyrrhiza lepidota, Nutt. Diffused generally.

Psoralea lanceolata, Pursh. From Bellevue to Yellowstone.

Psoralea floribunda, Nutt. Big Sioux river to Bad Lands.

Psoralea campestris, Nutt. Bad Lands.

Psoralea argophylla, Pursh. A most beautiful plant, covering the plains as with silvery velvet. Big Sioux to mountains.

Psoralea cuspidata, Pursh. Fort Pierre to Bad Lands.

Psoralea esculenta, Pursh. Affords the Indians a very nourishing farinaceous root, upon which they subsist almost entirely in the spring and early summer months, when game is scarce. It is also a great favorite of the grizzly bear.

Psoralea digitata, Nutt. Sand hills on Loup fork.

Amorpha fruticosa, Linn. A common shrub, above Missouri to mountains.

Amorpha canescens, Nutt. Very abundant on the upland prairies, Loup fork, and Niobrara river.

Amorpha nana, Nutt. Fort Laramie and high up the Missouri.

Dalea aurea, Nutt. Bad Lands.

Dalea alopecuroides, Willd. Big Sioux river.

Dalea laxiflora, Pursh. Fort Pierre to the Yellowstone.

Petalostemum candidum, Mich. Big Sioux river.

Petalostemum multiflorum, Nutt. Fort Pierre to Bad Lands.

Petalostemum violaceum, Mich. Upper Missouri to Bad Lands.

Petalostemum villosum, Nutt. Bad Lands; also sand hills on Loup fork.

Petalostemum macrostachyium, Torr. Sand hills along the Loup fork and Niobrara.

Trifolium stoloniferum, Muhl. Bad Lands.

Trifolium pratense, Linn. Lower Missouri.

Trifolium repens, Linn. Lower Missouri.

Hosackia Purshiana, Benth. Sandy bottoms of Missouri.

Astragalus hypoglottis, Linn. White river to Bad Lands.

Astragalus gracilis, Nutt. Bad Lands to the Yellowstone.

Astragalus striatus, Nutt. Fort Pierre to Bad Lands, covering prairies like clover fields.

Astragalus Missouriensis, Nutt. Fort Pierre to Fort Union.

Astragalus caryocarpus, Ker. Fort Pierre to Bad Lands.

Astragalus Plattensis, Nutt. Fort Pierre.

Astragalus Canadensis, Linn. Fort Pierre to Bad Lands.

Astragalus racemosus, Pursh. Abundant in the sandy bottoms of Missouri; Cedar island.

Astragalus mollissimus, Torr. Niobrara river, August 18th.

Astragalus Drummondi, Douglass. Sterile hills around Fort Union.

Astragalus adsurgens, Pall. James river.

Phaca caespitosa, Nutt. Bad Lands.

Phaca longifolia, Nutt. Bad Lands.

Phaca pectinata, Hook. Upland prairies on the Yellowstone river; abundant.

Phaca elongata, Hook. Fort Pierre to Fort Union.

Phaca bisulcata, Hook. Fort Union.

Orytropis Lamberti, Pursh. Very abundant on prairies around Big Sioux and Niobrara rivers.

Oxytropis splendens, Douglass. James river.

Homalobus multiflorus, Nutt. Big Sioux to Bad Lands.

Kentrophyta montana, Nutt. Abundant in sandy river-bottoms on the Yellowstone.

Hedysarum boreale, Nutt. Abundant; mouth of Yellowstone.

Desmodium Canadense, D. C. Fort Clark.

Desmodium Dillenii, Darl. Big Sioux river.

Desmodium paniculatum, D. C. Bellevue, W. T.

Desmodium nudiflorum, D. C. Bellevue, W. T.

Lespedeza capitata, Michx. Abundant on the rich bottoms about Council bluffs, Big Sioux.

Lespedeza hirta, Ell. On Missouri.

Crotalaria sagittalis, Michx. Big Sioux river.

Lupinus pusillus, Pursh. Common on the Yellowstone.

Lupinus ornatus, Douglass. Niobrara river, August 18th.

Lupinus decumbens, Torr. Laramie mountains, August 24th.

Tilia Americana, Linn. Abundant to Big Sioux; seen sparingly to mouth of Niobrara, where it ceases.

Lupinus perennis, Linn. Platte valley.

Lupinus—? Bad Lands of the Judith.

Thermopsis rhombifolia, Nutt. From Council bluffs to Fort Pierre; Bad Lands, &c.

Sophora sericea, Nutt. White river valley; Fort Pierre.

Gleditschia tricanthus, Linn. Occurs as high on the Missouri as Big Sioux.

Cercis Canadensis, Linn. Same as preceding.

Cassia Chaemacrista, Linn. Sandy bottoms of Missouri, from Council bluffs to White river.

Desmanthus brachylobus, Benth. Council bluffs and Platte valley; rich bottoms.

Schrankia uncinata, Willd. Gravelly hills on the Upper Missouri generally.

Gymnocladus Canadensis, Lam. Abundant in woody bottoms to Big Sioux.

Baptisia leucophea, Nutt. Platte valley.

Baptisia leucantha, Torr. and Gray. Lower Platte river, June 25th.

ROSACEÆ.

Prunus Americana, Marsh. Fort Pierre.

Prunus pumila, Linn. Abundant in the sand hills of Loup fork; along Missouri river near Little Soldier's camp.

Prunus serotina, Ehrh. Council bluffs.

Prunus Virginiana, Linn. Generally diffused.

Gillenia stipulacea, Nutt. Mouth of Big Sioux.

Gillenia trifoliata, Moench. Mouth of Big Sioux.

Agrimonia eupatoria, Linn. Bellevue, N. T.

Agrimonia parviflora, Ait. Around Fort Union.

Spiræa opulifolia var. *pauciflora*. Black hills, September 3d.

Spiræa betulafolia var. *corymbosa*. " "

Cercocarpus parvifolius, Michx. Laramie mountains, August 20th.

Horkelia Gordoni. Laramie mountains.

Chaemorhodas erecta, var. *Nuttalli*, Torr. and Gray. Big Bend and Yellowstone.

Geum strictum, Ait. White river to Yellowstone.

Geum album, Gmel. Fort Pierre and Mandan village.

Geum triflorum, Pursh. Fort Union.

Geum rivale, Linn. Laramie mountains.

Potentilla glandulosa, Nutt. Laramie mountains, August 24th.

Potentilla Norvegica, Linn. Council bluffs to Yellowstone.

Potentilla paradoxa, Nutt. Along banks of Missouri.

Potentilla effusa, Dougl.? Prairie near Fort Clark.

Potentilla Pennsylvanica, Linn, var. *strigosa.* Bad Lands.

Potentilla diversifolia, Lehm. Bad Lands.

Potentilla rigida, Nutt. Yellowstone.

Potentilla Canadensis, Linn. Big Sioux river.

Potentilla anserina, Linn. Niobrara river to Fort Pierre.

Potentilla fruticosa, Linn. On the Yellowstone.

Potentilla arguta, Pursh. Fort Clark and Fort Union.

Sibbaldia procumbens, Linn. Laramie mountains, August 24th.

Fragaria vesca, Linn. Along Missouri to Yellowstone.

Fragaria Virginica, Ehsh. Fort Union.

Sanguisorba annua, Nutt. Fort Union.

Rubus occidentalis, Linn. Council bluffs.

Rubus strigosus, Mich. Sparingly on Yellowstone.

Rubus villosus, Ait. Council bluffs.

Rosa blanda, Ait. On prairies generally.

Rosa lucida, Ehrh. White river; Fort Pierre.

Cratægus punctata, Jacq. White river; Big Bend, &c.

Cratægus tomentosa, var *mollis*, Gray. Mouth of Big Sioux.

Amelanchier Canadensis, Torr. and Gray. Common throughout the Upper Missouri country; bears a delicious fruit, which ripens in June.

LYTHRACEÆ.

Lythrum alatum, Pursh. Rich alluvial bottoms, Platte valley, June 3d.

ONAGRACEÆ.

Epilobium minutum, Lindl. Black hills, September 10th.

Epilobium angustifolium, Linn. Not uncommon in Kansas; also near Council bluffs.

Oenothera pinnatifida, Nutt. Bad Lands to Yellowstone.

Oenothera albicaulis, Nutt. Same localities.

Oenothera caespitosa, Nutt. Bad Lands, &c.; the common form with large flowers, and another one with flowers not more than one inch in diameter.

Oenothera montana, Nutt. Yellowstone; a small pubescent form of the latter?

Oenothera coronopifolia, Torr. and Gray. Niobrara, August 15th.

Oenothera serrulata, Nutt. Fort Pierre, and through the whole region in different varieties.

Oenothera biennis, Linn. Common along the valley of the Missouri to the mountains.

Oenothera rhombipetala, Nutt. Sand hills, August 4th.

Oenothera lavandulaefolia, Torr. and Gray. Niobrara river, August 15th.

Oenothera spinulosa, var. *Drummondii*. Loup fork of the Platte, July.

Gayophytum ramossissimum, Torr. and Gray. Black hills, September 10th.

Ludwigia palustris, Ell. Wet places in Platte valley, near mouth of Loup fork.

Gaura coccinea, Nutt. Throughout the territory; different forms, canescent. Very small-leaved, or almost glabrous, with larger leaves.

Gaura parviflora, Dougl. Bad Lands and Yellowstone country.

Gaura biennis, Linn. Along Missouri river to Council bluffs.

Circea Lutetiana, Linn. Bad Lands.

Myriophyllum spicatum, Linn. Common in ponds throughout the Upper Missouri.

Hippuris vulgaris, Linn. In standing pools, Upper Missouri.

LOASACEÆ.

Mentzelia ornata, Torr. & Gray. Common on bluffs about Fort Pierre.

Mentzelia nuda, Torr. & Gray. Bad Lands.

CACTACEÆ.

Mamillaria vivipara, Haw. From the mouth of White river to the Yellowstone. In the bottom lands it forms large cæspitose masses, but on the arid hills along the Yellowstone a simple depressed variety is noticed; both belong to the subspecies which I have named *vera*, and the latter may be distinguished as var. *simplex*.

Mamillaria Nuttalli, Engl., *forma borealis*, Cactus mamillaris, Nutt., Mam. simplex, Torr. & Gray. On White river, Fort Pierre, &c.

Opuntia Rafinesqui, var. *fusiformis*, Engl. & Big. Near Big Bend of the Missouri, below Fort Pierre.

Opuntia Missouriense, D. C. Different forms noticed in the Synopsis of the Cactaceæ of the United States. (Proceedings Am. Acad. vol. iii, 1856.) a, *rufispina*; b, *platycarpa*; c, *microsperma*; d, *subinermis*. Found all over the territory explored by the Expeditions. Durion's hills was about the most eastern locality of this species.

Opuntia fragilis, Nutt. D. C. Bad Lands to Yellowstone. This species is very nearly allied to the last, and not to the glomerate *Opuntiæ*, with which it is usually united. It is seldom found in flower or fruit, being abundantly propagated by the fragile joints which even the wind breaks and scatters. The fruit is at first fleshy, and becomes dry only at last, while the fruit of *Opuntia Missouriensis* becomes dry and papery as soon as ripe.

GROSSULACEÆ.

Ribes hirtellum, Michx. On Powder river, on rocks; a spineless, small-leaved form.

Ribes oxyacanthoides, Linn. On the Yellowstone.

Ribes floridum, L'Her. Abundant about Fort Pierre, &c., and all along the Missouri.

Ribes aureum, Pursh. With the last.

Ribes rotundifolium, Michx. Niobrara river, June 5th.

Ribes Missouriense, Nutt. Only a variety of the last.

CUCURBITACEÆ.

Echinocystis lobata, Torr. & Gray. Durion's hills, on the Missouri.

CRASSULACEÆ.

Sedum stenopetalum, Pursh. Laramie mountains.

Penthorum sedoides, Linn. In wet places. Platte valley; Loup fork.

SAXIFRAGACEÆ.

Heuchera hispida, Pursh. Fort Pierre to Yellowstone.

Heuchera Americana, Linn. Not rare in woody places along the Missouri.

Heuchera Richardsonii, R. Brown. Black hills.

HAMAMELACEÆ.

Hamamelis Virginica, Linn. Abundant in limestone woods along the Missouri to mouth of the Platte river.

UMBELLIFERÆ.

Sanicula Canadensis, Linn. Bellevue, N. T. June 20th.

Sanicula Marilandica, Linn. Council bluffs to Fort Mandan.

Sium lineare, Michx. Moist places from the mouth of the Missouri to mountains.

Sium angustifolium, Linn. Council bluffs.

Thaspium barbinode, Nutt. Rich woody places along the Missouri.

Thaspium aureum, Nutt. Near Council bluffs.

Cicuta maculata, Linn. Sargent's bluffs, Mandan village, &c.

Cymopterus glomeratus, D. C. Mouth of White river, and Bad Lands.

Cymopterus montanus, Nutt. Bad Lands.

Peucedanum foeniculaceum, Nutt. Common on high prairies around Council bluffs.

Peucedanum carnifolium, Torr. & Gray. Niobrara river.

Peucedanum nudicaule, Nutt. White river valley; in flower about the middle of April.

Osmorrhiza longistylis, D. C. Council bluffs to Niobrara.

Osmorrhiza brevistylis, D. C. Council bluffs.

Musenium divaricatum, Nutt. Fort Pierre, Bad Lands, &c.

Leptocaulis patens, Nutt. Loup Fork.

ARALIACEÆ.

Aralia nudicaulis, Linn. Bellevue, N. T.

CORNACEÆ.

Cornus florida, Linn. Along the rich wooded bottoms as far as Fort Leavenworth.

Cornus stolonifera, Michx. Wooded bottoms of Missouri from mouth to source.

Cornus sericea, Linn. Abundant along Missouri bottoms. The inner bark is much used by the Sioux Indians with their tobacco in proportion of three to one; called by them the "red osier."

CAPRIFOLIACEÆ.

Symphoricarpus occidentalis, R. Br. The most abundant shrub along the rivers and streams from the mouth of the Missouri to the mountains; often called "blue wood;" much used for making brooms; sometimes covers the river bottoms almost exclusively.

Lonicera hirsuta, Eat. Bellevue.

Triosteum perfoliatum, Linn. Not rare as high up the Missouri as mouth of Big Sioux.

Sambucus Canadensis, Linn. Common along Missouri; seen in the valley of Yellowstone.

Viburnum Lentago, Linn. Fort Union, Blackfoot country.

RUBIACEÆ.

Galium aparine, Linn. Kansas river.

Galium trifidum, Linn. Council bluffs.

Galium triflorum, Michx. Fort Pierre, Fort Union, &c.

Galium asprellum, Michx. Council bluffs.

Galium circaezans, Michx. Bellevue, N. T.

Galium boreale, Linn. Fort Clark, Fort Union.

Oldenlandia angustifolia, Gray. Along Missouri to Council bluffs.

Oldenlandia purpurea, Gray. Bellevue, N. T.

COMPOSITÆ.

Vernonia fasciculata, Michx. Quite common on prairies, valley of Missouri.

Kuhnia eupatoroides, Linn. Council bluffs to Niobrara.

Eupatorium perfoliatum, Linn. On rich bottom prairies near mouth of Big Sioux.

Eupatorium purpureum, Linn. Council bluffs to James river.

Eupatorium ageratoides, Linn. Woody bottoms Council bluffs to Fort Pierre.

Eupatorium serotinum, Michx. Bellevue, N. T.

Liatris squarrosa, Willd. A smoothish and a rough hairy form; prairies in Kansas and Nebraska, common; root tuberous.

Liatris punctata, Hook. Common on prairies along the Yellowstone; root ligneous, elongated, horizontal.

Liatris pycnostachya, Michx. Common on prairies. Bellevue, N. T.

Liatris scariosa, Willd. Western prairies, abundant.

Pectis angustifolia, Torr. North Platte.

Brickelia grandiflora, Nutt. Laramie mountains, August 24th.

Machæranthera tanacetifolia, Nees. On Powder river, Yellowstone, and Bad Lands of the Judith.

Machæranthera canescens, Gray. (*Aster canescens*, Pursh.) Along the Missouri, at the mouth of the Big Shyenne, at Fort Clark, &c.

Machæranthera viscosa (*Dicteria viscosa*, Nutt.). Common in prairie dog villages on the Yellowstone river; only the lowest leaves are sharply and divaricately toothed, all others are linear and entire; the plant is annual or biennial, six to ten inches high, divaricately branched, the heads much smaller than in the foregoing species.

Aster cordifolius, Linn. Not uncommon, Big Sioux and Niobrara.

Aster saggitifolius, Willd. Big Sioux and Niobrara.

Aster azureus, Lindl. Council bluffs.

Aster multiflorus, Ait. Council bluffs.

Aster sericeus, Vent. Fort Pierre.

Aster Novæ-Angliæ, Ait. Low places on Missouri.

Aster lævis, Linn. Upper Missouri.

Aster ptarmicoides, Nees. Black hills.

Aster angustus, Torr. & Gray. Bad Lands of Judith.

Aster pauciflorus, Nutt. Near Fort Union, September.

Aster simplex, Willd. Shyenne river, September 3d.

Aster glacialis, Nutt. Laramie mountains, August 24th.

Townsendia grandiflora, Nutt. Eagle Nest butte, White river.

Erigeron pumilum, Nutt. High hills around Fort Pierre.

Erigeron strigosum, Muhl. Low places, Vermilion prairie.

Erigeron Philadelphicum, Linn. Alluvial bottoms of Missouri.

Erigeron Canadense, Linn. Common all over Missouri country.

Erigeron compositum, Pursh. Sterile hills at Fort Union, without flower or fruit.

Erigeron glabellum, Nutt. Prairies around Fort Pierre and the Yellowstone.

Erigeron bellidiastrum, Nutt. Niobrara river, August 12th.

Erigeron macranthum, Nutt. Black hills, September 10th.

Aplopappus Nuttalli, Torr. and Gray. Bad Lands.

Aplopappus lanceolatus. Fort Union.

Aplopappus spinulosus, D. C. High prairies of the Upper Missouri.

Boltonia glastifolia, L'Her. Bellevue, N. T.

Gutiernezia Euthamiae, Torr. and Gray. Yellowstone country; also Black hills. A smoothish and a scabrous form.

Solidago rigida, Linn. Bellevue to the Yellowstone.

Solidago incana, Torr. and Gray. Fort Pierre to Yellowstone.

Solidago Missouriensis, Nutt. Bellevue to Fort Pierre.

Solidago gigantea, Ait. Common along the Missouri and Yellowstone.

Solidago speciosa, Nutt. Black hills, September 3d.

Grindelia squarrosa, Dunal. Common on high prairies from latitude 43° to the mountains; medicinal among Indians.

Chrysopsis villosa, Nutt. Common on dry hills, Fort Pierre.

Chrysopsis hispida, Hook. Bad Lands and Yellowstone.

Diaperia prolifera, Nutt. Common on Yellowstone.

Silphium laciniatum, Linn. Called by the inhabitants of the country, "Compass plant;" reaches its healthiest growth on the rich fertile bottoms of Missouri, but often found in great abundance on the high prairies. The highest point on the Missouri river that I have observed this plant, is near latitude 44°, mouth of White river; most abundant in the Platte valley, and on the broad rich bottoms between Council bluffs and Niobrara river, where it sometimes occupies large areas to the exclusion of other vegetation. That the leaves of this plant set their edges north and south, may be proved by a pocket compass. Forty-nine plants out of fifty exhibit this peculiarity. It thus becomes an excellent guide to the traveller across the pathless prairies.

Silphium integrifolium, Michx. Bellevue, N. T.

Silphium perfoliatum, Linn. Seldom seen above the mouth of Niobrara river.

Euphrosyne xanthifolia, Gray. Yellowstone and Upper Missouri in bottoms; a green and canescent form.

Iva axillaris, Pursh. Dry argillaceous hills. Fort Pierre and Fort Union.

Ambrosia trifida, Linn. Along streams and borders of woods, from mouth of Missouri to mountains. Quite abundant.

Ambrosia coronopifolia, Torr. and Gray. Fort Pierre.

Franseria Hookeriana, Nutt. Sandy bottoms of Yellowstone river.

Heliopsis laevis, Pers. Along streams in Kansas and Nebraska to Fort Pierre.

Xanthium strumarium, Linn. Sandy bottoms of Yellowstone.

Echinacea purpurea, Moench. Purple cone flower, called Rattlesnake Weed in the West, and is found abundantly throughout the country. Root very pungent. Used very effectively by the traders and Indians for the cure of the bite of the rattlesnake.

Echinacea angustifolia, D. C. Fort Pierre, Bad Lands, Yellowstone. Mostly very hispid; hoary.

Lepachys columnaris, Torr. and Gray. Common throughout the Missouri country, but most abundant from Council bluffs to Niobrara river, on the rich broad bottom prairies. In flower, July 8th. Rays usually yellow, sometimes of a deep purple velvet.

Lepachys pinnata, Torr. and Gray. Vermilion prairie. Rare.

Rudbeckia hirta, Linn. Council bluffs.

Helianthus petiolaris, Nutt. Common from Sargent's bluffs to Fort Union.

Helianthus rigidus, Defs. From Bellevue to Yellowstone.

Helianthus lenticularis, Dougl. Fort Pierre. Abundant in Indian cornfields at Fort Mandan.

Helianthus Maximiliani, Schrad. Fort Pierre to Fort Union.

Helianthus hirsutus, Raf. Big Sioux river.

Coreopsis palmata, Nutt. Bellevue, N. T.

Bidens bipinnata, Linn. Bellevue, N. T.

Bidens chrysanthemoides, Michx. Yellowstone river.

Balsamorrhiza sagittata, Nutt. Black hills.

Linosyris viscidiflora, Torr. and Gray. Fort Union.

Linosyris graveolens, Torr. & Gray. Sterile hills on the Yellowstone; very common; also Bad Lands; the larger glabrous, and the smaller a stinted canescent form.

Thelesperma filifolia, Gray. Platte valley, July 30th.

Thelesperma gracile, Gray. Sand hills, July 24th.

Dysodia chrysanthemoides, Michx. On the Yellowstone.

Gaillardia aristata, Pursh. Fort Union.

Hymenopappus tenuifolius, Pursh. Big Sioux to Fort Union and Bad Lands.

Bahia appositifolia, Nutt. Common on roadsides and in prairie dog villages, from Fort Pierre to Bad Lands and to the Yellowstone.

Actinella acaulis, Nutt. On high sterile hills, Bad Lands, and Yellowstone.

Actinella Richardsoni, Nutt. Fort Union.

Actinella lanata, Nutt. Niobrara river.

Helenium autumnale, Linn. Kansas and Southern Nebraska.

Anthemis arvensis, Linn. Naturalized to Fort Leavenworth.

Achillea millefolium, Linn. Found all over the prairie country of the West; must be indigenous west of the Mississippi.

Antennaria plantaginea, R. Br. Upper Missouri and Black hills.

Antennaria dioica, Gaertn. Fort Pierre to Yellowstone.

Antennaria margaritacea, R. Br. Laramie mountains.

Antennaria dimorpha, Nutt. Bad Lands.

Gnaphalium uliginosum, Linn. Council Bluffs.

Artemisia longifolia, Nutt. Common on high hills along the Yellowstone.

Artemisia dracunculoides, Pursh. Bellevue to Yellowstone.

Artemisia filifolia, Torr. Gravelly hills along the Platte; Bad Lands.

Artemisia Canadensis, Michx. Near Fort Laramie; also Durion's hills to Yellowstone.

Artemisia Ludoviciana, Nutt. In the Bad Lands and along the Yellowstone; always white, with deeply serrate or entire leaves.

Artemisia cana, Pursh. Abundant on the Yellowstone, and on the Missouri above Fort Union. This is the species which is properly called "sage" on the Upper Missouri; it grows shrubby, two to four feet high.

Artemisia frigida, Willd. From latitude 43° to mountains.

Artemisia tridentata, Nutt. Common in Bad Lands.

Artemisia biennis, Willd. In Platte valley.

Senecio aureus, Linn. Council bluffs and Big Sioux.

Senecio integerrimus, Nutt. About Council bluffs to mountains.

Senecio lobatus, Pers. Fort Leavenworth to Fort Pierre.

Senecio canus, Hook. Bad Lands to Yellowstone, with the upper leaves serrate or entire, tomentose, canescent or almost glabrous.

Senecio filifolius, Nutt. Black hills.

Senecio spartioides, Torr. & Gray. Niobrara river.

Senecio rapifolius, Nutt. Laramie mountains.

Senecio eremophilus, Richards. Black hills.

Cacalia atriplicifolia, Linn. Bellevue, N. T.

Cacalia tuberosa, Nutt. Not uncommon on the rich bottoms of the Missouri and Platte.

Lygodesmia juncea, Don. A very abundant plant all over the sterile hills of the Upper Missouri and its tributaries; grows most luxuriantly on the second upland prairie. It makes its first appearance near Council bluffs, and extends to the mountains.

Cirsium altissimum, Spreng. Bellevue to Fort Pierre.

Cirsium undulatum, Spreng. Arid hills and prairies from Niobrara to Fort Pierre and Bad Lands. The var. β. Torr. & Gray, with smaller heads and more deeply divided and spiny leaves, was found on the Yellowstone.

Cirsium canescens, Nutt. Bad Lands; certainly biennial with a long root; perhaps belonging to *C. undulatum*, as Torr. & Gray suggest; distinguished by the deeply pinnatifid and decurrent leaves; decurrent part $\frac{1}{2}$–$1\frac{1}{2}$ inch long, undulate and very spiny; peduncles leafy; involucre pubescent.

Nabalus asper, Torr. & Gray. Bellevue, N. T.

Nabalus racemosus, Hook. Black hills, September 3d.

Mulgedium pulchellum, Nutt. Big Sioux river.

Troximon cuspidatum, Pursh. Council bluffs and Big Sioux, Bad Lands. The white tomentose margin on the bright green leaves gives the young plant especially a very peculiar aspect.

Troximon glaucum, Nutt. Upland prairies on the Yellowstone, with long and short leaves, villous or glabrous scales of involucre.

Crepis runcinata, Torr. & Gray. Yellowstone.

Lactuca Ludoviciana, D. C. Fort Mandan (Nuttall's original locality), Bad Lands, down to the mouth of the Big Sioux river. A very distinct and well-marked species and a true *Lactuca*. Apparently biennial or perennial; 1–3 feet high; cauline leaves oval, runcinate or almost entire, clasping with an auriculate base; heads paniculate, much larger than in any other North American species, about 9 lines long.

Sonchus asper, Vill. Fort Leavenworth, K. T.

Stephanomeria runcinata. Bad Lands of Judith.

Villanova chrysanthemoides, Gray. *Plantæ Wrightiana*, Plate 2. Laramie mountains, August 24th.

Hieracium scabrum, Michx. Laramie mountains.

Hieracium Canadense, Michx. Laramie mountains.

LOBELIACEÆ.

Lobelia cardinalis, Linn. Moist places along the Missouri to the Big Sioux; in Kansas, on Big Cottonwood creek.

Lobelia spicata, Lam. Mouth of the Platte.

Lobelia inflata, Linn. Yellowstone valley, where it is cultivated by the Crow Indians, and used in their religious ceremonies.

CAMPANULACEÆ.

Campanula rotundifolia, Linn. Prairies near Fort Clark; abundant, but very rare elsewhere.

Campanula aparinoides, Pursh.

Specularia perfoliata, A. D. C. Bad Lands, &c.

Specularia paradoxa, Nutt. (*Sub prismato carpo.*) Bad Lands.

ERICACEÆ.

Vaccinium Myrtillus, Hook. Black hills.

Arctostaphylos Uva-ursi, Spreng. Very abundant on the high rocky hills about Fort Clark; also abundant in the mountains. It is the real "Kininkkinnick" of the

Indians, and used by them to mix with their tobacco, in preference to any other plant. The bark of *Cornus sericea* is used as a substitute only in the absence of the *A. uva-ursi*.

Chimaphila umbellata, Nutt. Black hills.

Pyrola minor, Linn. Laramie mountains, August 20th.

Pterospora Andromedea, Nutt. Laramie mountains.

EBENACEÆ.

Diospyros Virginiana, Linn. Occurs in Kansas.

PLANTAGINACEÆ.

Plantago major, Linn. Along Missouri and Yellowstone rivers.

Plantago eriopoda, Torr. Saline marshes near Fort Union.

Plantago Virginica, Linn. Fort Pierre.

Plantago Patagonica, var. *gnaphalioides*. Very abundant in sandy soil and gravelly places on the Upper Missouri.

Plantago pusilla, Nutt. On prairies near Fort Pierre; also on the river opposite St. Joseph, in Kansas.

PRIMULACEÆ.

Androsace occidentalis, Pursh. Bad Lands, Fort Pierre.

Lysimachia stricta, Ait. Platte valley, and along Missouri.

Lysimachia ciliata, Linn. Common from Council bluffs to Bad Lands.

Glaux maritima, Linn. Bad Lands of the Judith, Blackfoot country.

BIGNONIACEÆ.

Martynia proboscidea, Glox. Fort Pierre.

LENTIBULACEÆ.

Utricularia inflata, Walt. In ponds, Council bluffs, White river valley.

OROBANCHACEÆ.

Phelipæa Ludoviciana, Don. Sandy prairies, Yellowstone.

Aphyllon fasciculatum, Torr. & Gray. Great Bend of Missouri.

Aphyllon uniflorum, Torr. & Gray. Council bluffs.

SCROPHULARIACEÆ.

Scrophularia nodosa, Linn. Common in prairies throughout the Upper Missouri country.

Scrophularia nodosa, var. *discolor*. Smaller, with firmer leaves, lower side of leaves pubescent and very pale; Fort Pierre.

Chelone glabra, Linn. Along valley of Missouri to latitude 43°.

Pentstemon grandiflorus, Fraser. A beautiful plant found along the bluffs of the Platte, banks and sandy bottoms of Missouri to mountains.

Pentstemon cœruleum, Nutt. Eagle Nest hill, White river valley.

Pentstemon erianthum, Nutt. Hills around Fort Pierre.

Pentstemon albidum, Nutt. Low with glabrous calyx. Hills around Fort Pierre.

Pentstemon cristatum, Nutt. On high prairies; Upper Missouri.

Pentstemon gracile, Nutt. Prairie bottoms, near Fort Pierre.

Pentstemon pubescens, Solander. Fort Pierre; June.

Pentstemon levigatus, Solander. Fort Leavenworth; May.

Pentstemon acuminatus, Lindl. Sandhills on Loup fork.

Pentstemon Fendleri, Gray. Sandhills on Loup fork.

Pentstemon confertus, Lindl. Laramie mountains, August 24th.

Pentstemon ———? undetermined. Niobrara.

Mimulus ringens, Linn. Council bluffs and Big Sioux.

Mimulus Jamesii, Torr. On the Platte. Dr. Cooper.

Gratiola Virginica, Linn. Quite common along the Missouri.

Veronica anagallis, Linn. Common; Council bluffs.

Veronica scutellata, Linn. With the preceding.

Veronica peregrina, Linn. Fort Pierre.

Veronica Americana, Schwein. Niobrara river.

Veronica arvensis, Linn. Council bluffs to Bad Lands.

Ilysanthes gratioloides, Benth. Yellowstone country.

Limosella aquatica, Linn. Wet places on the banks of the Yellowstone. This is the same as the European plant.

Synthyris Houghtoniana, Benth. Black hills.

Gerardia purpurea, Linn. Council bluffs.

Gerardia tenuifolia, Vahl. Fort Pierre.

Castilleia sessiliflora, Pursh. Fort Pierre, Bad Lands, Yellowstone, &c.

Castilleia septentrionalis, Lindl. Black hills.

Castilleia linariafolia, Benth. Laramie mountains, August 24th.

Castilleia argutifolia, Nutt. Laramie mountains.

Melampyrum Americanum, Michx. Extends up the Missouri as far as the mouth of the Platte.

Pedicularis lanceolata, Michx. Fort Pierre, Yellowstone, &c.

Orthocarpus luteus. Near Powder river on Yellowstone.

ACANTHACEÆ.

Dipteracanthus strepens, Nees. Fort Leavenworth to mouth of Niobrara river.

Dianthera Americana, Linn. Platte valley.

VERBENACEÆ.

Verbena urticifolia, Linn. Dixon's bluffs, on Missouri.

Verbena bipinnatifida, Nutt. Bad Lands and Yellowstone river. Some forms of *Verbena* were found near the mouth of Kansas river, and at Sargent's bluffs, which are evidently hybrids, probably between *V. urticifolia* and *V. bracteosa*. Numerous hybrids between the species of *Verbena* are not rare in the vicinity of St. Louis, which I have noticed in Silliman's Journal, Jan. 1844, page 99.

Verbena bracteosa, Michx. A very common plant about prairie dog villages on the Upper Missouri.

Verbena hastata, Linn. Platte valley.

Verbena stricta, Vent. Platte valley; July.

Verbena Aubletia, Linn. Along the Missouri in Kansas.

Lippia lanceolata, Michx. Fort Leavenworth, Kansas Territory.

Phryma Leptostachya, Linn. Not rare along the Missouri to latitude 43°.

LABIATÆ.

Teucrium Canadense, Linn. Bad Lands, &c.

Mentha Canadensis, Linn. All along the Missouri to the Yellowstone.

Mentha borealis, var. *glabrata*. Loup fork, July 6th.

Lycopus sinuatus, Ell., Benth. Council bluffs to above Fort Pierre. Some forms are very deeply pinnatifid.

Lycopus obtusifolius, Michx., Benth. Common along the Yellowstone. Abundantly distinguished from the former by the larger flowers with included stamens. Sterile filaments reduced to mere warts and naked throat of corolla. The leaves are somewhat clasping with a sessile base, the lowest ones obtuse, but the upper ones acute and even acuminate, regularly serrate and on both sides abundantly glandulo-punctate.

Isanthus cœruleus, Michx. Fort Riley. Found by Dr. Cooper.

Pycnanthemum lanceolatum, Pursh. Loup fork, July 31st, 1857.

Hedeoma pulegioides, Pers. Bad Lands.

Hedeoma hispida, Pursh. Council bluffs to Bad Lands and Yellowstone. Leaves strongly ribbed on the lower side, scarcely punctate, longer than the verticils; teeth of punctiferous calyx spreading.

Hedeoma Drummondi, Benth. Sandy soil on the Yellowstone river, common. Similar to the preceding but perennial with a long tap root; leaves nerveless, strongly punctate on both sides, shorter than the verticils; teeth of fructiferous calyx connivent.

Salvia trichostemoides, Pursh. Fort Pierre, Bad Lands.

Salvia Pitcheri, Torr. Collected by Dr. Cooper near Fort Riley.

Monarda Bradburiana, Beck. Fort Pierre.

Monarda fistulosa, Linn. The form usually named *M. allophylla*, Fort Pierre and Bad Lands to Yellowstone.

Monarda aristata, Nutt. Sandhills on Loup fork, August 1st.

Blephilia ciliata, Raf. Bad Lands.

Lophanthus nepetoides, Benth. Council bluffs.

Lophanthus scrophulariaefolius, Benth. Bad Lands.

Lophanthus anisatus, Benth. Yellowstone.

Physostegia Virginiana, Benth. Fort Pierre.

Scutellaria parvula, Michx. Fort Pierre.

Scutellaria galericulata, Linn. Fort Berthold to Fort Union, a smooth and a pubescent form.

Brunella vulgaris, Linn. Loup fork, July 30th.

Brunella officinalis, Linn. Loup fork, July 30th.

Marrubium vulgare, Linn. Council bluffs, &c.

Stachys palustris, Linn. Bad Lands, Yellowstone.

BORAGINACEÆ.

Onosmodium Virginianum, D. C. Prairies from Bellevue to Fort Pierre.

Onosmodium hispidum, Michx. Prairies around Teton river, near Fort Pierre.

Onosmodium molle, Michx. Loup fork, July 24th.

Lithospermum breviflorum, Engl. & Gray. (Plant. Linheim.) Fort Pierre, Bad Lands, Yellowstone. Flowers smaller than in the original Texan specimens, only about one line long; style shorter than corolla; no trace of scales, nuts large, shining, impressed, punctate only on the ventral side. Some forms are decumbent, others erect; these latter resemble in fruit very closely *Lithospermum longiflorum*, which may be distinguished by the more canescent pubescence. The somewhat larger calyx, the rather less turgid nuts, and especially where it has not fallen off, the very long style. Is this plant really distinguishable from *L. angustifolium?*

Lithospermum breviflorum, var. *punctulosum*, Engelmann. Hispidum, caulibus e radice perpendiculari pluribus, erectis foliis linearibus; floribus pseudo-axillaribus minutis; nucibus minoribus undique exsculpto punctulosis. Sandy bottoms about Fort Union at the mouth of the Yellowstone river. The flowers are absolutely identical with those of the last, otherwise the much greater roughness and the curiously punctate nuts would seem to indicate specific difference.

Lithospermum hirtum, Lehm. Council bluffs.

Lithospermum canescens, Lehm. Same place.

Lithospermum longiflorum, Spreng. Council bluffs to Bad Lands.

Lithospermum Mandanense, Nutt. Mouth of Big Sioux river, in May.

Lithospermum angustifolium, Michx. Near mouth of Powder river on Yellowstone.

Mertensia lanceolata, D. C. White river and Bad Lands to Fort Pierre.

Myosotis verna, Nutt. Bad Lands and Fort Pierre.

Echinospermum Lappula, Lehm. Fort Pierre.

Echinospermum patulum, Lehm. From Niobrara and White river to Bad Lands, Fort Pierre, and Yellowstone. More abundant than the last.

Echinospermum strictum, Nees. Fort Pierre.

Eritrichium glomeratum, D. C. Fort Pierre, Bad Lands to the Yellowstone. The young specimens from White river are white canescent, the old ones from Fort Union are very rough and green; the seeds are more or less tubercled, style persistent, much thickened below.

Eritrichium floro-cinereum, Torr. (ined. Fendler plants.) On Platte river near Fort Laramie.

Eritrichium micranthum, Torr. (Fendler, 635.) Niobrara river, August 16th.

Eritrichium suffruticosum, Torr. Fort Laramie, August 13th.

Cynoglossum Morrisoni, D. C. Fort Pierre and White river.

HYDROPHYLLACEÆ.

Hydrophyllum Virginicum, Linn. Council bluffs and higher up on the Shady river banks.

Hydrophyllum appendiculatum, Michx. Fort Pierre.

Hydrophyllum macrophyllum, Nutt. Shady woods as high up the Missouri as mouth of White river, and in White river valley. Most abundant in the carboniferous limestone regions of Council bluffs, April.

Ellisia ambigua, Nutt. Prairies and woods from Fort Leavenworth to the Yellowstone. The larger specimens, have the flowers frequently in naked racemes.

Ellisia Nyctelea, Linn. About old houses and gardens to Big Sioux, and along old roads in prairie dog villages on the Upper Missouri.

Phacelia circinata, Jacq. In Kansas; Dr. Cooper.

POLEMONIACEÆ.

Phlox reptans, Linn. Above Council bluffs.

Phlox pilosa, Linn. Above Council bluffs.

Phlox Hoodii, Hook. Fort Union to Bad Lands.

Phlox divaricata, Linn. Council bluffs and Platte valley.

Collomia linearis, Nutt. Common about Fort Pierre; Fort Union.

Gilia longiflora, Torr. In sandhills of Niobrara river.

Gilia congesta, Hook. White river to Yellowstone.

CONVOLVULACEÆ.

Calystegia sepium, R. Br. Council bluffs to Yellowstone, Loup fork.

Calystegia spithamaea, Pursh. Council bluffs to Fort Pierre.

Convolvulus argentea, Pursh. Bad Lands, Fort Union, and Yellowstone.

Ipomea leptophylla, Torr. I have seen this plant in but one locality along the Missouri; Bear creek near "Bad Lands." But in the sandhills on Loup fork, along the Niobrara, and around Fort Laramie, it is very abundant.

Cuscuta glomerata, Choisy. Abundant on sandy bottoms of Missouri.

Cuscuta Gronovii, Willd. Woodlands on Missouri.

Cuscuta decora, Choisy. Bottoms of Missouri.

SOLANACEÆ.

Solanum heterandrum, Pursh. Fort Pierre to Yellowstone.

Solanum nigrum, Michx. Not rare on the sandy bottoms of Missouri.

Solanum triflorum, Nutt. Very abundant in prairie dog villages on Upper Missouri.

Solanum Carolinense, Linn. Along Missouri to Council bluffs.

Physalis lanceolata, Michx. Sandy bottoms of Missouri to Fort Pierre.

Physalis viscosa, Linn. Sandy bottoms of Missouri to mountains.

Androcera lobata, Nutt. Very abundant about old trading houses, along old roads, and in prairie dog villages on Upper Missouri.

Datura stramonium, Linn. Introduced as high up the Missouri as Council bluffs.

GENTIANACEÆ.

Gentiana alba, Muhl. Fort Union.

Gentiana affinis, Griesb. Black hills, Sept. 21st.

Eustoma Russelianum, G. Don. Around saline lakes in the sandhills of Loup fork and Niobrara. Very abundant. August.

APOCYNACEÆ.

Apocynum cannabinum, Linn. Abundant on low bottoms of Missouri to mountains.

Apocynum androsæmifolium, Linn. Black hills, September 4th.

ASCLEPIADACEÆ.

Asclepias macranthera, Torr. Not rare on the moist prairies of the Upper Missouri, Loup fork, and Platte valley; July 16th.

Asclepias incarnata, Linn. Moist places on the Loup fork and Platte.

Asclepias speciosa, Torr. Fort Pierre, &c.

Asclepias purpurascens, Linn. Council bluffs.

Asclepias pubescens. Forts Pierre and Clark.

Asclepias Meadi, Torr. Loup fork, sandhills.

Asclepias tuberosa, Linn. Mouth of Big Sioux, and in Platte valley.

Asclepias verticillata, Linn. Abundant on prairies, Fort Pierre.

Anantherix viridis, Nutt. Platte valley, Loup fork, July 16th.

Acerates longifolia, Nutt. Common around Fort Pierre.

Acerates angustifolia, Nutt. With preceding.

Acerates viridiflora, Ell. Dwarfed. Loup fork, July 27th.

OLEACEÆ.

Fraxinus Americana, Linn. Generally diffused throughout the Northwest.

ARISTOLOCHIACEÆ.

Asarum Canadense, Linn. Near Council bluffs.

NYCTAGINACEÆ.

Oxybaphus nyctagineus, Sweet. Fort Pierre, &c.

Oxybaphus floribundus, Choisy. Fort Clark.

Oxybaphus hirsutus, Sweet. Yellowstone.

Oxybaphus angustifolius, Sweet, and var. *decumbens*. Fort Pierre to Yellowstone.

Abronia fragrans, Nutt. Yellowstone.

Abronia cycloptera, Gray. Yellowstone.

CHENOPODIACEÆ.

Chenopodium album, Linn. Common all along the Missouri.

Chenopodium glaucum, Linn. Along the Yellowstone.

Chenopodium ambrosioides, Linn. Mouth of Milk river.

Chenopodium urbicum, Linn. Big Muddy, Fort Union.

Atriplex hastata, Linn. Little Rocky Mountain creek.

Cycloloma platyphyllum, Moquin. Laramie mountains, August 24th.

Monolepis Nuttalliana, Moquin. Fort Union.

Monolepis chenopodioides, Moquin. Below Fort Pierre, along Missouri and Yellowstone to Fort Sarpy.

Obione speciosa, Moquin. Bad Lands to Yellowstone.

Obione canescens, Moquin. Throughout the Missouri and Yellowstone region.

Obione argentea, Moquin. Abundant on arid hills near mouth of Yellowstone.

Obione Suckleyana, Torr (in Stevens's Report, P. R. Surveys, in ed. fig. 3), Fort Union

Eurotia lanata, Moq. Bad Lands to Yellowstone, Fort Laramie.

Kochia dioica, Nutt. Fort Pierre to Yellowstone.

Corispermum hyssopifolium, Linn. Yellowstone; hairy variety on sandbars along Missouri, Fort Union, August 15th.

Suæda furticosa, Forsh. Saline places on Yellowstone.

Suæda maritima, Dumort. Milk river.

Chenopodina depressa, Moq. Saline places, Yellowstone.

Salicornia herbacea, Linn. Saline places, Fort Union.

Sarcobatus vermicularis, Nees. This is one of the most abundant shrubs on the Upper Missouri. It makes its first appearance near latitude 44°, and seems to thrive best in the saline clays of the Cretaceous and Tertiary formations. It is sometimes called "grease-wood" by the traders, and is often used for fuel by them on the Yellowstone river, where it grows to the height of ten or twelve feet, with trunks two to three inches in diameter. On the Yellowstone and along the Missouri, it sometimes covers many square miles to the exclusion of other plants.

Schoberia calceoliformis, Moq. Yellowstone.

AMARANTHACEÆ.

Montelia tamariscina, Gray. Sandhills on Loup fork.

Amaranthus albus, Linn. Sandy bottoms and shores of Missouri.

Amaranthus retroflexus? Linn. Bad lands.

Amaranthus hybridus. Fort Union.

Amaranthus blitum. Fort Union.

Frœlichia Floridana, Moq. Sandhills.

POLYGONACEÆ.

Rumex altissimus, Wood. All along the Missouri to Bad Lands.

Rumex maritimus, Linn. Along Missouri and Yellowstone.

Rumex persicarioides, Linn. Sandy bottoms of Missouri.

Rumex venosus, Pursh. Old Ponca village, Loup fork.

Polygonum amphibium, Linn. Low wet places along the Missouri.

Polygonum aviculare, Linn. Council bluffs, along the Missouri.

Polygonum tenue, Michx. Council bluffs to mountains.

Polygonum orientale, Linn. Council bluffs.

Polyyonum Pennsylvanicum, Linn. Bad Lands.

Polygonum persicaria, Linn. Fort Sarpy on the Yellowstone.

Polygonum ramosissimum, Michx. Bad Lands.

Polygonum dumetorum, Linn. Council bluffs.

Polygonum convolvulus, Linn. Black hills.

Polygonum nodosum. Chardon's creek in Blackfoot country.

Eriogonum annuum, Nutt. Yellowstone and Bad Lands.

Eriogonum flavum, Nutt. Bad Lands to Yellowstone.

Eriogonum gnaphaloides, Benth. On arid hills, Fort Union, and Bad Lands.

Eriogonum alatum, Torr. Fort Laramie.

Eriogonum aureum. Shyenne river.

Eriogonum umbellatum, Torr. Laramie mountains.

Eriogonum effusum, Nutt. Platte valley.

Eriogonum Jamesii, Benth. Sandhills.

Eriogonum rotundifolium, Benth. Bad Lands of the Judith.

Eriogonum brevicaule, var. *lyptophyllum*, Torr. Laramie mountains.

Oxyria digyna, Campd. Black hills.

LAURACEÆ.

Benzoin odoriferum, Nees. Woody bottoms along Missouri, below Niobrara.

ELAEAGNACEÆ.

Shepherdia argentea, Nutt. Very abundant from mouth of Big Sioux river to the mountains. It bears a profusion of red, acid fruit, called buffalo berries.

Eleagnus argentea, Pursh. I have seen this shrub in but one locality in Missouri, near Fort Clark, on the high Tertiary hills.

SANTALACEÆ.

Comandra umbellata, Nutt. Fort Pierre and on the Yellowstone.

EUPHORBIACEÆ.

Euphorbia corollata, Linn. Quite common on Missouri to latitude 45°.

Euphorbia marginata, Pursh. Very abundant to mountains.

Euphorbia maculata, Linn. Same as last.

Euphorbia polygonifolia, Linn. Along old roads, Upper Missouri.

Euphorbia dictyosperma, Fisch & Moq. Fort Pierre.

Euphorbia glyptosperma, Engel. Common all over Western plains.

Euphorbia inæquilatera, Souder in Linnea. With the last.

Euphorbia Geyeri, Engel. Near mouth of Powder river, on Yellowstone.

Euphorbia hypericifolia, Linn. Sandhills on Loup fork, also along Missouri.

Euphorbia hexagona, Nutt. Sandhills of Loup fork, Niobrara. Abundant.

Croton muricatum, Nutt. Sandhills.

URTICACEÆ.

Ulmus fulva, Michx. Abundant on the rich bottoms of Missouri to Big Sioux, and ceases to appear at the mouth of Niobrara river.

Ulmus Americana, Linn. Along rivers and streams to mountains.

Celtis occidentalis, Linn. Abundant near to Niobrara river.

Morus rubra, Linn. Very abundant to mouth of Big Sioux; seen sparingly, and of small growth to the mountains.

Urtica gracilis, Ait. Thickets and streams to Niobrara.

Urtica Canadensis, Linn. Same as preceding.

Parietaria Pennsylvanica, Muhl. Missouri and Yellowstone.

Humulus Lupulus, Linn. Most abundant in the Upper Missouri country.

PLATANACEÆ.

Platanus occidentalis, Linn. Abundant on the rich bottoms of Missouri and Kansas; but ceases to appear about one hundred miles above Council bluffs.

JUGLANDACEÆ.

Juglans cinera, Linn. Big Sioux.

Juglans nigra, Linn. Does not extend above latitude 43°.

CUPULIFERÆ.

Quercus tinctoria, Bartram. Council bluffs and Big Sioux.

Quercus rubra, Linn. With preceding.

Quercus macrocarpa, Michx. Extends to mountains.

Quercus obtusiloba, Michx. Bad lands.

Corylus Americana, Walt. Abundant around Council bluffs.

BETULACEÆ.

Betula glandulosa, Michx. Laramie mountains, August 26th.

Alnus ——— ? Black hills.

SALICACEÆ.

Salix longifolia, Muhl. In different forms along Missouri and Yellowstone.

Salix nigra, Marshall. Council bluffs.

Salix ——— ? Fort Pierre.

Salix ——— ? Forks of White river.

Salix ——— ? Fort Pierre, June 18th.

Salix ——— ? Medicine creek.

Populus tremuloides, Michx. Black hills.

Populus monilifera, Ait. A large tree, constituting by far the greater portion of the timber along the valley of the Missouri.

Populus ———. Called in the West "bitter Cottonwood." Makes its first appearance near Fort Laramie. Have never observed it along the Missouri. A few small trees observed near the head of the Shyenne, at the base of Bear Peak.

CONIFERÆ.

Pinus Engelmanni, Torr. On the Yellowstone.

Pinus ponderosa, Douglass. Black hills.

Abies Douglassi. Bad lands of the Judith.

Juniperus Virginiana, Linn. Along Missouri to mountains.

Juniperus communis, Linn. Fort Union.

LIST OF NEBRASKA CARICES.

BY PROF. CHESTER DEWEY.

C. vulpina, Linn. A well-known European species, first found in Ohio in our country some years since, abounds in Nebraska of large size: cannot be confounded with C. stipata, above Fort Pierre.

C. vulpinoidea, Michx.

C. multiflora, Michx. Fort Pierre.

C. stipata, Muhl. Little Sioux River.

C. rosea, Schk. Southern Nebraska.

var. *radiata*, Dew. Southern Nebraska.

C. setacea, Dew. Southern Nebraska.

C. teretiuscula, Good. Southern Nebraska.

C. Muhlenbergi, Schk. Missouri, below Fort Pierre.

C. cephaloidea, Dew. Near Fort Leavenworth.

C. Hookeriana, Dew. Missouri, below Fort Pierre.

C. stenophylla, Wahl. Upper Missouri. Well known in the Tyrol; found also in the Rocky Mountains, and in Nebraska, Dr. Hayden. First published as American also by Dr. Boott.

C. Douglasi, Boott. West of Fort Pierre. From N. W. Coast and Rocky Mountains, first described by Dr. Boott; since found so far south, like *C. Richardsoni* in its wide diffusion.

C. Nuttalli, Dew. Yellowstone river. This species, found by Mr. Nuttall in his botanic explorations on the Rocky Mountains, had escaped my memory, and I gave to the specimens from Nebraska the name of my young friend, Mr. Meek, in Silliman's Journal. Its spikes are closely aggregated into a head; its fruit small, ovate and short-lanceolate, and much shorter and narrower than the broad long-lanceolate scale; culm 3 to 4 inches high, with almost setaceous leaves. These characters separate it from the next preceding species.

C. marcida, Boott. Abundant over Southern Nebraska.

C. cristata, Schw. Little Sioux river.

C. straminea, Willd. Above Fort Pierre.

var. *minor*, Dew. Above Fort Pierre.

C. scirpoides, Schk. Near Fort Leavenworth.

C. mirabilis, Dew. Common.

C. fistucacea, Schk. Missouri, below Fort Pierre.

C. scoparia, Schk. Common over East Nebraska.

C. tenera, Dew. Missouri, below Fort Pierre.

C. leporina, Linn. Credited before to the Arctic Regions, and not very common.

C. petasata, Dew. Upper Missouri, collected first in Arctic America, and is abundant in Nebraska.

C. festiva? Dew. (Too old to decide.) Near Fort Leavenworth.

C. curta, Good. Yellowstone river.

C. obtusata, Lily. Long known in Europe, and found on the Rocky Mountains and in Nebraska.

C. grisea, Walk.

C. laxiflora, Schk. Fort Leavenworth.

C. arctata, Boott. Missouri, near Fort Pierre.

C. Meadi, Dew. In Michigan, and now in Nebraska.

C. eburnea, Boott. Missouri river.

C. Crawei, Dew. Missouri river.

C. Steudeli, Kunth. Missouri river. First found in Ohio.

C. Davisi, Torrey. Yellowstone river.

C. Shortiana, Dew. Kentucky, and in Nebraska.

C. marginata, Muh. Missouri, near Fort Pierre, as figured by Schk.

C. hystricina, Willd. Eagle-nest creek.

C. laxiflora, Lam., not of Schk. *C. anceps*, Schk., and of American authors for years. Near Fort Clark.

C. blanda, Dew. *C. conoidea*, Muh. Near Fort Clark.

C. aristata R., Br. Abundant at the "Bad Lands."

var., *longo-lanceolata*, Dew. The scale as long as and often longer than the fruit, narrow. "Bad Lands."

C. lanuginosa, Michx. On the Yellowstone.

C. riparia, Good. Along the Missouri.

C. vesicaria, Linn. Along the Missouri.

C. lacustris, Willd. Common on the Weters.

C. longirostris, Tor. Along the Missouri.

C. piliformis, Good. Eagle-nest creek.

C. ampullacea, Good. Along the Missouri.

C. monile, Tuckerman. Along the Missouri.

C. utriculata, Boott. Abundant along streams.

C. trichocarpa, Muh. Along the Missouri.

C. lævi-conica, Dew. Along Big Sioux. Staminate spikes 2 or 3, cylindric and slender; pistillate spikes 2, sometimes 3, cylindric, erect, oblong, subdensi-flowered, leafy-bracteate, the lowest short pedunculate and vaginate; stigmas three; fruit long-conic, slender and tapering, scarcely inflated at base, bifurcate, and oblique at the orifice, smooth and obsoletely striate, as long or a little longer than the ovate and lanceolate scale; culm tall and slender. (American Journal of Science, Vol. XXIV, p. 47, Second Series.) The smooth and slender conic fruit and scale remove this plant from *C. trichocarpa*.

C. acuta, Linn. Eagle-nest creek.

C. vulgaris? Fries. Eagle-nest creek.

C. stricta, Lam. Eagle-nest creek.

C. strior, Dew. Eagle-nest creek.

C. recta, Boott. Near Fort Pierre. Discovered by the English Exploring Expedition in Arctic America, and described by Dr. Boott.

C. Nebraskensis, Dew. Near Fort Pierre. Staminate spikes two, oblong and near, the lower small and sessile; pistillate spikes two to four, oblong, short-cylindric, densely flowered, the upper often staminate at their apex and sessile, the lower short-pedunculate, all with leafy bracts; fruit with two stigmas, convex, obovate or elliptic, short-pointed above, and tapering at the base, a little shorter than ovate and acute, or lanceolate scale; stem about a foot and a half high, sharp-triquetrous edges, and smooth, leafy towards the base. (American Journal, Vol. XVIII, p. 102, Second Series.)

C. Haydenii, Dew. Near Fort Pierre, and at Eagle-nest creek. Staminate spike single, sometimes two, cylindric, the lower sessile, and sometimes with flowers at the base; pistillate spikes three to five, long-cylindric, erect, graceful or slender, 2 to 3 inches long; base flowered, especially at the lower part of the spikes, one or more staminate at the apex, sessile except the lowest; fruit, *distigmatic*, elliptic, convex, short-beaked, and entire at the orifice, about half the length of the scale, which is lanceolate, black, white line on the back, culm 2 to 3 feet high, rather slender, leafy at the base.*

* When Sprengel printed his Systema Vegetabilium, Vol. III, in 1826, it contained 267 species of Carex, all the Reed-grasses or sedges then known to him,—a very host of species of one genus. Since that time the number has increased to 800 or more. Perhaps 350 of these have been found in North America, and about 250, to speak in general terms, have been found in the United States, east of the Mississippi. The above Catalogue contains more than 50 species, collected in Nebraska Territory, most of which are spread over a wide extent of our country, so prolific in vegetable life. C. D.

NOTE.

The foregoing Report was written, for the most part, over three years since, and contains a condensed statement of the geological information concerning the Upper Missouri which had been secured up to that time. It may be regarded as a report of progress, and will be followed by the more complete and more matured results of the Expedition of 1859 and '60, under Capt. Wm. F. Raynolds, which are now in an advanced stage of preparation. The cost of publication has rendered it necessary to omit the illustrative sections, and many other details, which would have added materially to the value of the work.

A detailed account of the geology of the White River group, Loup River beds, and the Judith River deposits, has been omitted, on account of the intention of the author to visit those localities again at no distant day, and to make a thorough exploration of them.

The Map accompanying the memoir is reduced from the military map of Nebraska and Dakota, by Lieut. G. K. Warren, T. E. Many of the details of the topography have been omitted.

It remains now for the author to acknowledge his indebtedness to several gentlemen who have aided him during the progress of the Report. To Lieut. G. K. Warren, under whose direction, as commander of the Expeditions, the greater portion of the information was obtained, the writer is indebted for every facility and assistance that could be afforded, consistent with the public service. The memoir itself bears ample evidence of the kind aid and counsel, ever freely given, by my friend and associate, Mr. F. B. Meek. Messrs. Baird, Cope, Gill, Lea, and Binney revised the Catalogues in their respective departments. Dr. Engelmann and Prof. Dewey prepared the Catalogue of Plants. Dr. J. S. Newberry furnished some valuable information for the Map in regard to Southern Kansas.

To the Smithsonian Institution, and to its distinguished Secretary, Prof. Henry, the writer, during all his investigations in regard to the geology and natural history of the Upper Missouri, is indebted for the use of rooms, books, and every facility essential to the successful prosecution of his labors.

ERRATA.

Page 14, last line of second paragraph, for "*Meycochœrus*" read, "*Merychochœrus.*"

Page 16, fourth line from bottom, for "La Pule" read "La Prele."

Page 18, fifth line from top, for "above" read "preceding."

Page 36, sixth line from top, for "Juya-kara Peak" read "Inya-kara Peak."

Page 68, second line from bottom, for "will" read "shall."

Page 69, for "*Ammonites alpinianus*" read "*Ammonites Galpinianus.*"

Page 94, for "*Corbula matriformis*" read "*Corbula mactriformis.*"

Page 116, first line of second paragraph, for "appears" read "appear."

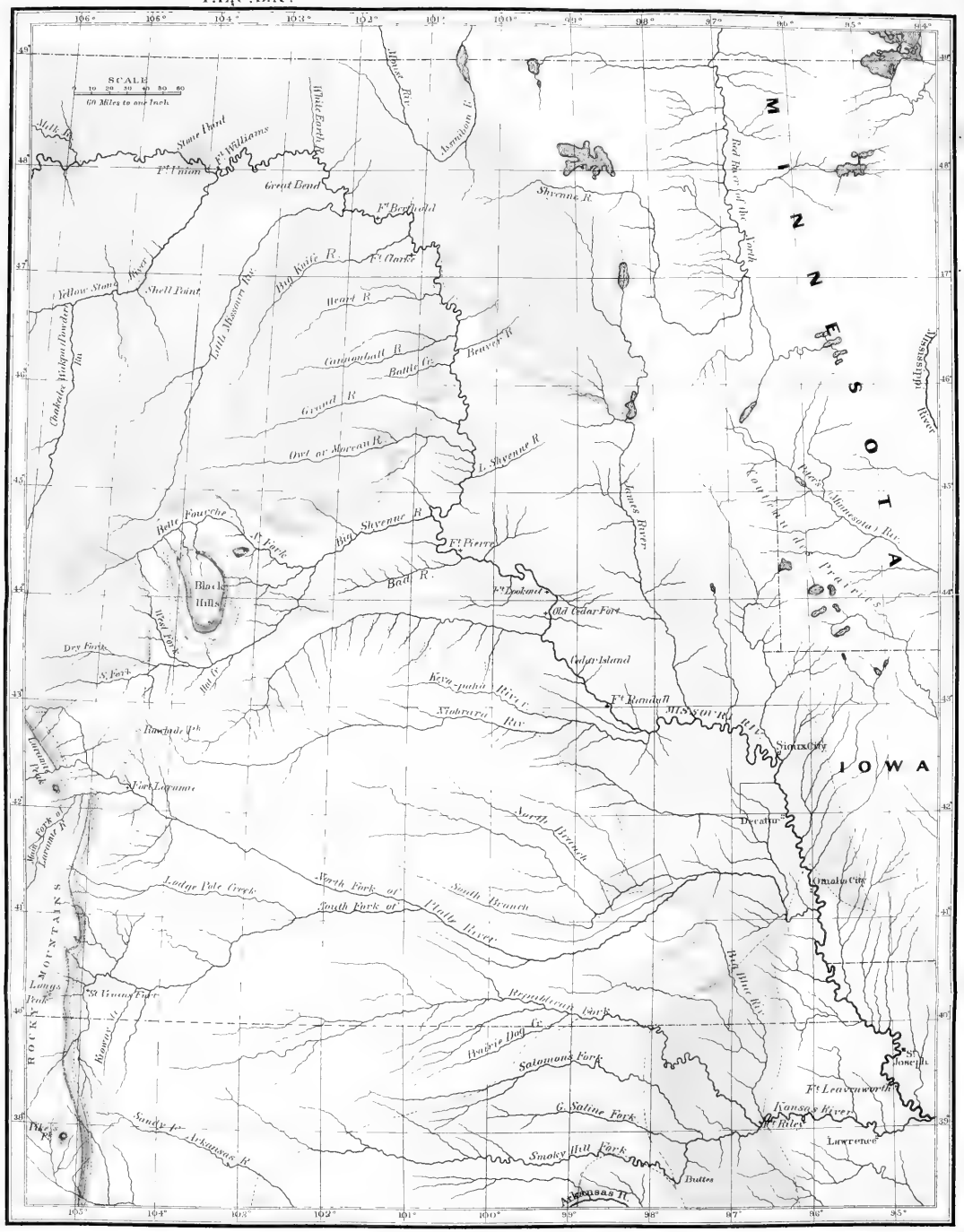
INDEX.

OUTLINE REDUCTION OF THE

MAP OF KANSAS, NEBRASKA AND DACOTA.

TOPOGRAPHY BY LIEUT. G.K.WARREN, T.E.U.S.A.

GEOLOGY BY Dr F.V.HAYDEN.



Azoic & Granite | Lower Silurian | Carboniferous | Permian | Red deposits Jurassic | Jurassic | Cretaceous | Lignit. Tertiary | White River Tertiary

ARTICLE II.

EXPERIMENTS AND OBSERVATIONS UPON THE CIRCULATION IN THE SNAPPING TURTLE (CHELONURA SERPENTINA), WITH ESPECIAL REFERENCE TO THE PRESSURE OF THE BLOOD IN THE ARTERIES AND VEINS.

By S. Weir Mitchell, M.D.,
Lecturer on Physiology.

Read October 18th, 1861.*

Since the experiments of Hales in 1731, and the later and more accurate researches of Poiseuille, a number of observers have studied the blood-pressures in various vertebrate animals, among which may be mentioned the horse, dog, sheep, cat, rabbit, and bird. So far as I can discover, the only observations of this nature upon cold-blooded vertebrata were made by Volkmann, who experimented upon frogs and fresh-water fishes. No other similar examination of blood-pressures appears to have been made, and up to the present date no one has studied the subject in connection with reptiles of any kind.

The object of this memoir is to exhibit the results of a series of researches upon the blood-pressure in one of the most vigorous members of this class, the *Chelonura serpentina*, and thus to fill an important gap in our knowledge of hæmometry. The reptile in question is admirably suited for this purpose. It is strong, active, singularly tenacious of life, and may be procured easily of any weight up to twenty-five or thirty pounds. Inhabiting the waters of many of the streams and mill-dams in the Middle States, it may be readily had in excellent condition during the spring and summer, and for all purposes of physiological and toxicological research, may be made use of whenever it is desirable to replace the frog by an animal of greater bulk and superior tenacity of life.

The Snapping Turtles used in the following researches were brought from Havre de Grace on the Susquehanna river, and from the lower part of the State of Delaware, care being taken that only such were employed as had been captured by hand (dug out of the mud), rather than such as had been taken by the hook and line.

As I have alluded to the great strength and tenacious vitality of these creatures, it may be well to make some brief statement of a more distinct nature as to the extent to which they are endowed with these qualities.

A Snapper weighing twenty-seven and a half pounds was fastened by its tail to a ring,

* Published in April, 1862.

and the blunt hook of a spring scale was caught in the upper jaw, the other end of the scale being also secured to the table. During this time the Turtle's head was held extended. When it was released the animal drew it briskly into the cover of the shell, thus pulling on the scale until the index-point marked fifty-seven pounds as the force of the pull made by the retracted neck. Nearly equal vigor was manifested by others of the same species, and all were so active that by extending the head and using their powerful tails they were able to right themselves with ease, when placed on their backs, a position in which the Green Turtle becomes altogether powerless.

The length of life in the separated head of the Snapper, and its power to bite long after being removed from the rest of the body, is very well known, but the astonishing resistance of the animal to one of our most active poisons is a still better test of its great and enduring vital power. So remarkable indeed was this, that I have studied it with some care, and described it at length in a separate paper. At present it will suffice to relate a single experiment illustrating the point in question.

Assuming M. Bernard's experiments* as a basis, if a Snapper weighing twenty-six pounds were a warm-blooded creature, it would be killed by the injection into its veins of about one-tenth of a grain of woorara. On several occasions I have injected into the jugular veins of Turtles weighing from twenty to twenty-seven pounds, thirty times this amount. The animal became motionless within five minutes, but soon began to recover, and at the close of twenty-four hours was, in several instances, as well as ever. As the heart's action is not primarily checked by this poison, which acts only on the motor nerves, it is gradually eliminated, and after some hours the power to move the respiratory muscles returning, the Turtle gradually recovers all its usual activity; the limit of endurance being the length of time during which the reptile can exist without renewing its supply of oxygen. I have occasionally seen Turtles weighing two or three pounds, so poisoned with woorara as to remain motionless and without the least reflex movement during three days, after which life and action gradually but completely returned.

It will thus be seen that for strength and tenacity of life, the Snapper is well suited to exhibit a type of reptilian blood-pressures.

The following points were made the subjects of study:

1st. The arterial pressure.

2d. The force of the heart's contraction.

3d. The effect of inspiration and expiration on the arterial pressure.

4th. The influence of muscular motion on the arterial blood-pressure.

5th. The blood-pressure in the central and distal ends of divided veins.

6th. The effect of muscular exertion on the venous pressures.

* Sur les substances toxiques, etc. Paris, 1857, p. 335.

The instrument used in the following experiments was the hæmometer of Magendie, as modified by M. Bernard.* The blood was kept fluid by filling the caoutchouc tube of the instrument with a saturated solution of carbonate of soda, which was found to displace two millimetres of mercury in the registering tube. Accordingly a reduction to this extent from the record of blood-pressure has been made in each instance. Any further description of an instrument so well known to physiologists would be altogether unnecessary.

EXPERIMENT.—Turtle weighing twenty-two pounds, from Delaware. Temperature of air 73° F. Present, Messrs. Keene, Stone, and Cantrell. The Turtle having been properly secured so as not to impede the circulation or respiration, a tube was placed in the left femoral artery and connected with the caoutchouc tube† of the hæmometer, when the following record was obtained after a few minutes' repose:

TIME.	PRESSURE. Minimum.	Maximum.	REMARKS.
4.41 P. M.	30 M.M.	40 M.M.	Pulse 28 to the minute.
4.42	35	45	Respiratory act.
4.44	33	43	
4.46	33	45	Slight respiration.
4.47	30	38	
4.49	36	43	Respiratory act.
4.50½	32	40	
4.52½	27	37	After respiration.
4.53	33	42	Cleaned tube, no clot in it.
4.56	29	38	
4.57	28	37	When violent movements took place, during which the pulse became too irregular for notation. The extremes reached, were
	23	49	
4.57½	26	35	No clot in tube.
4.58	27	37	
	28	37	
	25	33	
	30	40	A full respiratory act.
5.6	28	37	After respiratory act.
	30	42	
5.12 to 5.15	27	37	
	29	37	Pulse 28. During respiration and violent motion, the limits were
	29	43	
During several minutes,	29	36	Steady pulse.

June 18th, 1861. Present, Messrs. Keene, Stone, and Cantrell.

EXPERIMENT No. 2.—Temperature 71° F. Snapping Turtle. Weight twenty-two

* Leçons sur les Propriétés Physiologiques et les Altérations Pathologiques des Liquides de l'Organism, par M. Cl. Bernard.—T. I, p. 167. Paris, 1859.

† This tube was so thick as to withstand perfectly the dilating force thus brought against it.

pounds. The left carotid artery was isolated without loss of blood, a tube secured in the opening, and the following record obtained:

TIME.	PRESSURE. Minimum.	Maximum.	REMARKS.
6.3½	37 M.M.	47 M.M.	
6.6	35	44	
6.6½	35	44	
6.10	35	44	
6.11	36	47	Respiratory act.
6.18	32	38	
6.18½	30	37	
6.26	33	41	Tube cleaned. Minute loose clot in artery.
6.29	36	46	
6.29½	41	53	Respiratory act.
6.32½	36	46	
	49	59	After violent movement and repeated respiration.
	32	43	Steady and regular.

The above observations are given in full, as an example of the mode of conducting the experiments. In every case, the extreme pressures were noted; but no complete record was kept of the influence of every respiratory act or muscular movement. Very little trouble was given by the clotting of the blood in the vessel or tubes, and even when clots did form, they were so loose in texture as scarcely to interfere with the registration of pressure.

In the experiments of Poiseuille, Volkmann, and Vierordt, the mean between the extremes of the rise and fall was given as the standard of arterial blood-pressure, and the instrument used was some form of Poiseuille's hæmadynamometer. M. Bernard has since shown that the hæmometer of Magendie, which he terms the cardiometer, is a better instrument for exhibiting the changes of circulation with rapidity and exactness, and that, moreover, its registration gives higher numbers for the pressures than the older instrument. Having made use of the same apparatus in my own researches, I have preferred to follow M. Bernard's method of notation, which may be easily explained in a few sentences.

This distinguished observer states that when the cardiometer is connected with the artery of an animal the mercury rises to a varying height, which he calls the arterial pressure, believing it to be due, in part at least, to the elasticity and vital contractility of the arterial walls. Each pulse of the heart elevates the column of mercury to a certain point above this, whence again it falls during the diastole of the ventricles. The excess of mercury thus lifted he takes to represent the power of the heart's systole. Both of the numbers thus obtained may vary with the individual and with the respiratory and other movements of the body. M. Bernard holds the view that the arterial tension is not due alone to the injecting power of the heart, and that certain agents, which alter the heart-force, do not diminish the arterial tension, whilst other substances which plainly

lessen the arterial tension, do not alter the power of the central propelling organ. Most physiologists are of opinion that the intersystolic pressure is indirectly, but alone due to the action of the heart, the arteries only restoring to the blood, so to speak, the excess of power employed in their distension, during the contraction of the cardiac pump. Thus, if in the case of a warm-blooded mammal, the mercury of the manometer should rise to 100 m.m., and at each heart-pulse leap to 120 m.m., falling during the diastole again to 100 m.m., M. Bernard would describe the arterial pressure as represented by the weight of a column of mercury of a 100 m.m., and would estimate the heart-force at 20 m.m., M. Poiseuille, on the other hand, would give the average, or 110 m.m., as representing the circulatory pressure.

Further research is needed before this question can be settled, and as the difference is merely one of mode of statement, I have preferred to follow M. Bernard's method of notation, without feeling pledged to the correctness of the views upon which its practice is founded.

The following results were obtained from observation of the pressure of the blood in the carotid arteries of eight Snapping Turtles, every possible precaution being taken to prevent loss of blood or injury to nerves and veins while insulating the artery. The numbers here given are those which were noted when the Turtle was in repose and not breathing. As the respiratory acts occurred at intervals of from one to three minutes, observations were easily obtained during these periods of repose.

No. 1. Snapping Turtle. Weight 23 lbs. Temp. of air 71° F. Pulse 25. The tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.	DIFFERENCE.
	35 M.M.	45 M.M.	10 M.M.
	35	44	9
	35	44	9
	32	38	6
	30	37	7
	32	43	11
Mean,	33.2	41.8	8.6

No. 2. Snapping Turtle. Weight 20 lbs. Temp. 72° F. Pulse 29. The tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.	DIFFERENCE.
	39 M.M.	48 M.M.	9 M.M.
	41	53	12
	41	53	12
	38	47	9
	39	47	8
	39	50	11
	33	47	14
	37	44	7
Mean,	38.4	48.6	10 2

No. 3. Snapping Turtle. Weight 26½ lbs. Temp. of air 76° F. Pulse 31. The tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.	DIFFERENCE.
	29 M.M.	42 M.M.	13 M.M.
	29	43	14
	29	38	9
	28	38	10
	26	37	11
	22	33	11
	20	30	10
	24	34	10
	23	32	9
	29	39	10
	24	34	10
Mean,	25.7	36.3	10.6

No. 4. Snapping Turtle. Weight 24½ lbs. Temp. of air 72° F. Pulse 27. The tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.		DIFFERENCE.
	33 M.M.	49 M.M.		16 M.M.
	34	51		17
	33	49		16
	31	46		15
	30	47		17
	33	51		18
	31	46		15
	34	47		13
	33	45		12
	34	47	Pulse 32.	13
	33	43		10
Mean,	32.6	47.3		14.7

No. 5. Snapping Turtle. Weight 21 lbs. Temp. of air 77° F. Pulse 40. A tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.	DIFFERENCE.
	34 M.M.	47 M.M.	13 M.M.
	33	50	17
	42	58	16
	36	49	13
	37	49	12
	41	53	12
	42	51	9
	37	51	14
Mean,	37.7	51	13.3

No. 6. Snapping Turtle. Weight 20 lbs. Temp. 79° F. Pulse 36. The tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.	DIFFERENCE.
	40 M M.	56 M.M.	16 M.M.
	37	50	13
	37	50	13
	37	52	15
	37	52	15
Mean,	37.6	52	14.4

No. 7. Snapping Turtle. Weight 19½ lbs. Temp. of air 74° F. Pulse 30. The tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.	DIFFERENCE.
	30 M.M.	39 M.M.	9 M.M.
	36	47	11
	29	40	11
	31	41	10
	31	41	10
	32	43	11
Mean,	31.5	41.8	10.3

No. 8. Snapping Turtle. Weight 19½ lbs. Temp. of air 74° F. Pulse 30. The tube was placed in the left carotid:

	MINIMUM.	MAXIMUM.	DIFFERENCE.
	39 M.M.	45 M.M.	6 M.M.
	39	44	5
	35	45	10
	30	41	11
	30	39	9
	35	44	9
	31	40	9
Mean,	34.1	42.5	8.4

Upon comparing the above records, it will be seen that the mean of the minimum pressures is 33.8; that of the maximum 45.1; and that of the difference 11.3. The first number, therefore, represents the average height of a column of mercury sustained by the arteries during the diastole of the heart, the average effect of the systole being to lift the column 11.3 m.m. higher. The statements in regard to the blood-pressures in mammals vary so much that it is not easy to find a standard of comparison with those of chelonians; but, assuming M. Bernard's observations to be correct, we find that the minimum of pressure in the arteries is nearly the same in mammals of all sizes, being about

110 m m. in the horse.
103 m.m. in the dog.
95 m.m. in the rabbit.

The rise caused by the heart-beat bears, however, a greater relation to the size of the animal, and is noted in the above animals as 65, 12, and 5 respectively. The minimum pressure in the artery of the Snapping Turtle is, therefore, about one-third that in the

artery of a mammal, or as 33.3 to 110, 103 or 95, according to the animal chosen for comparison.

The force of the heart-act in the Turtle elevates the column, on an average, 11 m.m., which is about the pressure observed in a dog of middle size when tranquil, and when the respirations do not prevent accurate observation of the influence of single pulsations, as is commonly the case.

Upon reviewing these results, it is hardly possible to escape the conviction that the capillary circulation must for some reason be more easily carried on in the Turtle, or else that in this animal the arteries are more relaxed than in the dog for example, and less contractile than in mammals of like weight. In cold-blooded vertebrates, such as the frog and fresh-water fish, M. Volkmann* found the arterial pressures to vary between 18 m.m. and 84 m.m.

The impulse conveyed to the column of blood during the systole of the heart in the Turtle is somewhat different from that of the mammal. In place of a sudden and abrupt motion, as seen in these latter animals, the mercury moves so slowly that the time of its rise during a systole may be estimated at one second, the period of fall being one second and one-fifth. The rise of the mercury was usually steady and regular; its fall was broken and irregular, so that after falling two-thirds of the distance rapidly, an equal time was occupied in effecting the remaining third of the total descent. The number of heart-pulsations varied in the eight animals examined from 25 to 40. In the individual cases its number was scarcely altered during the whole observation.

The same regularity did not prevail in the circulating current, and, apart from the influence of respiration and muscular motion, it may be seen that the pressure varied from time to time, owing to causes which I was unable to understand.

EFFECT OF INSPIRATION, EXPIRATION, AND MUSCULAR MOTION ON THE ARTERIAL PRESSURES.

Before considering these points it will be proper to make a brief statement as to the mechanism of the respiration in the Snapper. All of the leading authorities on the physiology of chelonian reptiles describe their respiration as effected by an act of deglutition similar to that which occurs in the batrachia.† However this may be in some chelonians, I have arrived at the conclusion that in the Snapper the respiratory movements are entirely effected by abdominal or thoracic organs, and that their type is that of the mammal rather than that of batrachians. If, for example, the Turtle's mouth remains open it breathes as usual, which would be impossible were its respiration effected by an action of swallowing the air or of forcing it into the lung, according to the usual statement.

* Volkmann. Die Hämodynamick.

† Milne Edwards. Leçons sur le Physiologie, etc., Paris, 1858. Tome II., 2d partie, p. 387.

To settle the question more completely I cut the trachea of a Snapper across, and still found that the breathing went on at the ordinary rate. Next, a bent glass tube, two millimetres in width, was adapted to the upper end of the divided trachea and allowed to dip into water. The water rose and fell in the tube about one millimetre only at each respiratory motion, and even this was clearly due to the synchronous reflex movements in the laryngeal muscles, which open and shut the glottis during the act of breathing,—a circumstance which is also observed to take place in higher vertebrates, as Dr. Dalton has well shown.

Lastly, the bent tube was adapted to the lower end of the divided trachea and again dipped in water. At each inspiration the fluid was largely drawn up into the lung and rejected again during the subsequent expiration. It is, therefore, impossible to concede that this type of respiration is any other than that which is seen in mammals, and we must admit at once that the whole respiratory movement is effected in the Snapper as in them by the agency of thoracic and abdominal groups of muscles.

I have, elsewhere, shown more fully the mode in which they effect this end and the part played by the various muscles thus employed.

Respiration occurs in the Snapper about once in a minute in some cases, and often less, as once in two or two and a half minutes in others, while this animal undoubtedly has the power to exist a long time without breathing, when the process would involve inconvenience.

The respiratory process consists first of a full expiration, which is followed at once by a long and very large inspiration, and that again by a short and incomplete expiration, which still leaves the lungs more or less full until the time for the next respiratory movement arrives, when again a long expiratory act begins it.

During the interval between two respiratory acts, a slight pulsatile motion is visible in the space between the two limbs and the carapax and plastron. This movement appeared to be respiratory in its character, and to test the correctness of this view I resorted to the following plan.

Experiment.—A large tube was placed in the lower end of the divided trachea, and a smaller glass tube* fitted to it and bent at an angle of 45 degrees. The open end was allowed to rest in water. In the intervals between the full respirations above described, the water rose and fell in the tube about 3 to 4 m.m., and this movement corresponded with the motion observed on the flanks of the animal. It was, however, so small in amount, the tube being only 2 m.m. in width, that it could scarcely be said to effect any change of moment in the mass of air in the lungs, and at the utmost could only be efficient in shifting slightly the air in contact with the various parts of the breathing

* 2 millimetres wide.

surfaces. A very simple experiment finally decided the nature of the motion above described.

Experiment.—A tube having been placed in the right carotid artery was connected with the hæmometer. A second tube, fitted to the cut trachea, was so bent as to be allowed to dip just below the surface of a vase of water. On bringing the arterial and tracheal tubes near together, the rise and fall of the fluids in both was found to be exactly synchronous. The pulsatile motion perceived in the flanks and transmitted through the lungs, as shown above, seems, therefore, to be due to the propagated impulses from the neighboring vessels, and, perhaps, in part also from the pulmonary arteries.

During the interval between two respirations the column in the hæmometer tube rose and fell with singular steadiness at times. The long expiration which begins the series of respiratory motions, had no marked effect on the column sustained. The long inspiration which followed caused a small rise in the mercury, and the short incomplete expiration which terminated the series of movements raised it still higher.

The following experiment will serve to exemplify the amount and character of this influence.

Snapper. Weight 19½ lbs. Temp. 70° F. Pulse 33. Tube in the left carotid:

TIME.	MINIMUM.	MAXIMUM.	DIFFERENCE.	RESPIRATORY STATE.
4.10 P. M.	34 M.M.	45 M.M.	11 M.M.	
4.12	34	44	10	Expiration.
	36	46	10	Inspiration.
	40	51	11	Short expiration.
4.14½	33	40	7	Expiration.
	33	41	8	Inspiration.
	39	49	10	Short expiration.

In mammals it is easy to see why active expiration should cause an increased pressure in the arteries, since the thorax is contracted and the belly drawn in so as to exert considerable compression upon the large arteries, and thus to cause an instant rise in the manometric column of mercury attached to an artery. In the Turtle the first respiratory act is a slow one, and the amount of force employed in effecting it but small; whence no marked influence is visible in the arteries. The long inspiration which follows usually increases a little the arterial pressure, although sometimes, where the action of breathing is not energetic, no such effect can be seen. The cause of the slightly increased pressure alluded to above I have been unable to fathom. The short expiration which completes the respiratory series at once raises the arterial pressure. This is, probably, due to the fact that at this time the lung distended with air is favorably situated to exert direct pressure on neighboring vessels, and also to the fact that this final expiratory motion is vigorous and abrupt.

The effect of muscular movement upon the pressure of the blood in the arteries was well marked and interesting. During violent movement the force of the heart remained unaltered, but the whole column of mercury rose, a result which attained to a maximum when the movements were coincident with the long inspiration and the short expiration which terminate each single series of respiratory movements. On such occasions the mercury sometimes rose as high as 70 m.m. and the action of the heart was irregular and unequal in force. Immediately after the movements were over, the mercurial column fell to a much lower point than usual, and then gradually ascended to the normal standard, as illustrated by the following record.

EXPERIMENT.—Snapper. Weight 24½ lbs. Temp. of air 78° F. Tube in left carotid. Not all the respiratory acts were here noted:

TIME.	MINIMUM.	MAXIMUM.	
4.45	33 M.M.	49 M.M.	
4.47	34	51	
4.48	33	49	
	20	50	During violent struggles the heart acting irregularly.
4.55	31	46	Pulse 27.
5.06	33	51	Free movement.
5.11	31	46	
5.13	15	70	Prolonged movements and active respirations, during which this rise took place.
	31	46	
5.21	34	47	Movement.
5.27	27	33	
5.28	31	40	Movement very violent.
5.29	10	18	
5.34	32	44	
5.34½	33	45	Pulse 28.

VENOUS BLOOD-PRESSURES.

The arrangement of the veins of the neck in the Snapper favor peculiarly an examination of the blood-pressures, since they are so large and numerous that an interruption of the current in one of them does not at all interfere with the general flow of blood towards the heart.

Both carotids are accompanied by one large internal jugular vein, and sometimes by two. The external jugular is also very large, and the œsophagus is surrounded by a plexus of anastomosing veins of large dimensions. At the back of the neck there are also one or two dorsal veins of considerable size.

EXPERIMENT.—Turtle. Weight 20 lbs. The tube was placed in the distal end of the internal jugular vein, when the mercury rose to 6 m.m. and was seen to pulsate feebly, the column rising about ⅓ m.m. at each heart-pulse. Violent motion raised the column to 11

m.m. in one case and to 14 m.m. in another. Pulse 29. The carotid artery at this time exhibited a pressure of from 41 to 53 m.m.

Experiment.—Turtle. Weight 20 lbs. The tube having been placed in the distal end of the vessel, the column rose to 5 m.m. Slight pulsation of $\frac{1}{3}$ to $\frac{1}{2}$ m.m. During muscular action it rose to 28 m.m. Pulse 36. The tube was next placed in the cardiac end of the cut vein, when it rose to 3 m.m. and pulsated about $1\frac{1}{2}$ m.m. Similar results were obtained upon further experiment. When the tube was placed in the distal end of a large vein, the average height of column of mercury supported was 6.7 m.m. In the cardiac end of the same veins the average was 3 m.m. In all cases muscular motion elevated the column from 11 to 30 m.m.

It will be seen above that a pulsation of feeble character took place even when the distal end of the vein was examined. This singular phenomenon appears to be a normal occurrence in the larger veins of the neck. In those of the limbs it was scarcely perceptible, but in the neck it was always visible, and was well marked in the great veins, and best of all in the external jugular. At first I supposed it to be due to the pulsation of neighboring arteries, or to the transmission through anastomotic channels of the pulse which is noticed when the lower or cardiac end of a vein is the subject of study. The first of these possibilities is negatived by the fact that the pulsation was still seen where the vein chosen was remote from any large artery, which is the case with the external jugular vein. The second is disposed of by making use of the dorsal vein or external jugular far up in the neck, and where it is thus remote from large communicating branches.

The pulsation referred to is, in all probability, due to the propagation of the heart-force through the capillary system into the veins. The venous pulse which was observed in the cardiac end of the veins of the neck, was not visible in the veins of the limbs. It was due, no doubt, to the pulsatile action of the walls of the vena cava, so well described by Alison.

Muscular movements, as in other animals, increased the venous pressure considerably. The influence of the respiratory acts on the venous circulation was imperfectly studied, owing to a failure of proper material, and is, therefore, reserved for future study.

ARTICLE III.

CONTRIBUTIONS TO THE ETHNOGRAPHY AND PHILOLOGY OF THE INDIAN TRIBES OF THE MISSOURI VALLEY.

BY F. V. HAYDEN, M.D.

CHAPTER I.

INTRODUCTION.

THE materials which compose the following chapters have been accumulated since the summer of 1855, and I now for the first time venture to present them for publication. They are named "Contributions," because they by no means exhaust the subjects treated, and also because they convey but little more than a glimpse of the beauty and fulness of the various Indian languages spoken in the Northwest. No opportunity will be left unimproved in the future to verify or add to the materials already secured, although no effort has been spared to render the present memoir as accurate as possible. A very full *Grammar and Dictionary of the Dakota Language* has been published by the Smithsonian Institution, which it is but just to pronounce the most important contribution to Indian Philology ever made in this country. To this work I am very much indebted for many valuable suggestions during the latter part of my researches. It can hardly be regarded as necessary to perform an equally laborious task for all the native languages of our continent, neither could it be done except by intelligent missionaries, who have spent their lives with the Indians, and acquired a great degree of familiarity with their modes of expression. With the Dakotas, who occupy so vast an area of our Northwestern country, educated missionaries have resided many years, and have become able to converse with fluency in their own tongue, but this can be said with regard to very few of the Northwestern tribes. In the spring of 1860, some Lutheran missionaries attempted to establish a mission school and farm in the Crow district, near the eastern base of the Big Horn Mountains, but they had been in that country but a few months before the principal man of the enterprise, Rev. Mr. Brauninger, was killed by a roving war party of Dakotas, and thus the attempt to civilize the Crows was abandoned. Among the Blackfeet, at the present time, are some Catholic priests, who are laboring to instruct the youth in the English language, but as yet nothing has been done toward acquiring a knowledge of the native tongue. No permanent mission station has ever been established among the Assi-

niboins, Minnitarees, Mandans, Arickares, Shyennes, Arapohos, or Dakotas of the Missouri, and with the exception of the latter, only brief vocabularies of the languages spoken by these nations have been published.

The tribes enumerated in this work have been separated into four distinct groups, and it is believed that a more careful study and comparison of their different dialects will only tend to confirm this division.

I. Knisteneaux, or Crees,
II. Blackfeet,
III. Shyennes,
} Algonkin Group, A.

IV. Arapohos,
V. Atsinas,
} Arapoho Group, B.

VI. Pawnees,
VII. Arikaras,
} Pawnee Group, C.

VIII. Dakotas,
IX. Assiniboins,
X. Crows,
XI. Minnitarees,
XII. Mandans,
XIII. Omahas,
XIV. Iowas,
} Dakota Group, D.

Belonging to the last group are the Ponkas, Otos, Missourias, Kansas, Osages, Inapaw, Winnibagos, whose languages have not yet been studied to any extent.

I am well aware how incomplete these Contributions are, and would not at this time suffer their publication, did I not believe that there is contained in them much useful information which ought to be given to the world in advance of a more elaborate work. In stating the definitions of many of the words, I have often used the peculiar idioms of those Far-Western men, which they have derived from long intercourse with the Indians, and an acquaintance with their peculiar modes of expression.

In obtaining words from the native Indian, the object is not to labor with any preconceived opinion in regard to their meaning or their grammatical structure, to which the mind of the Indian must bend in giving his replies, but to let him answer freely, and then by a variety of cross questions, arrive at an approximation to the truth. It has often been a matter of much surprise to me, how much of the grammatical structure of a language may be obtained from a wholly uneducated but intelligent native by judicious management. I have found it of great advantage to enlist the aid of the chiefs and leading men in my labors, from the fact that they, in almost all cases, take great pride in being regarded as

the censors of the purity with which their language is spoken. They have not unfrequently told me that all the words obtained from certain of the more common men of the tribe were useless, inasmuch as they did not speak their own language correctly. Among all the tribes with which I have been acquainted, physical and mental superiority have always taken the lead in the affairs of the nation, without regard to birth, and this is a result growing out of the nature of their nomadic and precarious life. Life to them is, to a great extent, a struggle for existence, and therefore the position of an Indian in his tribe is an almost certain index of his mental status. For this reason, in securing information or in acquiring the language of a tribe, it will be found most advantageous to consult only the chiefs and leading men, and this is the course that I have endeavored to pursue in collecting the materials for this memoir. Whenever I have been obliged to accept the aid of women or ordinary men, I have always submitted the results to a chief to be verified or rejected.

In these preliminary papers, the orthography employed by Mr. Riggs and Professor Turner in the Dakota Grammar and Dictionary published by the Smithsonian Institution, has been adopted in part. It is to be hoped that the Smithsonian Institution, which takes the deepest interest in all researches relating to the aboriginal inhabitants of our country, will recommend some uniform system, and reduce all the Indian languages to a single standard of pronunciation. In the following vocabularies, the consonants are used with their common English sounds, when it could be done, and this is understood when not expressly mentioned.

a is sounded as in ah, father; when followed by a consonant, ā* is used, otherwise it is short, as a in fat.

e has the sound of a in face, or e in they; short when followed by a consonant, as in met.

i, as in marine; i short as in pin.

o, as in note, or short o as in got.

u as oo in food; short as in hut.

ai has the sound of i in line.

au, as in now, how.

ć has the aspirated sound of ch in chin, church.

g always the hard sound, as in go, give.

h represents a strong guttural sound, like that of ch in the Gaelic word *Loch*, or the German *ich*; also resembling the Arabic kha.

ŋ denotes the nasal sound, similar to the French *n* in *bon*, or the English *n* in *drink*.

ks has the sound of *x* in *maxim*.

ts is sounded as in Betsy.

wh as in what, when.

ź has the sound of *z* in *azure* or *s* in *measure*.

* As a rule, a vowel is long when ending a syllable, and short when followed by a consonant. The exceptions to this rule are indicated thus: ā, long; ă, short.

Any additional sounds that may be needed, will be noted at the bottom of the page in succeeding portions of the work.

All the syllables are separated, for greater distinctness, and accented when it could be done with certainty. The accents of some words are omitted, from neglect when securing them in the country, and I dare not trust to my memory to remedy the matter now.

In all my researches in the Northwest, most important aid has been rendered to me by the different members of the American Fur Company. All their stores of knowledge of Indian life, language, and character, which they had acquired by years of intercourse with the different tribes, were freely imparted to me, only a small portion of which is given in the following pages. I am especially indebted to Mr. Alexander Culbertson, the well-known agent of the American Fur Company, who has spent thirty years of his life among the wild tribes of the Northwest, and speaks several of their languages with great ease. To Mr. Andrew Dawson, Superintendent of Fort Benton, Mr. Charles E. Galpin, of Fort Pierre, and E. T. Denig, of Fort Union, I am under great obligations for assistance freely granted at all times.

To the Smithsonian Institution, and to Professor Henry, I am indebted for rooms, books, and every facility that could be afforded, for the prosecution of my studies. The memoir was written within the walls of the Institution.

I wish also to acknowledge my indebtedness to the veteran author, Mr. H. R. Schoolcraft, for the loan of many rare books, and especially to Col. Peter Force for the free use of rare books in his magnificent collection, without access to which the present work would have been far less complete.

The Indian reservations were located on the map under the direction of Hon. Wm. P. Dole, the Commissioner of Indian Affairs. This map represents the latest information of that Bureau.

CHAPTER II.

ETHNOGRAPHICAL HISTORY.

I. Knisteneaux, or Crees.

A GREAT difficulty occurs at the commencement of the history of any of these prairie tribes, in discovering anything of ancient date of a reliable character. Among people where no written records exist, and whose only method of preserving their national history is oral tradition, this, after being handed down through several generations, becomes usually so confused and fabulous by the additions and fanciful embellishments of the several narrators,

that but little can be extracted worthy to be considered of historical value. In regard to the Crees, all appears obscure farther back than 1760.* At any rate, events said to have happened prior to that period, narrated by different persons, differ so materially as to be unworthy of note. From 1760 down to the present time the history of the Crees can be traced with a fair degree of certainty.

So much has already been written in regard to the literature of the Cree language with its cognate Algonkin dialects, that I have thought it unnecessary to present a resumé of its bibliography at this time, but pass on at once to a sketch of this nation, condensed from information obtained from some of the most intelligent men of the tribe. I will, however, call attention to a rare work† on the Cree language, by Mr. Joseph Howse, which I regard as a very important contribution to Indian philology. It appears to be a thorough and philosophical analysis of the grammatical structure of the language, with copious illustrations from the Chippewa, which show the close affinity of the former to the latter.

The Cree nation was originally a portion of the Chippewa, as the similarity of language proves; and even now they are so mingled with the latter people as with difficulty to be considered a distinct tribe, further than a slight difference in language and their local position. Their name for the tribe in their own tongue is Né-a-ya-óg, which means, "those who speak the same tongue." They are called by the Assiniboins Shi-é-ya, by the Dakotas Shi-e-á-la, and by other neighboring tribes, as the Crows, Blackfeet, and Gros Ventres of the prairie, nearly the same, only differing a little in the pronunciation of the word Shi-é-ya. This word has very nearly the same signification among the Assiniboins as that of Né-a-ya-óg among the Crees. Indeed, the word Shi-é-ya being Assiniboin, could have no other meaning as a derivation among other tribes, except as an appellation of the native Cree, received from the Dakotas and Assiniboins where it originated.

Prior to the year 1700 the Crees say they inhabited a district much farther north than at present. Their range at that time was along the borders of Slave and Athabasca Lakes,

* Since writing the above I have had access to an interesting collection of voyages, recently published under the editorial direction of Mr. J. G. Shea, of New York. In the account of Le Sueur's voyage up the Mississippi, 1699–1700, there is an allusion to the Crees and Assiniboins. Le Sueur seems to have been an Indian trader, and had erected a trading post on the Mankato, or Blue Earth River, a tributary of the St. Peter's River. These tribes are called by him Christinaux and Assinipoils, and he remarks that they "live above the fort on the east, more than eighty leagues up the Mississippi." We are thus able to ascertain very nearly the geographical location of these two tribes more than one hundred and sixty years ago. The Indians themselves, however, can give no definite information of their movements farther back than the period mentioned in the text.

† A Grammar of the Cree Language, with which is combined an analysis of the Chippewa Dialect, by Joseph Howse, Esq., F.R.G.S., twenty years a resident in Prince Rupert's Land, in the service of the Hon. Hudson's Bay Company; pp. 324. London, 1844.

tains. They generally trade their robes on the Missouri, and carry their fine furs, wolf-skins, dried meat, and tallow, to the traders of the Hudson's Bay Company.

Besides the foregoing there are about two hundred lodges more who are not formed into bands, but scattered along Lac de L'Isle Croix, and live by hunting reindeer, moose, fish, and wild fowl. They live in skin tents in the summer, but sometimes build log and bark huts in winter, and seldom more than one cabin is found in the same place. These are the poorest of the Crees.

These Indians are of the same opinion in common with other prairie tribes, that the Master of Life, the sun, intended all hunting lands for the sole use and occupation of the Indians, but do not think that he parcelled out distinct portions to each nation. Land, as far as their knowledge of it extends, is regarded as a common whole, which any nation (of Indians) has a right to live upon and retain possession of as large a district as they are able to defend. Their right to their own territory is in accordance with this general principle, contending that they have been forced back from superior grounds to those they now inhabit, and consequently they have the right in turn to dislodge others for their own welfare. All nations feel and acknowledge the expediency and necessity for seeking a subsistence any and everywhere, as long as they are dependent solely on the chase for support; hence the deadly struggles on the borders of each to prevent approximation. Each nation feels that it must make war to prevent others from settling near them, and the result is, that between each nation there is a large extent of neutral ground, seldom if ever traversed except by passing war parties.

The Crees do not seem to possess any idea, either by tradition or otherwise, from which we should judge that whites or any other civilized race had occupied the country previous to the Indians; nor have they any knowledge of quadrupeds foreign to America, or differing from those now hunted and domesticated by them. They have no name for the entire continent, neither are they aware of its extent. They will mention American lands, English possessions, &c., but these terms only extend to those parts with which they are acquainted.

None of these wild tribes have any just idea of the form of the earth, nor of its natural divisions into seas, continents, islands, &c. The earth they regard as a great plain, and they know that there are many lakes that contain islands, for the Cree country abounds with them. All the nations are well enough acquainted with the natural features of their own lands, but they have no idea of the extent of other territories. They have no notion of the earth as a whole, and the ocean they think is a large lake, from the description given them by the voyageurs of that body of water. Indeed, they have a very faint idea of any lands or waters outside of the boundaries of the district over which they range; and when the voyageurs, who have been sent out by the Hudson's Bay Company to the

sea-coast, describe to them the great ocean, they are not generally disposed to place any confidence in their statements.

The principal river in the Cree country is the Riviere du Parc, which takes its rise from springs in the Rocky Mountains, east of the Missouri, and, running in a northeastern direction, empties into Lake Winnipeg. In regard to its length, our informant, who has frequently travelled from its mouth to its source, states it to be sixty-seven days' travel up in Mackinaw boats; which, averaging eighteen miles per day, would make its whole navigable length about twelve hundred miles, and from the head of navigation to its source one hundred and fifty miles farther. Small boats are taken up this river at all times, when it is free from ice, to within one hundred and fifty miles of its source, where the Hudson's Bay Company have erected a fort, called "Fort Cassepierre," at which point goods are landed for the trade with the Crees in that vicinity. This is the highest post on the river, though there are other trading-houses at different points lower down the stream. The middle portion of this river is about three hundred yards in width; at its mouth it is nearly a mile wide, and generally from ten to fifteen feet deep, and contains one hundred and sixty rapids and falls of various heights; at all of which the goods which are taken up, or the packs of furs which pass down, are carried round by portage. On this account, all packages are made to weigh ninety-five pounds each. These are transported on the backs of voyageurs around the falls, and at large or dangerous rapids the boats are also carried, otherwise they are let gently down after having been unloaded.

Assiniboin River takes its rise on the north side of the Woody Mountains, and after running through several lakes, empties into Lake Winnipeg. Its entire length, including the lakes, is estimated at four hundred miles. There are no rapids in this river, and it is navigable throughout with Mackinaw boats, in which the goods and peltries of the Hudson's Bay Company are carried to and from the different posts along its banks.

Red River is a branch of the Assiniboin River, emptying into it about forty miles above the junction of the latter with Lake Winnipeg. This is called "The Fork," and on it is established one of the largest forts belonging to the Hudson's Bay Company. The principal branch of Red River rises in Red Lake; it is from fifty to sixty yards wide, with a deep and slow current. The other branch heads in Lake Traverse, and joins the first about one hundred miles above the mouth of Pembina River. This is called the "Plat Cote" branch, and is not navigable for boats except during spring freshets, and even then it is attended with much danger.

Pembina River rises in Turtle Mountain, its sources soon forming a lake; after which it passes through four other lakes. It is a long, crooked stream, full of rapids, and is not navigable by any craft larger than a bark canoe. It empties into Red River, eighty miles

above the junction of that river with the Assiniboin. Nine miles above its mouth, and spread along its banks, is a settlement of the Cree half-breeds.

La Riviere aux Souris owes its origin to springs rising in the Coteau de Prairie, or "divide." This is a long and very crooked stream; so much so, we are informed, that after seven days' travel down it, a distance of not more than thirty miles in a right line has been gained. Its length is estimated at six hundred miles; it is from one hundred to one hundred and fifty yards wide, but very shallow, and is not navigable except when swollen by the spring thaws, when it may be descended with loaded Mackinaws. It joins Assiniboin River ninety miles above the mouth of Red River, and there are five trading-posts of the Hudson's Bay Company along its banks.

These are the principal rivers in the Cree country, although there are many others running into these. Along the banks of all, and indeed throughout the whole of this immense district, are a great many springs of excellent water, many of which might afford power for machinery; others are impregnated with salt, from which an abundant supply of this article is obtained by the inhabitants. Nearly all the lakes of the larger class are deep enough for good-sized steamers, and are stocked with incredible quantities of fish and wild fowl.

All the territory claimed by the Crees, with the exception of a few square miles near its southeastern boundary, is beyond the parallel of 49°, and consequently in the English possessions. The general surface of the country is what may be called rolling, though there are extensive level prairies in some parts of it. As a whole it forms a gradual descent from the base of the Rocky Mountains east of the Missouri, including several mountains of smaller note, which give rise to the rivers and creeks running in every direction through the interior, thus cutting up the surface. At the base of many of the hills and mountains from which springs flow are found marshes, or what are called by the inhabitants "muskegs," of various extent, from a few miles to a day's travel across, depending upon the supply of water by which they are fed, or whether the surface of the ground is level and without any indented outlet. These swamps are, for the most part, covered with tall, strong grass, growing very thick, six or eight feet high, sometimes with rushes intermingled; but the ground, though humid, is not miry, and can in most places be traversed on horseback. All the rivers are well wooded along their margins, and groves occur on the adjoining bluffs and for some distance beyond, often extending several miles when the soil is moist and adapted to the growth of trees. On the level plains patches of timber are to be met with, being more numerous and larger in the northern than in any other part of the district. Although there is more prairie than woodland, it is by no means a barren country, and differs materially in quality of soil and appearance from the Dakota lands, which continue on the east and southeast, where all the plains are dry and unfruitful.

The soil of the whole Cree district is of a good quality, as has been shown by the agriculturists settled along the banks of Red and Pembina Rivers, and the small band of Cree Indians who raise maize and other vegetables at Tinder Mountain. The half-breed settlement on Red River contains at this time over eight thousand persons, many of whom cultivate the soil and raise live stock to a great extent; but owing to their locality being subject to inundations from Red River during the spring thaws, sweeping off their stock and other property, many of them have been induced to remove and settle on Pembina River within the American boundary, where they live by hunting and cultivating small portions of land. Many more of these people will follow, and soon a village will spring up in this place. There are at the present time a Catholic and a Presbyterian church, schools, grist and saw mills, several stores and trading establishments, &c.; indeed, the country presents many advantages which cannot fail to attract the attention of numerous restless emigrants in search of lands flowing with milk and honey. Wheat, oats, barley, and corn grow well; also potatoes and all kinds of garden vegetables are produced abundantly; but as yet, no market being created for their surplus grain and stock, the attention of settlers on the American side has not been directed to farming on a large scale. Those on the English side dispose of a portion of their produce and stock to the Hudson's Bay Company, who ship it to other parts farther north, where breadstuffs are not raised; but only a small part is thus disposed of, the greater portion being consumed among themselves.

It is believed that the whole Cree district is arable and fit for tilling or grazing purposes, both prairie and woodland, though the latter perhaps is not as good as the low prairie, on which the spontaneous grasses of the most nutritious character grow. But the small rushes, common to the low grounds in this country, are said to be more nutritious for animals than any kind of grain. A very poor horse will become fat if allowed to range among them twenty-five or thirty days. Notwithstanding the high latitude of the country the domestic animals are not usually housed during the severe cold winter; and those left to run at large are said to be invariably in a better condition in the spring than those kept in stables and fed on grain. Indeed, this region is known to be one of the best grazing and grain-growing countries in North America. Horned cattle and horses are raised in numbers, with a few sheep, but the latter are not much attended to.

Where springs and streams are not convenient, water can be obtained by digging from ten to thirty feet in level places, and the water thus found is free from any mineral taste, and suitable for culinary purposes. The portions designated as marshes are not useless or irreclaimable; on the contrary, the waters accumulating in these swamps could be collected and made subservient to agricultural uses. The soil in these places is of the richest quality, and would soon repay the expense of draining did the increase of population demand it.

In most places where the country is thickly timbered, the ground underneath is covered with moss and bushes, but with little or no grass. It is only in such places and for that reason that the soil sustains any damage from the burning of the prairies. The moss forming the sod being reduced to a cinder by the fire, the roots are destroyed, and several years must elapse before another coat of green adorns it; which, like the preceding, is destined to be burned when the fire passes in that direction. The vegetation of the prairie, however, receives no such damage; being deeply rooted the stalk only burns, and the heat is swept away by the winds; the roots retain their life; and soon after another crop springs up more lively and thick than the former, owing to the surface being cleared, by the fires, of the decayed vegetation. The large timber, however, suffers greatly on these occasions. Vast forests are thus completely destroyed, and centuries will be required to replace them.

The burning of the prairies is not a custom resorted to by the Indians to facilitate hunting, as is generally supposed. Nothing offends them more, and their laws among themselves are very severe in this matter, as it effectually destroys their hunting by driving away all game, and renders the country unfit for pasturage during the winter when burnt late in the fall. These fires originate, for the most part, in the carelessness of hunters and travellers, by the malice of individuals, or passing war parties of other nations. Sometimes these fires are very destructive, and sweep over districts hundreds of miles in extent; on other occasions they are extinguished by rains, snow, or the wind blowing in the contrary direction. A few years ago a large party of half-breeds camped near a frozen swamp and let their horses loose among the tall grass. Their camp fires by some accident communicated with the grass, and the wind being very strong, all their horses, to the number of two hundred or more, were surrounded by the flames and destroyed.

The climate may be considered variable, not in regard to heat and cold, but moisture and dryness. Cold and constant northeast winds in the spring bring rain, and from May until the last of June may be called the wet season. In July and August there are no settled rains for days at a time, but violent thunderstorms come from the west and southwest, which in a few hours swell the smaller streams to the top of the banks, though seldom to overflowing. Red River, being the grand reservoir of all the others, is the only stream that inundates the surrounding country. This inundation is seldom caused by rain, but only by the sudden thawing of the deep snow in the spring. Severe thunderstorms seldom last more than an hour or two, when the clouds pass away, the sun shines out fiercely, and soon the prairies are as dry as before. These storms are of frequent occurrence in the summer months, but the autumn is dry and pleasant. About the tenth of September the evenings and mornings become cool and frost appears. October ushers in the winter with snow; the rivers close up about the first of November, and remain

frozen over until the middle of April. The snow is deep, the months of December, January, and February very cold, the thermometer seldom rising above zero, but ranging from that point to 40° below it. During the winter north and northwest winds prevail, which always bring snow, while at that season south and west winds indicate clear weather. All travelling and hunting by the Indians and half-breeds in the winter season is done with dog-sleds, horses not being able to wade through the deep snow. The hunters travel about on snow-shoes. The snow is never permitted when it falls to lie quietly on the ground, but is soon drifted by the winds into immense banks, and every valley and ravine becomes almost impassable. Thus large areas are left bare, exposing the grass to the animals. The climate is quite healthy; fevers are almost unknown, but exposure for a long time in the cold air brings on catarrh, rheumatism, quinsy, and diseases of the lungs.

On one of the branches of Red River, and near the new settlement of Pembina, is a small lake, from which two hundred barrels of salt have been obtained by the inhabitants. Lignite occurs quite abundantly over a large portion of the Cree country, and may at some future period be employed for the purposes of fuel.

These immense plains and forests are alike silent as to their having been anciently the abode of any race differing from the present occupants. Nothing is ever seen that would indicate that this country had ever been the residence of other nations of savages, much less any works of human industry of civilized beings at a remote period. The only objects worthy of attention in this respect, are the mounds of earth raised by the interments of the dead; but these have been formed within the last century, and are known to contain the bodies of those Indians who died of the small-pox in 1776 or 1777.

Hundreds of bodies have been buried beneath them, or, rather, the mounds are composed of many separate burials, alongside, and over each other; and persons are yet living who contributed to their structure, by interring their parents or friends. During the second visitation of this disease in 1838, several smaller depositories of this kind were made by the Crees; a comparatively small number of people having died at that time. These facts may throw light upon the origin of these formations in other parts of our country. Ordinarily, Indians are not buried in heaps; because, when not visited by severe maladies, they rove in quest of game, are a healthy people, and seldom more than one or two graves are seen near any one of their transient encampments; and even where large villages have wintered, the interments do not often exceed ten or a dozen. But, when a pestilence like the small-pox prevails, attacking the whole nation at the same time, they are disabled from travel, obliged to remain stationary until the disease abates, and thus hundreds are consigned to the same burial-ground. In former years, the Indians could not excavate to a sufficient depth, for want of proper tools; and, therefore, as each

individual died, he was interred near the surface, and the spot covered with a large quantity of rock and earth to protect the body from birds and beasts of prey. The disposition of all the Indians is to have their bodies deposited near those of their deceased relatives, or even on the top of them; and this would, in process of time, build up a large mound-like cemetery, which would also become covered with grass and trees. It is evident, that the extensive mounds found in different parts of this continent, have been formed in this manner, where large villages of Indians have been located for years, and selected a spot for their burial-ground. The size of these mounds is not remarkable, since they took, perhaps, a century or more to accumulate; but where a numerous population existed, and were swept off by pestilence, each interment contributing its quantity of earth and rock, a mound of large size would soon appear. As it has always been the custom, and still is, for the North American tribes to bury with their dead, if a man, his implements of war, if a woman, her domestic utensils, these depositories, if carefully opened, and the different strata of burial examined, would exhibit the different stages of advancement, providing they had made any. The only change we now know anything of, is the abandonment of their stone implements, as soon as they were able to obtain metallic ones. The Cree nation always inter their dead, in preference to placing them in the forks of trees, as is the custom with other tribes. The grave is scarcely of sufficient depth to cover the body, which, with the envelopes and implements, is of considerable bulk. A pile of earth and stone is raised, around and on the top, in the form of a cone, fifteen to twenty feet in circumference, and two to four feet in height. The arms and utensils used by this tribe in ancient times, were, pots of stone; arrow-points, spear-heads, hatchets, and other edged tools, of flint; knives of the buffalo hump rib; fish-hooks from sturgeon-bones, and awls from the bones of the moose; the fibres of the root of the pine tree, called by them wa-táh, was, and is still to some extent, used as twine for sewing together their bark canoes; a kind of thread is also made out of a weed called shá-a-sup, which they use for making nets; stone axes and mallets were made of various sizes, and used for different household purposes; spoons, called mi-kwói-yis, and pans, were made out of the horns of the moose. Of all these, there yet remain a few, but most of them have been laid aside for more convenient ones obtained from the traders. Bone fish-hooks and awls, with lines made of the aforementioned root and plant, are still in use, and preferred by the Indians to those of European manufacture. They also cling with great tenacity to the horn spoon; perhaps for the reason that it is larger, and better adapted to serve their capacious stomachs. The process of manipulation by which these things were wrought, was chiselling one stone with another, until the flint knife was made, with which other instruments were formed; a process, doubtless, long and tedious. The art is now lost, or, at least, discontinued; but we are informed that it was not con-

fined to separate individuals, as a trade: each warrior or hunter made his own arms, or employed some old man to make them, whose time was of less value.

The amount of their knowledge on this subject is small, even less than that of the surrounding nations. They believe the earth to be an extensive territory of the same figure as their own country, intersected by rivers, mountains, lakes, and surrounded by oceans, the whole forming, as it were, a flat circle, joined around the edge to the sky, which is a solid mass of blue earth supporting the entire universe. The sun, they say, is a body of light and heat, and is the great master of life, gives life, heat, and light to all things, and is a country inhabited by departed spirits. The moon also they regard as another world, but not a hot body, deriving its light from the sun and stars, and in the sun and moon is located the Indian paradise. Stars are small lights attached as by a cord to the sky, and are not supposed to be other worlds, but ornaments and luminaries to the upper regions. The Milky Way is called the "Chief's Road," and is thought to be a line of division separating the sky into two portions. This was done by their Great Spirit Chief for purposes set forth in their traditions, which are too lengthy to be recounted here. The sun is thought to go round the earth, which remains stationary; and every effort proves abortive to make them understand that the apparent motion arises from the diurnal revolution of the earth. When the sun is in an eclipse, they say a portion of the material is burned up,—dead,—and this is what is meant by a "dead sun," but they entertain no superstitious fears of eclipses being the forerunners of great evil, as other nations, and look upon the extinction of a part as the natural result of a burning body, which, as it exists of itself, has the power to burn again. The North Star is called the stationary star; the Ursa Major, the "tail of stars." These are all that have particular names attached. They are also aware of the revolution of the Ursa Major around the Polar Star, and can tell the watches of night by this with tolerable certainty. The Aurora Borealis is called the "dance of the dead," who are supposed to be enjoying themselves in these regions. Meteors are stars falling out of their places by having the cords burned that attach them to the sky, and go out as they fall. In regard to comets they have no clear idea, neither have they any superstitious belief attending their appearance. Indeed, these Indians do not seem to fear any natural phenomena except thunder, which is supposed to be the screaming and flapping of the wings of a large bird, which they represent on their lodges as a great eagle. Wind is supposed to be produced by its flying, and flashes of lightning are caused by the light of the sun reflected from its white and golden plumage, and when strokes of lightning are felt, they are thunder-stones cast down by this bird. All storms, tornadoes, &c., are caused by its wrath, and fair winds, calm and fine weather, are regarded as tokens of its good humor.

The Crees have no word signifying a year, neither is there any stated number of days

forming that period of time. Each month begins when the new moon appears, and ends when it is no more seen. During the few days the moon is invisible, it is said to be dead. They cannot even tell how many days make a moon, and all subdivisions of time are denoted by the different phases of the moon, as "moon on the increase" (first quarter), "half moon" (second quarter), "more than half round" (third quarter), "full or round moon," "decreasing moon," "small moon," "dead moon." Every moon is named after some fruit ripening, or other invariable annual occurrence, as follows, beginning with the spring some time in March, when the snow begins to disappear.

1. Is-ke-pé-sim, Duck month or moon.
2. A-ik-e-pé-sim, Frog moon.
3. Sha-ke-pá-ka-o-pe-sim, Leaf moon.
4. Mé-ne-sa-ká-tik-tuk-e, Service berries ripe.
5. Nó-tse-hi-kó-pe-sim, Buffalo-rutting moon.
6. Wa-ke-pa-kán-o-pe-sim, Leaves-changing moon.
7. Wa-sta-o-pa-ká wo-pe-sim, Leaves entirely changed.
8. Pin-pa-kán-o-pe-sim, Leaves off the trees.
9. Na-ma-pí-ne-kais, Fish-catching moon.
10. Pa-pa-ke-sé-kin-e kis, Moon that strikes the earth cold.
11. Kis-ki-pá-pa-ke-ték-e-num, Coldest moon.
12. Ka-mák-e-tuh-pe-sim, Ice-thawing moon.
13. Me-ke-sŭ'-e-pe-sim, Eagles-seen (moon).

The other divisions of time are as follows:

Pa tak-páw, Daybreak.
Pe-e-sim-sák-o-ta-o, Sunrise.
A-pe-ták-e-se-káu-o, Midday.
Pa-kis-e-mó, Sunset.
Wa-wa-ne-ná-kwon, Twilight.
Te-pis-ká-o, Night.
A-pis-tá-te-ka-o, Midnight.
We-pá-a-sta-o, Moonlight.

Any intermediate period of time would be indicated by pointing with the finger to the place where the sun is supposed to be at the time referred to.

One, pe-ét.
Two, ni-shí.
Three, ni-sto.
Four, na-ó.
Five, ne-un-ún.
Six, gú-to-wa-shik.
Seven, ta-pa-kó.
Eight, a-ha-ná-ne-o.
Nine, ka-ká-we-ta-tat.
Ten, mí-ta-tat.
Eleven, pa-á-kwo-sap.
Twelve, né-so-sap.
Thirteen, nísh-to-sap.
Fourteen, ná-o-sap.
Fifteen, ne-á-nun-sap.
Sixteen, gu-to-wá-she-sap.
Seventeen, me-tá-ta-ta-ŭ-wá-ta-pá-ko.
Eighteen, me-ta-ta-ta-ŭ-wa-a-a-na-ne-o.
Nineteen, me-tá-ta-ta-u-wá-ka-ka-we-tá-tat.
Twenty, né-si-ta-no.
Twenty-one, ne-sì-ta-nó-pe-ét-o-sap.
Thirty, ni-stó-mi-ta-nó.
Forty, na-mí-ta-no.
Fifty, ne-a-nú-na-mí-ta-no.
Sixty, gu-to-wá-se-mí-ta-no.
Seventy, ta-pa-o-ta-te-mí-ta-no.
Eighty, a-a-ná-na-tá-ta-mí-ta-no.
Ninety, ka-ká-me-ta-tá-te-mí-ta-no.
One hundred, me-tá-ta-sta-mí-ta-no.
Five hundred, ne-a-nún-me-tá-tas-ta-mi-tá-no.
One thousand, kis-éé-me-ta-tás-ta-mi-tá-no.
Ten thousand, me-tá-tat-kis-ée-me-tá-tas-ta-mi-tá-no.

It is seen by the above that the Crees, as is the case with most if not all the Northwest tribes, count entirely by tens. From one to ten, each number has a separate name, but afterwards the word "sap" is added, meaning beyond, as, pa-á-kwo-sap, one beyond ten,= eleven; né-so-sap, two beyond ten,=twelve; and so on until we reach seventeen, when the name for ten and for seven is mentioned, as me-tá-ta-ta-ū-wá-ta-pá-ko. This continues to twenty, which becomes né-si-ta-no, and to it are prefixed the names of the first ten numerals in their order up to thirty, &c. They can count with correctness as far as a thousand, but farther than this, they have very little occasion to enumerate. Should it become necessary, they use small sticks as counters, to prevent confusion. They have no number representing a million, nor do they add, subtract, or divide, without the use of counters to aid their memory.

It is customary with the traders of the Hudson's Bay Company to facilitate hunting by crediting the Indians for small amounts, varying according to the character of the person credited. Indians that have always paid their debts promptly can get advances to the amount of thirty plues, while others of more doubtful reputation are credited with an amount sufficiently large to enable them to hunt, say five to ten plues. A plue is an imaginary amount placed on the value of skins, equal to about two shillings sterling. The proceeds of all hunts are reckoned in plues, and the prices of merchandise are fixed to conform to this standard, by which the Indians are able to calculate with certainty how much of each article they will receive for furs collected. The traders' accounts are kept in the following manner.

Dr.	*Le Chef du Tonnérre. Cree.*		Cr.
1854.		1855.	
Aug. To 6 feet blue cloth, ...	8 plues.	March. By 10 muskrat skins, ...	2 plues.
" 1 foot scarlet cloth, . . .	3 "	" 1 large beaver skin, . . .	4 "
" 1 white blanket, 3 points, .	7 "	" 1 small " " . . .	2 "
" 20 loads ammunition, . . .	1 "	" 10 otter skins, average 2 p., .	20 "
" 3 feet N. W. twist tobacco, .	1 "	" 6 cross fox skins, " 4 " .	24 "
" 1 N. W. gun, ...	15 "	" 2 silver " " " 5 " .	10 "
" 1 horse, ...	30 "	" 1 buffalo robe, ...	3 "
	65 "		65 "

Now although a plue has a nominal value of about two shillings sterling, it is not to be inferred that the actual value of that amount of money is paid in merchandise, at prime cost, with expenses of transportation and a fixed per cent. added. All articles of trade are reduced to a standard price, and made proportionally higher or lower as they are necessary or indispensable to the Indians. Care is taken, however, not to rate too high such articles as guns, ammunition, horses, traps, and other things absolutely required for hunting

purposes, for in that case, the Indians not being able to procure them, would fail in their hunts, and the trade thereby suffer. But such articles as tobacco, cloth of gay colors, ornaments, beads, &c., bear very high prices in comparison with their actual cost. Thus we see in the foregoing bill that a Northwest gun, the prime cost of which in England is seldom less than two pounds sterling, sells for fifteen plues, while half a pound of tobacco worth sixpence is sold for one plue.

The Indians themselves keep no accounts either pictorial or otherwise, nor can we learn that any devices are used by them in trade, except that they sometimes aid the memory by notches on a stick, or the memory is refreshed by the trader when they have the means to pay. The Crees sometimes use strokes in successive lines of ten each, until they arrive at the required amount, as

1 1 1 1 1 1 1 1 1 1 . . .	10	
1 1 1 1 1 1 1 1 1 1 . . .	10	34
1 1 1 1 1 1 1 1 1 1 . . .	10	
1 1 1 1	4	

CHAPTER III.

II. Blackfeet.

ETHNOGRAPHICAL HISTORY.

It has usually been understood that the history, traditions, and customs of Indians have been handed down from generation to generation by the principal men of each tribe with a fair degree of certainty by means of oral tales. Each tribe, it is true, has its traditions, which are very numerous, but they are for the most part fabulous; and I have never yet met with an Indian nation that could give its history with any degree of accuracy farther back than one hundred years. Even then it is so mingled with fable that it becomes quite a difficult matter to sift out the truth from so much chaff. It becomes, therefore, a matter of great ethnological interest to place on record as much of the present history of these wild, changing tribes of the prairie, as can be secured of a reliable character. From the different members of the American Fur Company, many of whom are intelligent, well-educated men, I have obtained a large mass of information in regard to the Blackfeet, which I think is reliable, and in a future publication I hope to present it in full.

The Indians usually known under the general name of Blackfeet, are the Piegans, Blood Indians, Blackfeet, and the Gros Ventres of the prairie, or, as they are sometimes called, Fall Indians. Of these, the first three speak the same language, and are sprung from the same stock, but the last belong to quite a different group, and use a dialect entirely distinct from the others. The Gros Ventres, or, as they call themselves, Atsinas, are a branch

of the Arapohos, who, from some feud, so common among savages, became separated from their friends, crossed the Rocky Mountains and associated themselves with the Blackfeet. When this division took place is not now correctly known, though it seems not to have been at a very remote period, most probably within the last century. When treating of that group in a subsequent sketch, I shall present all the information that can be obtained in regard to that matter. Their former hunting grounds, as indeed those of the whole Blackfoot nation, were on the tributaries of the Saskatchewan, in which region buffalo and other game abounded. Previous to the opening of the trade with these Indians on the Upper Missouri, they sold all their skins to the Hudson's Bay Company, seldom visiting the headwaters of the Missouri, except for marauding purposes.

The Blood Indians range through the district along Maria, Teton, and Belly Rivers, inclining west and northwest far into the interior. In this section, wood is more abundant, pasturage excellent, and, consequently, buffalo almost always abound there.

The Blackfeet inhabit a portion of country farther north than the Bloods, extending to the banks of the Saskatchewan, along which they often reside.

They have never altogether abandoned their English friends, and more frequently dispose of their furs to them than to the American traders on the head branches of the Missouri.

The Piegans roam through the Rocky Mountains on the south side of Maria River, on both banks of the Missouri. They often extend their travels as far as St. Mary's Valley, where the Flatheads are stationed, with whom a precarious peace has been in existence for many years back, though often interrupted by the other bands of Blackfeet. They also hunt as far down the Missouri as the Mussel-shell River, and up that stream to the borders of the Crow country.

The three divisions last mentioned constitute the Blackfoot nation proper, whose name has become notorious for their fierce and deadly struggles with all the neighboring tribes, and in former times struck terror to all white men who travelled in any district from the Saskatchewan to the Yellowstone, and from the Yellowstone to the Columbia.

The Blackfeet are such a nomadic people that it is a difficult task to obtain a perfectly accurate statement of their numbers. The following estimate, given in one of the United States Indian agent's reports,* is probably an approximation to the true number:

Bands.	Lodges.	Men.	Women.	Children.	Total.
Blackfeet, ...	150	260	400	540	1200
Bloods, ...	300	500	800	1100	2400
Piegans, ...	460	900	1200	1600	3700
Total, ...	910	1660	2400	3240	7300

* Report of the Commissioner of Indian Affairs, 1858.

In Volume I of the Pacific Railroad Reports, by Gov. I. I. Stevens, Mr. James Doty has given an estimate of the numbers of the Blackfeet, from information obtained under the most favorable circumstances.

Bands.	Lodges.	Population.	Warriors.
The Bloods, ...	350	2450	875
The Blackfeet, ...	250	1750	625
The Piegans, ...	360	2520	900
Total, ...	960	6720	2400

These bands all live in skin tents, like the rest of the prairie tribes, follow the chase for a subsistence, and in former years were famous for their war excursions against neighboring tribes.

The country they inhabit varies in its natural features from the broad plains east of the Missouri to the highlands and undulating hills as we approach the western barrier of the Rocky Mountains. That part of it reaching towards the Saskatchewan is a level plain, many days' travel in extent, and nearly destitute of timber. There is an abundance of good grass, however, and small lakes supply water to the immense herds of buffaloes that are found there in the summer season. These animals seem to prefer the level plains in warm weather, approaching the timbered sections in the fall and winter to obtain the shelter of woods and hills during the severe cold and deep snows of that season. On this account the Indians can provide themselves with food and clothing at all times; for if the buffalo remained in the plains during the winter season, they would not be able to procure fuel, and certain death would ensue from the intense cold and terrible winds that sweep over these broad, naked prairies.

On the south side of the Missouri, up the Mussel-shell, Judith, or any of the streams which take their rise in the mountains in that direction, the face of the country is more broken, hilly, and better timbered. Travelling over this district is quite difficult, on account of the exceeding ruggedness of the surface, called by the Indians and Canadian voyageurs "Bad Lands." Very good grass is found in this portion in many places, and it is a favorite resort for game, on account of the facilities for concealment. Near the mountains there is an abundance of wood, water, and grass, for the wild animals, or for the horses of the Indian and voyageur.

The timber of the several rivers running through the Blackfoot country, is chiefly cottonwood, and on the hilly portions, several kinds of pine and cedar, with a few quaking asps and stinted elms. Along most of the ravines springs up a thick growth of bushes,

such as osier (*Cornus*), rose, and bluewood, with patches of cherry, plum, and service-berry shrubs. On the eastern side of the Missouri, berries are not abundant, but along the base of the mountains, they are very plentiful. Plums and cherries are the most abundant, and are eagerly sought after by the Indians, and regarded as great delicacies. Gooseberries, wild currants, and grain de bœuf can also be found, but not in large quantities. None of the trees bear nuts that can be eaten, and in consequence, the supply of fruit cannot be considered a safe resource, should game become scarce.

The soil of this portion of the western territory is not generally more than three or four inches in depth, and in the "Bad Lands," or more rugged portions, there is comparatively little grass, and the rocks are composed mostly of clays, sands, and sandstones. The valleys and level plains are quite well clothed with the short, curly buffalo grass, and other prairie grasses. None of these grasses grow more than eighteen inches or two feet in height, but they are very nutritious. No great variety of flowers adorns these endless plains, and we look in vain for the beautiful display so often seen along the lower portion of the Missouri. The whole extent of country presents a dreary, desolate aspect, especially when parched up by the hot sun of midsummer, or covered with the deep snow of winter. There is nothing inviting to the eye of the traveller, except, perhaps, the herds of buffalo, some one of whom may furnish him a repast, after he has spent the day traversing the prairie in search of wood and water sufficient to cook his meal.

The climate near the mountains is much milder than that lower down the Missouri; the rivers close later, and open much sooner than at the mouth of the Yellowstone. Leaves put forth from two weeks to a month earlier in the spring, and sometimes the vegetation exhibits the full bloom of spring at the Blackfoot Fort, while the hills around Fort Union are covered with snow, and the trees show no sign of leaves. Snow-storms are not so violent and cold, nor of so long duration, and in the level country, the snow rarely falls more than eighteen inches in depth, but it is soon blown into the ravines, leaving the tops of the hills bare, and the valleys impassable on horseback.

The degree of cold at the Blackfoot trading post is seldom lower than 20° below zero; usually above that point, while at Fort Union, the thermometer ranges from 25° to 40° below zero for three or four weeks at a time. War parties of Assiniboins, going to the Blackfeet from the latter place, have travelled as far as Milk River on snow-shoes, over three feet of snow, and above that point, found the surface scarcely covered. Ducks and geese pass the winter at the foot of the mountains, in springs and streams which are never frozen over. On the summits of the mountains, snow often continues the year round, while that collected on their sides and in the valleys, melts away about the middle of May, which causes the annual rise of the Missouri. It is said by the Indians and voyageurs, that this rise almost invariably occurs about the time when the roses are in bloom.

In the summer of 1855, a treaty was concluded with the Blackfeet, by Commissioners on the part of the United States, having for its object the entire cessation of hostilities between them and neighboring tribes. Other stipulations were made with regard to depredations on white persons, either resident in, or travelling through their country. About $50,000 worth of goods of various kinds were sent to their country by the Government, and distributed among them, and a number of other tribes who were present at the treaty. Since that time, the Blackfeet have become more and more peaceable, and at the present time, they are considered the best disposed Indians in the Northwest. Their head chief has adopted, in part, the costume of the white man, and is setting the example to the remainder of his tribe, of settling down for a portion of the year, and cultivating the soil; and as the game becomes scarce, others will follow.

In regard to the early history of the Blackfoot nation, we know very little, except from brief allusions of various writers, and a few scanty vocabularies. They have always been considered a bloodthirsty, cruel, and treacherous race, a terror to white men as well as Indians. As far as their present condition is concerned, the contrary is the case. There is now no more peaceable, honorable, and prosperous Indian nation in the West than the Blackfeet. The impression in regard to their ferocity was doubtless derived, to a great extent, from the glowing accounts which have been given from time to time of their sanguinary conflicts with the trappers, a class of people, many of whom were scarcely less savage than themselves, and who always gave them ample cause for attacking them, when they found them the weaker party. From my own experience among them, and from information derived from intelligent men, who have spent the greater portion of their lives with them, I am convinced that at the present time, they are among the most peaceable, honorable Indians in the West, and in an intellectual and moral point of view, they take the highest rank among the wild tribes of the plains. They are also more flexible and teachable in their natures, and the head chief, a man who has attained his position by his prowess and success in war, has laid aside the Indian costume, put on that of the white man, located his family permanently on the Government farm, and commenced the cultivation of the soil, thus setting a noble example to his tribe. I have never met with Indians who appeared so susceptible to the influences of civilization as the Blackfeet, providing they are rightly applied. It is true that they have been brave and fond of war, which they have waged with relentless zeal against the Crows, and other hereditary enemies, from time immemorial. Their superior intelligence and energy have rendered them successful against an equal number of whites, and superior numbers of the neighboring tribes, until they became a terror to both. The writer has travelled much in their country, and when within the limits of the district claimed by them, he has felt safe, but

when white men are found by them in their enemies' country, they are regarded as giving aid and comfort to their foes, and are liable to be treated accordingly; at least, this was the case until after the treaty with the United States Government in 1855. Since that time, they have been, for the most part, at peace with all nations.

Very little reliable information has ever yet been given to the world in relation to this tribe, and it is only within a comparatively recent period, that the true affinity of their language was known, some supposing them to speak an independent language; others a remote dialect of the Dakota stock. In the Transactions of the American Ethnological Society, Vol. II, Gallatin proved conclusively that they belonged to the great Algonkin Group. So far as I can ascertain from the books within my reach, I desire to present a brief account of the statements of travellers, who have noticed them, and to allude to the different vocabularies of their language, which have already been given to the world.

So far back as 1789, Mackenzie, in his "General History of the Fur Trade," says: "On the head waters of the South Branch (Saskatchewan), are the Picaneux, to the number of twelve to fifteen hundred men. Next to them, on the same water, are the Blood Indians, of the same nation as the last, to the number of fifty tents, or two hundred and fifty men. From them downwards extend the Blackfeet Indians, of the same nation as the two last tribes; their number may be eight hundred men. Next to them, and who extend to the confluence of the South and North Branch, are the Fall or Big-bellied Indians, who may amount to about six hundred warriors." Again, he says, "The Picaneux, Blackfeet, and Blood Indians are a distinct people, speak a language of their own, and I have reason to think, are travelling northwest, as well as the others just mentioned, nor have I heard of any Indians with whose language that which they speak has any affinity."

Umfreville, in a well-written work, published about 1791, says (on page 200) that the three bands, Blackfeet, Piegan, and Blood Indians, all speak the same language, and have the same laws and customs. They were the most numerous and powerful nation with which he was acquainted. In this work he gives a list of forty-four words of their language, which, so far as I know, was the first ever published of their tongue. He also mentions the occurrence of the small-pox in 1781, which spread generally throughout the Indian country. It proved very destructive, not one in fifty of those attacked surviving, and it seriously injured the trading interests.

In Lewis and Clarke's Journal, quite extended and interesting accounts are given of their intercourse with this tribe, but nothing definite in regard to their former history, and no vocabulary of their language. It would appear that at the time of their visit to the West, in 1804, '5, and '6, these Indians had taken up their abode near the sources of the Missouri.

Brackenridge, in his "Voyage up the Missouri River, in 1811,"* merely alludes to the Blackfeet. "They wander on the heads of the Missouri, Maria River, and along the Rocky Mountains; they are also Sioux. They trade at the same establishments with the Assiniboins, and are at war with the Crow nation. They have been very troublesome to our traders, to whom they have conceived a deadly hatred. Their country the most abundant in beaver and other furs."

Mr. Morse, in 1822, speaks of the Blackfeet as inhabiting the headwaters of the Missouri, of whom very little is known.†

In the Transactions of the American Antiquarian Society, Vol. II, Mr. Gallatin has summed up in the most able manner, all the knowledge that had been previously obtained in regard to the Blackfoot nation, and their language. Mr. Gallatin's memoir was published in 1836, and at that time, he says: "We have as yet no other vocabulary of those two nations (Blackfeet and Gros Ventres of the prairie), and of the Assiniboins, but the scanty one of Umfreville. It is sufficient, however, to show that the Assiniboins are, as they have been uniformly stated, a branch of the Sioux family, and that the languages of the Rapid Indians and of the Blackfeet are distinct from each other, and different from any other known to us."

Again, in 1848,‡ Mr. Gallatin published a second memoir on the American Aboriginal Languages, in which he proves most conclusively the affinity of the Blackfoot language with the Algonkin stock. Out of 180 words of which the vocabulary was composed, 54 have clear affinities. The vocabulary, as well as much information in regard to the Upper Missouri tribes, was furnished to Mr. Gallatin by Mr. Kenneth Mackenzie, an intelligent Scotchman, and for many years one of the principal partners of the American Fur Company, in charge of Fort Union, at the mouth of the Yellowstone.

A vocabulary of the Blackfoot language is published in Vol. VII of the United States Exploring Expedition, Ethnography and Philology, by Horatio Hale, Philadelphia, 1846. From what source Mr. Hale obtained this vocabulary, I could not ascertain.

In a work by George Catlin, "Letters and Notes on the Manners, Customs, and Condition of the North American Indians," London, 1841, 2 vols. 8vo., may be found a very good vocabulary of the language under consideration, and it is remarkable as being the second one ever published of these Indians. Mr. Catlin did not visit the Blackfoot country, however, inasmuch as he did not ascend the Missouri higher than the mouth of the Yellowstone. The Blackfeet not unfrequently visited this post in former times for trading or marauding purposes.

* Journal of a Voyage up the Missouri River, in 1811, by H. M. Brackenridge, Esq. Pittsburg, 1814.

† Report to the Secretary of War on Indian Affairs, by Rev. J. Morse, D.D. New Haven, 1822.

‡ Transactions of the American Ethnological Society, Vol. II. New York, 1848.

But the most reliable information in regard to the Indians of the Upper Missouri is given in that magnificent work of Maximilian, Prince of Wied.* He visited that country in the years 1832, '3, and '4, and spent considerable time among the Blackfeet, under circumstances which were favorable for obtaining an accurate knowledge of them. He also procured a brief but very correct vocabulary.

There is also a vocabulary of the Blackfoot language in the "Proceedings of the Philological Society of London," Vol. IV, 1850, but I was unable to gain access to it.

A good traders' vocabulary was made by J. B. Moncrovie, who was for a long time a trader among the Blackfeet Indians on the Upper Missouri. This is published in Schoolcraft's "Indian Tribes of the United States," Vol. II, pp. 494–505.

A few words, about twenty-three in number, and the Lord's Prayer translated into the Blackfoot language, is given in the latter part of a work entitled, "Oregon Missions, and Travels over the Rocky Mountains, in 1845 and '46, by Father P. J. De Smet, of the Society of Jesus."

The above comprises, as far as I can ascertain, the entire literature of the Blackfoot language, and it will be seen that it consists only of rather brief vocabularies. Nothing of the grammatical structure has ever been secured, and thus my brief sketch may be considered as the first attempt toward a grammar of this language.

An interesting sketch of the Blackfoot nation may be found in Part V of Schoolcraft's great work. The materials were supplied by the late Col. D. D. Mitchell, of St. Louis, Missouri, who spent many years among these Indians, as one of the partners of the American Fur Company. It may be well in this place to discuss the origin and meaning of the names of the different bands of the Blackfeet. Col. Mitchell relates the origin of the term Blackfoot in the following manner. These Indians originally inhabited the region of country drained by the Saskatchewan and its tributaries, and only visited the valley of the Missouri on hunting excursions or marauding expeditions. They became distributed over a wider range of country on account of the claims of two ambitious chiefs, each one of whom desired the sole command of the nation. Thus a separation took place, and the followers of one chief retired southward to the headwaters of the Missouri, where game is plenty and all the luxuries of a savage life are abundant. The remainder continued in the valley of the Saskatchewan, where they roam at the present day, trading, for the most part, with the Hudson's Bay Company. Prior to the separation, however, bloody battles ensued, in one of which the parties fought "three days and three nights. The sun and moon was made red by smoke of the hot blood which flowed through the ravines, and the rocks along the banks of Belly River remain red to this day." The black chief was at length defeated,

* Reise des Prinzen Maximilian zu Wied, Coblentz, 1839–1841. 2 vo's. 4to. Vol. II, pp. 589 *et seq.*; Vol. II, pp. 480–486. There is also an English translation of the narrative in 1 vol. 4to. London, 1843.

and he and his followers retired to the Missouri, where they arrived in the fall, when the prairies are burnt by the autumnal fires. In their travels their moccasins and leggins became blackened by the burnt grass, and in this condition they were first seen by the Crows and other neighboring tribes, who at once gave them the name they now bear. This account undoubtedly forms a part of their mythology, but how much of truth there is in it, it is impossible to determine. So far back as 1789, before any of the nation roamed so far southward as the sources of the Missouri, we know that the same three divisions, bearing the same names as at the present time, constituted the Blackfoot nation. The name is derived from sik-si-nim′, black, and probably at-si-kin′, a shoe or moccasin, which could be easily abbreviated into sik-si-ka′, the name not only for a band or division, but also for the whole tribe.

The name of the second band has been spelled in a variety of ways, as, Kahna, Kaenna, &c.; but as given to me by the best interpreter in the country, and approved by the chief, it is Kai′-e-na, people who counted a plenty of "coups," that is, people who took in war a great many scalps and arms; and this appears to me to be the true interpretation. The meaning given by the Prince of Neuwied is essentially the same. "Before the Blackfeet divided into separate bands, they were encamped in the neighborhood of five or six tents of the Kútonas or the Sarcees, I believe the former. The Siksikai and the Kahna desired to kill the Kútonas; and though the Piekanns declared against it, a part of those Indians attacked the few huts during the night, killed all the inmates, took the scalps, stained their faces and hands with the blood, and then returned. Disputes ensued in consequence of this cruel action; the Indians separated from each other, and the murderers received the name which they have ever since retained. They have always manifested a more sanguinary and predatory character than the others, of whom the Piekanns have always been remarked as the most moderate and humane of this nation."

The name of the third band has also been spelled in a variety of ways, as, Picaneux, Piekan, Piekanns, Piegan, &c. From the best authority, the interpreter before-mentioned gave the name to me as, Pi-kun′-i, people with badly dressed robes.

In the following grammatical sketch and vocabulary, I have presented only an abstract of the materials in my possession, and have made the whole as brief as possible. Farther researches will render much of the information not included in these papers more complete and reliable, and on that account it is omitted.

CHAPTER IV.

REMARKS UPON THE GRAMMATICAL STRUCTURE OF THE BLACKFOOT LANGUAGE.

I. Parts of Speech.

1. The parts of speech are the noun, adjective, adverb, preposition, conjunction, interjection, pronoun, and verb. Of all these, the verb is the most complex, and the most important.

II. Nouns.

2. No change is made in the termination of a noun to indicate its case: this is known by its position in the sentence. In nouns indicating possession, the name of the possessor usually comes first; as, mus-ōp-ski′-o-yis′, a muskrat's lodge.

3. Nouns have two numbers, singular and plural, which are shown by difference of termination. In the Blackfoot language all nouns, with few exceptions, have variable but distinct terminations, indicating the plural number, and a portion possess two plural endings; as, pō′-ksa-ćis, a hammer; plural, po′-ksa-ćīks; second form, po′-ksa-ći-sa′-wa, the word a-ku′-a-wa, meaning "a good many," being incorporated into the noun. Examples:

	Singular.	Plural.	
		1st form.	2d form.
Spring,	mu-tu′,	mu-tu′-isć,*	mu-tu′-a-wa.
Summer,	ni-pu′,	ni-pu′-isć,	ni-pu′-a-wa.
Autumn,	mu-ku′,	mu-ku′-isć,	mu-ku′-a-wa.
Winter,	stu′-yi,	stu′-yisć.	
Star,	ko-ka′-tos,	ko-ka-to′-sīks.	
Antelope,	a-wa′-kos,	a-wa-ko′-sīks.	
Tongue,	ma-tsi-ne′,	ma-tsi-ne′-īks,	ma-tsi-ne′-a-wa.

4. So far as I have yet observed, gender is distinguished by the use of different names; as, stum′-ik, a buffalo bull; ski-ni′, a cow; pu-no-ka′-mi-ta, a horse; ski′-am, a mare.

III. Adjectives.

5. Adjectives usually follow the nouns which they describe; as, mis′-tis-ōh′-o-tōk, petrified wood. But to this rule there are an unusual number of exceptions in the Blackfoot language; as, pi-wah′-o, bad lands, from pi′-wa, rough, rugged, and ah′-o, land; ba-kap′-sa-ko-ma′-pi, a lazy boy.

6. Adjectives have the same numbers as nouns (see Remark 3); as,

* Last syllable pronounced as istch.

	Singular.	Plural.	
		1st form.	2d form.
Good,	aḥ′-si-o,	aḥ′-si-īks,	aḥ′-si-a-wa.
Lazy,	ba-kaps′,	ba-kap′-sīks,	ba-kap′-si-a-wa.
Bad,	ma-kaps′,	ma-kap′-sīks,	ma-kap′-si-a-wa.
Dreadful,	ko-ma′-pi,	ko-ma′-pisć.	
Ugly,	muḥ-si-num′,		muḥ-si-num′-i-a-wa.
Hot,	kris-tu′-yi,	kris-tu′-yisć.	

7. Degrees of comparison in adjectives are not shown by inflection, but their signification is increased or diminished by means of adverbs; as, ki-naï′-aḥ′-si-o, all good; i-tai-maḥ′-si-o, there are none so good; mis-ti-pōks′-aḥ′-si-o, beyond good, the best of all.

8. Adjectives are sometimes formed from nouns by the addition of a syllable; as, ōḥ′-o-tōk, a stone, ōḥ-o-tōk′-sku, stony; mis-tek′, a rock, mis-tek′-sku, rocky. A more thorough knowledge of the language would doubtless multiply these examples.

9. The cardinal numbers are as follows:

One, nis′-i.
Two, na-tōk′.
Three, nōḥ.
Four, ni-su′-i.
Five, ni′-si-to.
Six, na′-au.
Seven, iḥ′-it-siḥ.
Eight, na-nis′-o.
Nine, piḥ-su′-a.
Ten, ki-pu′-a.
Eleven, nit′-si-ko-put′-o.
Twelve, nat′-si-ko-put′-o.
Thirteen, ni′-ko-put′-o.
Fourteen, ni′-si-ko-put′-o.
Fifteen, ni-sit-si′-ko-put′-o.
Sixteen, na-a′-ko-put′-o.
Seventeen, iḥ-it′-si-ko-put′-o.
Eighteen, na-ni′-si-ko-put′-o.
Nineteen, piḥ′-si-ko′-put′-o.
Twenty, na-tsi′-po.
Twenty-one, na-tsi′-po-nit′-si-ko′-put′-o.
Thirty, ni-hip′-o.
Forty, ni-sip′-o.
Fifty, nis-it′-sip-o.
Sixty, na′-ip-o.
Seventy, kit-si′-kip-o.
Eighty, na-na′-sip-o.
Ninety, piḥ′-sip-o.
One hundred, ki-pip′-o.

IV. Adverbs.

10. Adverbs precede the verbs which they qualify, as, ma-tōḥ′-si-po-ksi-po′-at, he came afterwards. The following is a list of the principal adverbs known:

e-sum′-o, a good while.
a-sto-ko′-ki, near by.
na-to′-tsi, so, likewise, in like manner.
ma-tōḥ′-si, afterwards.
ma-to-ko′-tsi, never.
mats-ta′-nis-tsit, again, once more.
a-me′-tōḥs, above.
seḥ′-ta, it may be, perhaps.
ai-sum′-o, long ago.
aḥ-o-tsi′-ma, in exchange.
skna′-to-nis, early, soon in the morning.
a-pin′-o-kōs, to-morrow.

pi-ih'-tsi, far off, at a distance.
nōh, now.
kin'-i, enough.
nun'-u-wa, at last.
nun'-u-wa-po-ksi-po'-at, he came at last.
ai-pis-tskai'-kum-o, a little while ago, lately.
mi-im', over yonder.
kin-i'-nai, there.
u'-no-mai, here.
e-ka'-pa-nis-tsi, after.
spoh'-tsi, above.
a-kai'-im, much, plenty.
sa-nis'-tsi, when, at what time?
tsi-ma', where, in what place?
ća'-ni-sto-tu'-yi, how? how have you done it?
to-tōh'-tsi, on this side.
a-pum'-ōts, on the other side.
pi-na-pōh'-tsi, down, as down the river.
sa-ōh'-tsi, out of doors.
na-kōh'-tsi, a little.
pa-ki-tsi'-ku-im, with great difficulty.
ka-tets', none.
ka-nis'-i, smoothly.
ma-ta'-kai-im, not enough.
is-ći'-ka, more.
ma-tu'-ni, yesterday.
ah-sah'-ta, why?

V. Prepositions.

11. As a general rule, prepositions follow the nouns which they govern, as:

sa-toh'-si, beyond.
pau-ah'-u-i-sa-toh'-si, beyond the ridge.
u-ni'-mai, at.
mu-yis'-u-ni'-mai, at the house or lodge.
pi-sto'-tsi, in.
mu-yis'-pi-sto'-tsi, in the house.
se-to'-ko, through, between.
kai-e'-ksi-se-to'-ko, through a gap or pass.
se-to-ko'-ksin, between or among.
a-pa-toh'-si, behind.
sai-a'-ni-sōts, down.
it-si'-o, in.
sa-ko'-mi-it-si'-o, in the ground.

VI. Conjunctions.

12. Conjunctions are few in number, as:

i-yo'-pi, if.

VII. Interjections.

13.

e-ku'-ta-nis-ći'-wats! is it possible!
at-sto mat'-sa! oh dear!
a-e'! oh! yes! is it so!
at-sto'-ma-ki-ni'-sa! pity! poor fellow!

VIII. Pronouns.

14. The pronouns are of two kinds, the simple and the fragment pronoun. The simple pronouns are complete in themselves, but the fragment pronouns are either prefixed or inserted into verbs, adjectives, and nouns. The simple pronouns are as follows:

ni-stu'-a, I.
ki-stu'-a, you or thou.
u-stu'-i, he or him.
ni-stu'-nan, us or we.
ki-stu'-wa-wa, you.
u-stu'-wa-wa, they or them.

nit-si-nan′, mine.
kit-si-nan′, thine.
u-tsi-nan′, his.

nit-si-na′-nan, ours.
kit-si-na′-nan, yours.
u-tsi-nan′-wa′-wa, theirs.

nin-i-ćі′-tup-i, I myself alone.
kin-i-ćі′-tup-i, you yourself alone, or thyself.
u-ni-ćі′-tup-i, he himself alone.

nin-i-ćі′-tup-i-nu′-ni, we ourselves alone.
kin-i-ćі′-tup-i-nu′-ni, you yourselves alone.
u-ni-ćі′-tup-i-wa′-wa, they themselves alone.

15. The fragment pronouns are connected with nouns, adjectives, adjective verbs, and verbs. Those prefixed to nouns denote possession; as,

no-tōs′, my horse.
ko-tōs′, thy horse.
o-tōs′, his horse.
nōh′-u-a, my son.
kōh′-u-a, thy son.
ōh′-u-a, his son.
nōh-u-i′-ksi-nan, our sons.
kōh-u-i′-ksi-nan, your sons.
ōh-u-i′-ksi-nan, their sons.
ni-tun′-a, my daughter.
ki-tun′-a, thy daughter.
i-tun′-a, his daughter.
no-ko′-si-nan-sa′-ko-ma′-pīks, our children, boys.

no-to′-sīks, my horses.
ko-to′-sīks, thy horses.
o-to′-sīks, his horses.
nōh′-u-īks, my sons.
kōh′-u-īks, thy sons.
ōh′-u-īks, his sons.
no-kōs′, my child.
ko-kōs′, thy child.
o-kōs′, his child.
no-ko′-sīks, my children.
kit-o-ki′-man, thy wife.
u-no′-i, his father.
no-ko′-sīks′-ni-tun′-īks, our children, girls.

16. These fragment pronouns are also incorporated into adjective verbs and adjectives; as,

ni-ta′-ats, I am well.
ki-ta′-ats, thou art well.
a-a′-tsu, he is well.

i-a-tsōp′,
i-a-tsi-a′-wa, } they are well.

ni-tut′-si, I am brave.
ki-tut′-si, thou art brave.
ma′-tsi, he is brave.

ni-ti′-o-to′-kōs, I am sick.
ki-ti′-o-to′-kōs, thou art sick.
i′-o-to′-kōs, he is sick.
ni-ti′-o-to-ko′-spin, we are sick.
ki-ti′-o-to-ko′-spin, you are sick.
i′-o-to-ko′-ksi-a, they are sick.

nit-o-kaps′, I am bad.
kit-o-kaps′, thou art bad.
nit-o-ka′-spin, we are bad.

17. The following is a list of the principal adjective pronouns:

Singular.	Plural.
a-mo′, this.	a-mōks′, these.
o′-ma, that.	o′-maks, those.
ta-ka′, who.	ta-ki′-ksan.
ah′-sats, what.	ah-sa′-i-ksan.
sa-kah′-ta, what person?	

Singular.	Plural.
kris-ta′-pi, something.	kris-ta′-pi-au-a.
mah-tsi′-tsi, nothing.	
it-sin′-a-ka, all.	
sta-nis′-ćis, when, at what time?	
tsa-ni-ta′-pi, how, in what way?	
tsim′-a, where, at what place?	

IX. Verbs.

18. To the verbs belong mood, tense, number, and person. The indicative, imperative, and infinitive moods are well marked, and also the present, past, and future tenses. The verbs are conjugated as follows:

a-ko-mim′, to love, loving.

nit-a-wa′-ko-mim, I love, or am loving.
kit-a-wa′-ko-mim, thou lovest, or art loving.
a-wa′-ko-mim, he loves, or is loving.
nit-a-wa′-ko-mi′-mi-nan, we love, or are loving.
kit-a-wa′-ko-mi′-ma, you love, or are loving.
a-wa′-ko-mi′-mi-o, they love, or are loving.

ni-ti′-a-ka′-ko-mim, I will love.
ki-ti′-a-ka′ko-mim, thou wilt love.
i′-a-ka′-ko-mim, he will love.
ni-ti′-a-ka′-ko-mi′-ma-nan, we will love.
ki-ti′-a-ka′-ko-mi-mo-wa′-wa, you will love.
i′-a-ka′-ko-mi′-mi-o, they will love.

ni-kai′-a-kris′-ta-ko-mim, I have loved.
ki-kai′-a-kris′-ta-ko-mim, thou hast loved.
i-kai′-a-kris′-ta-ko-mim, he has loved.
ni-kai′-a-kris′-ta-ko-mi′-ma-nan, we have loved.
ki-kai′-a-kris′-ta-ko-mi′-ma-wa, you have loved.
i-kai′-a-kris′-ta-ko-mi′-mi-a, they have loved.

a-ko′-mi-mis (imp. sing.), love.
ka-na′-wa-ko′-mi-mis (pl.)

nit-a-ko′-mi-mo′-tsi, I love myself.
kit-a-ko′-mi-mo′-tsi, you love yourself.
a-wa-ko′-mi-mo′-tsi, he loves himself.
nit-a-ko′-mi-mo-tsīh′-pi-nan, we love ourselves.
kit-a-ko′-mi-mo-tsīh′-pu-wa′-wa, you love yourselves.
a-wa-ko′mi-mo′-tsīks, they love themselves.

o′-yi, eating, to eat.

ni-to′-yi, I am eating.
ki-to′-yi, thou art eating.
o′-yi, he is eating.
nit-o-yīh′-pi-nan, we are eating.
kit-o-pīh′-pi-nan, you are eating.
o-i′-yiks, they are eating.
n'se-mi′-sto-yīh′-pi-nan, we both are eating.
se-mi′-sto, both or two.

ni-ta′-kso-yi, I am going to eat.
ki-ta′-kso-yi, thou art going to eat.
i-a′-kso-yi, he is going to eat.
ni-ta′-kso-pīh′-pi-nan, we are going to eat.
ki-ta′-kso-yīh′-pu-a, you are going to eat.
i-a′-kso-yīks, they are going to eat.

ni-ta′-kse-mi-sto-yīh′-pi-nan, we two are going to eat.
ki-ta′-kse-mi-sto-yīh′-pu-a, you two are going to eat.
i-a′-kse-mi-sto-yi′-waks, they two are going to eat.

nit-e-kris′-o-yi, I have done eating.
kit-e-kris′-o-yi, thou hast done eating.
it-e-kris′-o-yi, he has done eating.
nit-e-kris′-o-yīh′-pi-nan, we have done eating.
kit-e-kris′-o-yīh′-pu-wa′-wa, you have done eating.
it-e-kris′-o-yi′-waks, they have done eating.
nit-e-kris′-e-mi-sto-yīkh′-pi-nan, we both have done eating.

ni-ta′-wa-to′-to-pi-a, if I eat.
ki-ta′-wa-to′-to-pi-a, if thou eatest.
o-yīh′-to-pi-a, if he eats.
a-yo-pi-nit-so-yīkh-pi-nan, if we eat.

a-yo′-pi-kit-so-pīkh′-pu-wa-wa, if you eat.
a-yo′-pi-at-so′-pi-waks, if they eat.

na′-ksi-kum′-o-yi, perhaps I will eat.
ka′-ksi-kum′-o-yi, perhaps thou wilt eat.
a′-ksi-kum′-o-yi, perhaps he will eat.
na′-ksi-kum′-o-yīh′-pi-nan, perhaps we will eat.
ka′-ksi-kum′-o-yīh′-pu-wa′-wa, perhaps you will eat.
a′-ksi-kum′-o-yi′-waks, perhaps they will eat.

o′-yīt (imp. sing.), eat.
ka′-kso-yīh′-pu-wa (imp. pl.), eat.
a′-ni-i-so′-yīks, let them eat.

a′sim-i, to drink.

ni-tai′-sim-i, I drink, or am drinking.
ki-tai′-sim-i, thou drinkest, or art drinking.
a-tai′sim-i, he drinks, or is drinking.
ni-tai′-sim-īh′-pi-nan, we drink, or are drinking.
kit-ai′-sim-īh′-pi-nan, you drink, or are drinking.
a-tai′-sim-īh′-pi-nan, they drink, or are drinking.

ni-tai′-ak-sim′-i, I will drink.
ki-tai′-ak-sim′-i, thou wilt drink.
a-tai′-ak-sim′-i, he will drink.
ni-tai′-ak-sim-īh′-pi-nan, we will drink.
ki-tai′-ak-sim-īh′-pi-nan, you will drink.
a-tai′-ak-sim-īh′-pi-nan, they will drink.

ni-tai′-kris-im′-i, I have drunk.
ki-tai′-kris-im′-i, thou hast drunk.
a-tai′-kris-im′-i, he has drunk.
ni′-tai-kris-im-īh′-pi-nan, we have drunk.
ki-tai′-kris-im-īh′-pi-nan, you have drunk.
a-tai′-kris-im-īh′-pi-nan, they have drunk.

sim-it′ (sing. imp.) drink.
ak-sim′-i-ōp (pl. imp.) drink all of you.

a-i-mi, to laugh.

ni-tai′-im, I laugh.
ki-tai′-im, thou laughest.
ai-im′-i-o, he laughs.
ni-tai′-im-pīh′-pin, we laugh.
ki-tai′-im-pīh′-po, you laugh.
ai-im′-i-a, they laugh.

ni-tai′-a·kim, I will laugh.
ki-tai′-a-kim, thou wilt laugh.
ai-a-ksim-i-o, he will laugh.
ni-tai′-a-ksim-pīh′-pin, we will laugh.
ki-tai′-a-ksim-pīh′-po, you will laugh.
ai-a-ksim-i-a, they will laugh.

ni-tai′-kris-tsim, I have laughed.
ki-tai′-kris-tsim, thou hast laughed.
ai′-kris-tsim′-i-o, he has laughed.
ni-tai′-kris-tsim′-pīh-pin, we have laughed.
ki-tai′-kris-tsim′-pīh-po, you have laughed.
ai′-kris-tsim′-i-a, they have laughed.

ai-im′-it (imp.) laugh.

nit-i-a′-sto, I come, or am coming.
kit-i-a′-sto, thou comest, or art coming.
i-a′-sto, he comes, or is coming.
nit-i-a-stōkh′-pi-nan, they come, or are coming.
kit-i-a-stōkh′-pi-nan, you come, or are coming.
i-a-sto′-yīks, they come, or are coming.

nit-i-pi-o′-ksa-po, I am coming here.
kit-i-pi-o′-ksa-po, thou art coming here.
i-pi-o′-ksa-po, he is coming here.
nit-i-pi-o′-ksa-pōh′-pi-nan, we are coming here.
kit-i-pi-o′-ksa-pōh′-pi-nan, you are coming here.
i-pi-o′-ksa-po′-īks, they are coming here.

ni-ti′-a-ko′-to-me-po′-ksa-po, I will come here.
ki-ti′-a-ko′-to-me-po′-ksa-po, thou wilt come here.
i′-a-ko′-to-me-po′-ksa-po, he will come here.
ni-ti′-a-ko′-to-me-po′-ksa-pōh′-pi-nan, we will come here.

ki-ti'-a-ko'-to-me-po'-ksa-po-pu'-wa-wa, you will come here.
a-ti'-a-ko'-to-me-po'-ksa-po'-īks, they will come here.

ni-kai'-a-po'-ksa-po, I have come here.
ki-kai'-a-po'-ksa-po, thou hast come here.
a-kai'-a-po'-ksa-po, he has come here.
ni-kai'-a-po'-ksa-pōh'-pi-nan, we have come here.
ki-kai'-a-po'-ksa-pōh'-pu-wa'-wa, you have come here.
a-kai'-a-po'-ksa-po'-īks, they have come here.

po-ksa-po'-at (imp. sing.), come here.
po-ksa-pōk' (imp. plu.), come here.

ni-ko'-ta-me-po'-ksa-po, have I come here.
ki-ko'-ta-me-po'-ksa-po, hast thou come here.
ko'-ta-me-po'-ksa-po, has he come here.
ni-ko'-ta-me-po'-ksa-pōh'-pi-nan, have we come.
ki-ko'-ta-me-po'-ksa-pōh'-pu-wa'-wa, have you come.
ko'-ta-me-po'-ksa-po'-īks, have they come here.
seh'-ta-i-a'-kso-po'-ksa-po, perhaps he will come.

kit-a'-ni-sta, I told you.
kit-a'-ni-ku'-a, he told you.
ni-ta'-nik, he told me.
ta-ni-ki'-nan, he told us.
ma-to'-ki-nan (imp.), take us.
mis-ta-pīkst' (imp.), throw away.
e-a'-kse-ni, he is going to die.
e-a'-kse-ka-mi'-ta, I think he will live.
sput'-se-ko-i-ta'-po, he has gone to the sandhills,—a common expression, meaning, he is dead.
sput'-se-ko-i-ta'-pi-ki'-mi-taps, he, poor man, has gone under, is dead.
ke-ai'-yo-nit-si-nu'-a, I saw a bear.
ke-ai'-yo-kit-si-nu'-a, you saw a bear.
ke-ai'-yo-u-tsi-nu'-a, he saw a bear.
ke-ai'-yo-nit-si-nu'-a-nan, we saw a bear.
po-ksi-pip'-i-no'-tōs, bring my horse.
pōk-sup'-sko-no'-tōs, drive my horse here.
pōk-sup'-sko-o-mo'-ksim-po-no-ka'-mi-teks, drive those horses here.

si-mi'-a-pi-so-mo'-ksim-po-no-ka'-mi-tēks, water those horses.
sa-pīk'-si-mait, light the pipe.
kah-o'-ćis, come and smoke.
kit-o'-ta-tsi-wa'-ni-nte-a-ka'-ksi-te-ke, when I meet you, I shall be happy.
e-a'-kso-tau, it is going to rain.
ni-tes'-tau-e-a'-kso-tau, I think it is going to rain.
ma-ti-a'-kso-tau, it is not going to rain.
ni-ma'-tis-tah-pa-a'-kso-tau, I do not wish it to rain.
is-tah'-si-a'-kso-tau, I would like to see it rain.
so'-tau, it is raining.
ah-po'-tau, it snows.
e-a-kah'-po-tau, it is going to snow.
ma-ti'-a-kah'-po-tau, it is not going to snow.
ma-tah-po-tau, it is not snowing.
ah-sats'-kit-a'-pa-sum'-i, for what are you searching?
i-mi'-wa-ne-he-tah'-tai, the river is high.
ma-tsi'-wa-ne-he-tah'-tai, the river is not high.
ni-po'-po-tat-a-pin'-a-ku, it is daylight, I will make a fire.
po-ći'-ći-mi-ni, stir up the fire.
to-kōh'-i-tsa-tso-pats', give me some powder.
ni-pis-ći'-o-koh'-it, give me a blanket.
tsi-mak-tu'-i-ta-po, where has he gone?
a-mi-to'-ksai-ta'-po, gone up the river.
ki-a'-pi-te-ksi-na-pu'-is, there are a few houses there.
nit-ai'-is-ći'-nit, I cut it off.
kit-ai'-is-ći'-nit, you cut it off.
et-ai'-is-ći'-nit, he cuts it off.
nit-ai'-is-ći-nīh'-pi-nan, we cut it off.
kit-ai-is-ći-nīh'-pi-nan, you cut it off.
et-ai-ći-nih'-pi-nan, they cut it off.
as-ći'-nit, to cut off.
nit-au'-a-sen, I cry.
kit-au'-a-sen, you cry.
nit-eh'-pi, I dance.
kit-eh'-pi, you dance.
i-a'-ksa-kris'-ta-ku, it is approaching daylight.
a-ni-stis'-ko-ksa-po'-a, tell him to get up.

NAMES OF BANDS OF THE BLACKFOOT NATION, AND PRINCIPAL CHIEFS.

pi-kun′-i,* Piegans.
kai′-e-na, Blood Indians.
sik-si-ka′, Blackfeet.

1. a-pi-kai′-yīks, The Polecat Band.
2. ko-te′-yi-mīks, The Band that do not laugh.
3. si-kōh′-i-tsim, The Band with black doors.
4. a-mīks′-eks, Little Robes.
5. e-pōh′-si-mīks, The Band that fries fat.
6. sus-kso′-yīks, The Band with hairy mouths.
7. mo-ta′-tōts, The Band that are all medicine men.
8. is-ksi′-na-tup-i, The Worm people.
9. kai′-it-ko-ki′-ki-naks, White-breasted Band.
10. a′-pe-tup-i, The Blood people.
11. e-ka-to′-pi-staks, The Band that have finished packing, as bales of anything.
12. si-ka′-tsi-po-maks, The Band with black patched moccasins.
13. ne-ta′-ka-ski-tsi-pup′-īks, People that have their own way, that listen to no one.

1. ko-te-tsi′-tsi-man, The man who cannot overtake the buffalo.
2. i-tut′-tsi-ki′-o-pi, The man who sits in the middle.
3. im-i-te′-sko-mah-an, The dog that goes back.
4. ni-nai′-po-a-ksin, The man who rises in the morning.
5. ni-na-kai′-i-yo, Bear chief.
6. kit-si-po′-ni-sta, This name indicates any animal that has an unnatural color, and lives on the side of a hill or mountain, as a white buffalo, white skunk, &c.
7. i-muh′-se-ko-kau, Large painted lodge.
8. sta-tsi-stum′-ik, Underneath the bull.
9. pu-no-ka′-it-si-ni′-na, Elk tongue.
10. ni-na-sta′-ko-i, Mountain chief.
11. stum′-i-ko-tu′-kan, Bull's head.
12. im-e-te′-ko-en, Little Dog.
13. o-ni-ste′-po-ka-o, Young white calf.

NAMES OF SOME OF THE BANDS OF THE KAI′-E-NA.

i-ni′-po-i, Buffalo rising up,—meaning rather obscure.
sik-si-no′-kai-īks, Black Elks.
ni-tet′-ska-īks, They that fight by themselves.
mum-i′-o-yīks, Fish-eaters.

NAMES OF PERSONS AND NEIGHBORING TRIBES.

kut-e-se′-pi-a, They did not rush, as upon an enemy.
e-sta-po′-a-wah′-au, Walking off.
ma-kris′-kum, Spring of water.
ah′-se-i-ni′-ki-o, She that did not kill.
pah-tōk′-sai-ki-o, The woman of the pine.
ai-ki′-o-pi, The sitting squaw, a Gros Ventres chief.
ku′-ti-na-a′-pi, Old Kootenay, a Blackfoot chief.
ni-te′-na, The only chief.
he-ka′-ske-ne, Low horn.
ni-na′-i-sta′-ko, Mountain chief.
pu-no-ka′-ni-na, Elk chief.
o-ni-sta′-a-kōp, The sitting calf.
o-ni-sta′-sa-nu′-ku-en, The calf out of sight.
stum-i-ko′-sak, Bull's back fat.
na-to′-so-o-ni-sta′, The medicine calf.
sa-ku′-i-stum′-ik, Hindmost bull.
noh′-ska-stum′-ik, The three bulls.

i-sa-po′-a, The Crow Indians.
ko-tōh′-spi-tup′-i-o, The Flathead Indians.
ko-mun′-i-tup′-i-o, Green Paint Indians, Nez Percés.
ni-he-ta-te-tup′-i-o, Pend Oreilles.
pi-éi′-kse-ni-tup′-i-o, Snake Indians.
mum-i′-tup-i-o, Fish Indians.

NAMES OF MAMMALS.

stum′-ik, a buffalo bull. *Bos Americanus.*
ski-ni′, a cow.
o-ni-stahs′, a calf.
pu′-no-ka-o, a general term for elk. *Cervus Canadensis.*
pu′-no-ka-stum′-ik, a male elk.

* See page 256.

pu′-no-ka-pu′-ka, a young elk.
i-si′-ko-ti, black-tailed deer. *Cervus macrotis.*
o-muk-i′-ki-na, big-horn. *Ovis montana.*
a-wa′-to-yi, white-tailed deer. *Cervus leucurus.*
so-ki′-a-wa′-kos, antelope. *Antilocapra Americana.* (so-ki′, a prairie, and a-wa′-kos, deer.)
a-pu′-muk-i-na, a white big-horn. *Aplocerus montanus.*
kai′-yo, a grizzly bear. *Ursus horribilis.*
kai-yi-pu′-ka, a young bear.
si′-ko-kai′-yo, a black bear. *Ursus Americanus.*
sik-so-so′, a moose. *Alce Americanus.*
kris-tuk′-i, a beaver. *Castor Canadensis.*
kris-tuk′-i-pu′-ka, a young beaver.
i-si′-tsi, a wolverine. *Gulo luscus.*
mi-sin′-sku, a badger. *Taxidea Americana.*
a-pi′-sin, large wolf. *Canis occidentalis.*
sna′-o, medicine wolf. *Canis latrans.*
o-ta′-to-yi, red fox. *Vulpes macrourus.*
si-no-pa′, small kit fox. *Vulpes velox.*
pi-no-tu′-yi, a fisher. *Mustela Pennanti.*
au′-mo-nis, an otter. *Lutra Canadensis.*
so′-yi-kai′-yi, a mink. *Putorius nigrescens.*
mus-ōp′-ski, a muskrat. *Fiber zibethicus.*
u-muk′-u-ka-ta, a large prairie dog. *Cynomys ludovicianus.*
kit-si′-su-mu-ku′-ka-ta, a small prairie dog. *Cynomys Gunnisonii.*
kai′-ska, a porcupine. *Erethizon epixanthus.*
a-pi′-a-kai-yi, striped back, a skunk. *Mephitis mephitica.*
a′-pa, a weasel in winter pilage.
o-mu′-ka-pa, a large weasel.
o′-ta, summer weasel.
si-ka-ći′-sta, sage rabbit. *Lepus artemisia.*
o-muk′-a-ći′-sta, jackass rabbit. *Lepus campestris.*
i′-kais, a pine squirrel. *Sciurus Hudsonius.*
i-a-tsi′-ki, thirteen-lined squirrel. *Spermophilus tridecem-lineatus.*
ka′-na-skin, a wood mouse.
o-muh′-a-ka′-na-skin, a wood rat. *Neotoma cinerea.*
so-yi′-ka′-na-skin, a water mouse.

NAMES OF BIRDS.

pi-ta′-o, the war eagle.
si-kit-si-nai′-aks, a black eagle.
i-si-sun′-i-kim, the bald eagle.
si-kai′, a buzzard.
a-pe-ta-pun′-i-ki-mi, a fish hawk.
si-ke-ta-pun′-i-ki-mi, a brown fish hawk.
si-kup′-e-ta-pun′-i-ki-mi, a gray hawk.
kse′-ni, a cow bunting.
o-muk-sa′-kse-ni, a crow blackbird.
a-pi-a-ksa′-kse-ni, a brown blackbird.
so-yi′-ksi-ni, a water blackbird.
mi-e-kut′-si, a kind of duck.
mi-e′-sa, a fish duck.
ap-spi′-ni, the common wild goose.
kai′-yi, a kind of gull.
o-muk-sa′-kai-yi, a large gull.
a-pit-so′-to-yi, small prairie plover.
a-muk′-o-pit-so′-to-yi, large prairie plover.
kit-se-pit-′se-ku′-yi,
ni-a′-tsi, a killdeer plover.
o-muk′-a-tsi, a large killdeer.
sik-se-kun′-i-ki-su′-yi, a black woodpecker.
mi-ki′-ma-ta, a kind of small speckled woodpecker.
o-muk-si-ki′-ma-ta, red-headed woodpecker.
ōh′-u-mi, the domestic hen, or the bird that screams.
a-pin′-a-ku-sis-tse, the morning bird.
i-si-kau′-kai-yi, the lark.
ni-pu′-ma-ki, tomtit.
ma′-sto, a beaver.
ki′-to-ki, the common prairie hen.
o-muk′-si-ki′-to-ki, large prairie hen, sage cock.
kit′-si-it′-sim, pheasant.
pi-ksi-ka′-ći, teal duck.
pi′-ksi, a fish hawk.
ma′-ma-a-ći′-kim, the magpie.
pi-ći′-ksin, a small snake.
o-muk′-si-ći′-ksin, the rattlesnake.
mu-ći′-e-ku-ći′-man, a frog.
o-muk′-i-ći-e-ku-ći′-man, a large toad.
ma-ni′-ski (pl. -skīks), water lizards.

sko′-pi (pl. -pīks), tortoises.
ma-to′-is-ći, a hair worm.
i-ski-se′-na (pl. -naks), worms.
a-po′-ni (pl. -nīks), butterflies.
tse-ka′-a-tse (pl. -tse-īks), grasshoppers.
tup-i-kai′-nim, a large cricket.
si-ki-tup′-i-kai, a common cricket.
at-si′-na-ko, a mosquito hawk.
sūs-kris′-i, a mosquito.
o-muk-sūs′-kris-i, a large horsefly.
ut-si′-mo-sūs′-kri-si, a stinking fly that swarms about meat.
u-sko′-kin, a large ant.
o-ko′-ma, a body louse.

a-tse′-tsi-ksim, cottonwood.
ka-po′-ksim, the ash.
paĥ′-tōk, pine.
sik-si-no-kōk′, cedar, or blackberry pine, so called from its black fruit.
o-tōĥ′-o-tsist. *Opuntia Missouriensis.*
ōt-sta′-tsi-man. *O. Nuttalli.*
ak-spīs′, gummy weed. *Grindelia squarrosa.*
mas, pomme blanche. *Psoralea esculenta.*
ōts-će′-nist, strawberry. *Fragaria Virginiana.*

CHAPTER V.

VOCABULARY OF THE SIK-SI-KA′ OR BLACKFOOT LANGUAGE.

A.

across, a-pum′-ōts.
Adam's apple, i-to-kits′-kris-tun.
after a while, ni-ta′-tum-i; I will come after a while, ni-ta′-tum-i-tup′-o.
air, a-mi-pūk′.
alive, e-te′-pi.
all, it-si′-na-ka; the whole, ki′-na; all, entirely, mo-tu′-sa; all icy, mo-tu′-sa-ko-ku′-to.
ankle, ki-taĥ′-o-kin-a′-ki.
annoying, ska′-aps.
arm, o′-ćis; right arm, i-tōĥ′-si; left arm, i-a-kris′-o-ōks.
armpit, ōĥ-ris′.
around or **about,** a-ko′-kats; around about the village, ko-na′-to-ka′-to-a-ko′-kats.
to arrive, ma′-no-tu.
arrow, aps, or ap′-si; an arrow point, sa′-ku-pun; who owns these arrows? ta′-ka-mi-a-psi′-wa.
ashamed, ne-tu′-yis.
ashes, muks-kit′-si.
asleep, o′-kau; sleeping, i-yo′-kau.
to be astonished, ki-o′-to.
at, u-ni′-mai; at the house, mu-yis′-u-ni′-mai.
autumn, mu-ku′.
axe, ko′-ksa-kin.

B.

back, as the back part of the head or body, na-ka′-kin-i; back, backward, aĥ-pa-to′-tsi; back, in past time, mi-sam′.
bad, ba-kaps′, ba-ka′-psu, me-ska′-psu; a bad boy, ba-ka′-psa-ko-ma′-pi.
bank, of the river, at-siks′; the bank is near by, it-sat′-siks.
bark, of a tree, o-tōk′-skris.
barrel, su′-i-in.
beads: red beads, a-mank′-sku; black beads, si-ksi′-no-ku; white beads, about the size of pigeons' eggs, used in the Indian trade, ćik′-sku.
beak, of a bird, pi-kso′-kris-is.
beans, o-to′-ksi-nu′-tsi.
beard, mo-yo′-yi.
bed, sa′-a-kan.
behind, a-pa-toĥ′-si.
belly, o-ku′-a.
belt, or sash, me-pis; pl. me-pisć′.
to bend, ta-wa′-ksi-pin′-a-ki; bent, a-ksi-kin′-o-tuks.
better, su-kaps′.
between or **among,** se-to-ko′ksin.
beyond, sa-toĥ′-si; beyond the ridge, pau-aĥ′-u-i-sa-tōĥ′-si.
black, sik-si-nim′.

bowels, pi-stum′-i.
bowl, or plate, su-ih′-ta-ćis.
box, ai-i-su′.
boy, sa-ko′-ma-pi; a boy without finger or toe nails, sa-ko′-ma-pi-e-kai′-sa-na.
brains, o′-pi.
blanket, na-pis′-ći; a green blanket, ut-skai′-pis-ći.
blisters, arising on the skin from burning, a-moh′-sa-wa-nit′-si.
blood, a-pau′-ni.
blow the nose, i-mi-ći′-kin-i, to blow the nose.
blue, ōt-ku′-e-nut′-se.
boat, or canoe, a-ki′-ōh-sa′-ćis; steamboat, a-ki-ōh-sa′-ćis-a-mi′-to; also, is-ći′-a-ki-ōh-sa′-ćis, fire-boat; is-ći′, fire; ferry-boat, the boat that crosses people over the river, i-mah′-ta-pa-to-ći′-wa.
bog, low wet ground, pah-si-kaŋ′-ku-i.
boil, i-kih′-an; a sore containing pus, i-ta′-ćis; the pus of the sore, a-ćis′-i-o.
bone, oh′-in; collar-bone, i-sa-mi′-kan.
book, a pile of folded leaves, sa-pa′-ko-tsi-na′-ksi.
both, or two, sem-is′-to.
bottle, so-ko′-ka-tōs.
bow, spe′-kin-a-ma.
brass, ko-te-ke′-me; also, o-tai′-kim; small brass bells, used in the trade, mo-sōh′-i-ki-ni; small brass nails, e-tus′-ta-kai′-ōp.
brave, ma′-ći, also ma′-tsi.
to break, si′-nit.
breechcloth, oh-e′-a-ksa′-ćis.
brother, elder brother, nis′-a; younger brother, ni′-skum.
broom, na-mu′-ki-ma-ćis.
broth, o′-pis.
to brush, as clothes, ta-sa-tsi′-ni ōks.
buffalo, in a mass, i-ni′-wa; a mad bull, ma-ni-kris′-stum′-ik; a mad cow, ma-ni-kris′-ski-ni′; the dried excrement of the buffalo, "buffalo chips," kah′-pīh-ta.
to burn, e-nit′-se; burnt, it′-sin-it′-se.
butterfly, a-po′-ni.
to buy, pum′-at.
by, passing by, stut-sko′-a; by the house, or passing by the house, stut-sko′-a-mu-yis′.

C.

to call, mu-ta′-ni-stis.
to carry, a-wa′-se-ni.
circingle, for a horse, is-ksi′-si-pi-stauć′.
chair, so-pats′.
cherries, puh′-i.
chief, nin′-a; pl. nin′-aks.
child, po′-ka; pl. po′-kīks; o-kōs′ is also used; po′-ka, denotes an infant.
chin, ōp-ski′-na.
claw, of a bird, pi-kso′-ki-ćis.
to climb, a-mis′-o.
cloth, nai-pis′-ći; blue cloth, si-kai′-pis-ći; black cloth, sik-si-nuts′; red cloth, mah′-ai-pis′-ći.
cloud, so-kris′-te-ko-is; far beyond the clouds, so-kris-te-ko′-is-mi-sto-po′-ats; cloudy weather, a-su′-kris-te-ku′-i.
coat, su′-kōs; chief's coat, ni-ni′-o-su′-kōs.
coffee, ai-sik-si-ki′-mi; a coffee-pot, kri-su′-yi.
cold, stu′-yi; I am not cold, mis-ći′-stu-yi; I am cold, nis-tu′-yi; you are cold, kis-tu′-yi.
come, quickly, in a hurry, a-ke′-po-kse-po′-at.
to cook, ap′-sat; to cook different kinds of food in a pot together, a-yo′-sit.
copper, me-ko-ti′-ke-me.
cord, a-pis′; a rope made of hemp, a-pis′-ta-pi′-kin.
cough, ses-ki′-na.
coulée, sau-auh′-tai.
cow, ski′-ni; domestic cow, a-pōt′-ski-ni.
crazy, mat′-saps.
to cry, au-a-sen′.
crooked, yu-mo′-ki-o.
to crumble, as food, si-si-ki′-a.
cup, kūs.
curious, pi-si-ta′-pi; a curious dog, pi-si-ta′-pi-im′-i-ta′o.
to cut or split the feather from a quill, te-a-kris′-ta-ta-nin′-im.

D.

to dance, eh′-pi; I dance, nit-eh′-pi; you dance, kit-eh′-pi.
darkness, ske-nut′-si.
daughter (my), ni-tun′-a.
day, kris-te-ku′-e.

to die, a′-ni; dead, a-ni′-wa; I die, ni-ta′-ni; you die, ki-ta′-ni.

deer, a-wa′-kōs; a white-tailed deer, a-wa′-to-yi; prairie deer, antelope, so-ki′-a-wa′-kōs.

deep, mi′-a.

to destroy, mo′-tsa.

dog, im-i-ta′-o; a young dog, im-i-te′-ku-en; you are a dog, im-i-te′-ta-pi.

door, kit′-sim.

down, na-po′; gone down the river, wai-na-po′.

dreadful, ko-ma′-pi.

to drink, a-sim′-i.

dry, e-ki′-ksi-o; it is dry, e-ki-ksu′-yi; dried apples, a′-pa-sta-mi-na′-tsi,—so called because they look like rotten wood.

dust, sis-ée′; dust flying, sis-ée′-pu-ka.

E.

eagle, pi-ta′; pl. pi-teks′.

ear, oh′-to-kis; the external ear, ōh′-o-ōh′-to-kis.

earth, suh′-um.

easily, ki-na′-pi.

to eat, o′-yi.

egg, o′-wa.

elbow, o-kin′-stis.

enemy, ni-kuh′-to-ma.

enough, ki′-nai-e.

evening, o-to-ku′.

every, each, ki-nai′; everybody, ki-nai-tup′-i.

eye, a-waps′-pits; eye winkers and brows, u-mi-a′-pi-nan; eyelids, ko-wap′-spi.

F.

face, o-sto′-ksis.

to fall, e-ni′-si; falling, e-ni′-si-wa.

far off, at a distance, pi-oh′-tsi; a little way, a little distance, o-te′-stsi; near by, a-stsi′.

fat, o-tsi-nau′-a.

father, ni-i-na′, or ni-na′.

feather, pi-kso′-ku-is.

fear, ko′-pum.

to feel, ti-e′-nim.

few, ki-a′-pi, scattered.

fine, ma-tso′-waps; a fine horse, ma-tso-wa′-psi-no-ko′-mi-ta-o; also, ma-tsi′-no-ko′-mi-ta-o.

finger, o-ki′-éis; thumb or large finger, o-ma-ki′-éis; little finger, o-tsa-na′-ki-éis; finger-rings, sa-pe′-ki-éo-sa′-éis; the finger nails, ta-wa-ka′-no-ki′-éis; the joints of the finger, i-ta-ku′-yi-kit-si′-pi.

to fight, it-skan′.

fish, mum′-i; a fish-line, mih′-a-tsis.

fire, is-éi′, also, is-éi′-wa; a plenty of fire, a-kau′-is-éi.

flame, pa-ku′-is.

flint, kris-a′-ki-ta.

flood, i-ka-ku′-yi.

flour, ai-ki′-ta-tōp.

flower, ki-ni′-wa.

to fold the arms, a-ne′-i-kin-sak.

fool, mat-saps′; foolish, a-wa-tsaps′.

foot, ōh′-ats.

forehead, o′-mis.

forest, ut-si-wat′-sku-i.

forever, es-ksa′-a-ni′-ste.

friend, nit-sih′-i-wa.

frightful, sku-ni′-ta-pi.

G.

garnishing, on a robe, a-to-nus′-i.

get up (imp.), ni-pu′-uk.

to give, ko′-éis; give me, ko′-kit; I give it to you, ki-to′-ko-ta-o; you give, ki-ta′-kum.

girl, a-ke′-ku-en.

glove, o-tsēé′.

glue, tek-spo′-te-ku.

gold, same name as brass.

to go, a′-ma-to; go (imp.), po-ko′-mis; go with them, po-ko′-mi-sa-o; go away, mi-sto-po′-at; to go ahead, a-ma′-tup-i-isé′.

good, ah′-si-o; a good house, ah′-si-mu-yis′; a good boy, ah′-si-sa-ko-ma′-pi; all good, ki′-nai-ah′-si-o; beyond good, best of all, mis-ti-pōks′-ah′-si-o; he alone is good, i-tai-ah′-si-o; there are none so good, i-tai-mah′-si-o.

good while, wai-sa′-mo; he is gone a long time, wai-sa′-ma-ma′-to.

grass, ma-tu′-yis.

grease, po-mis′.

great, sku'-na-taps.

green, ut-sku'-i.

ground, sa'-ko; in the ground, sa-ko'-mi-it-si'-o; ground, the surface of which is covered with little butes, or hillocks, pi-kaȟ'-o.

grove of trees, u-tso'-a-sku-yi.

gum of the pine, a-wa'-ksis.

gun, na'-ma; to miss fire, to snap a gun, na-mi-ka'-kis; where is my gun? a-na'-ni-mo.

H.

hail, kris-i'-ki-ni.

half, or a part, a-no-kōȟts'.

hallo! i'-ya.

hair, tu-ko-iȟ'-in-i-pi; long-haired, i-nu'-spi; hair on the upper lip, ma-ta'-ksi-wa'-tsi.

hammer, po'-ksa-ćis.

hand, me-ćiȟ'-se-ku'-ist.

handsome, ba-tsi'-num, also, aȟ-waps'.

happy, a-ksi'-ti-ke.

hard, mi-wa; hard wood, mi-wa-mis-ćis'.

hat, i-ći'-mo-kain.

head, o-to-kan'; a kind of shell, of the genus *Dentalium*, used by the Indians as ornaments for the head, a-pi-ksis'-ćim-a-o-ksu'-is.

to heal, a-ki'-o.

to hear, ai-ōȟ'-sim.

heart, ōȟ-it'-sa-pa'-pi.

heavy, so-ku' and so-ke-sim'; both words are in use.

heel, ōȟ-tu-tun'-i.

here, in this place, un-i'-ma, u'-no-mai.

to hesitate, hold back, pe-i-tsīȟ'-tau.

high, spi; a high animal, spi-mi'-o.

hill, pa-waȟ'-u.

hip, ōȟ-i'-ni-sak.

to hold, e-i-ni'-o.

hole, aȟ-a'-ni-ka.

honest, ko-mo'-tsi; an honest man, ko-mo'-tsi-tup'-i.

horn, ōt-ski'-na.

horse, pu-no-ka'-mi-ta, literally elk dog, from pu-no-ka'-o, an elk, and im-i-ta'-o, a dog; mi-o'-mi-ta (pl. mi-o'-mi-tēks), pack horses; another form is in use in declension denoting possession: my horse, no-tōs'; your horse, ko-tōs'; his horse, o-tōs'; his horses, o-to'-sīks; a white horse, a-pi'-wa-no'-tōs; a gray horse, si-ka-pi'-wa-no'-tōs; a horse with black ears, i-sik'-sta-ki-no'-tōs.

hot, kris-to'-tsūs; kris-tu'-yi.

house, of the white man, na-pu'-is, mu-yis'.

how, in what way? tsa'-ni-ta-pi; how many? sa-na'-tsim.

husband, o'-ma.

I.

ice, ko-ku'-to.

if, i-yo'-pi.

in, pis-tohs'; in company with, ti-a-koȟ'-po-ko'-mau; in company with my son, ti-a-kōȟ'-po-ko'-mau-nōȟ-o'-a.

Indian, ni-i'-tsa-ta'-pi.

intestines, o'-ćis; manifolds, or large intestines of an animal, i-si'-stōn.

island, mi-ni'-wa.

iron, miks'-kim; an iron frying-pan, miks-kim'-i-kūs; iron horse, locomotive, miks-kim'-o-nu-ka'-mi-ta; iron wire, sik-si-ak'-skim.

J.

joint, i-tōȟ'-o-ki'-na-ki.

joke, ka-saps'.

jug, sa-ku'-ko-tus-ko.

to jump, cȟ-pa'-sto.

K.

kettle, i'-ski; isk.

kidneys, o-to-ko-to'-kisć; also o-tōk'.

to kill, i-ni'-ki-o.

kiss, so-nau'-ski-pi.

kinnic-kinnic, a-pi'-ni-kim.

knee, o-to'-ksi.

knife, stu'-un; a sheath for a knife, a-su'-tu-un; a two-edged knife or sword, sa-ma-kin'.

L.

lake, o-muȟ'-si-ki-mi.

land, aȟ'-o; a country, sa'-ko; the whole country, ki'-na-sa'-ko.

large, a-pa'-ki; a large quantity, o-muȟ'-u; a heap, a-kau'-ī, also a-ku'-a-wa.

lately, i'-so.
to laugh, a-i'-mi.
lazy, buh-aps' or ba-kaps'; a lazy fellow, good for nothing, pah'-i-kah'-si-o.
lead, o-wak'-shu-pa.
leaf, nips; also so-yo'-po; dry leaves, so-yo'-po-kist.
leg, o-kuts'; leg below the knee, a-tse'-na; calf of the leg, ōh-ki'-nan; an instrument for dressing robes, made from the leg-bone of the antelope, ma'-ski.
leggins, a'-tsi.
lengthwise, i-kum'-o; splits lengthwise, i-kum'-o-i-sta-to'-ksi.
less, o-wa'-tu-ksi.
level plain, mi-ni-stah'-wah-u.
light, kris-ti-ku'-e-nut'-si.
lightning, i'-pa-pum.
like, ni-tu'-i; he is like my son, ni-tu'-ni-i-tso-ōh-u'-i; just like, as he is just like his father, a-ye'-ko-no-tse; like, applied to any object but persons, ni-tum'-a-nis'-tsi-num'-i-a.
limb, of a tree, o-ku'-niks.
to listen, kris-to-ći'-si.
little, small, a-nuks'; a small man, a-nuk-si'-na; a little or small quantity, no-tse-nah'-o; give me a little, no-tse-nah'-o-kōh'-it.
to live, e-ta'-pi; I live, nit-se-ta'-ta-pi; you live, kit-se-ta'-ta-pi.
lodge, mu-yis'; a beaver lodge, kris-tuk-u-o-yis; a hole or rent in the lodge, ah'-un-ih-a; pins driven into the ground, to fasten down the bottom of the lodge, i-sto-ka'-ćis; the holes in the lower edges of the lodge where the pegs are inserted, pi-ki'; pins to fasten the side of the lodge-skin, after it is erected, sa-pi'-ki-na-na-ma'-ćis; the act of tying the lodge-poles at the top, a-tu'-ksi-pi'-stan; the hole in the top of the lodge to let out the smoke, ma-o-to'-tsi-man; lodge-poles, ma'-ni-stam.
long, i-nu'-ye.
long ago, a-ka'-a; I was displeased with you long ago, a-ka'-a-o-ki'-ma-su-ki.
look (imp.), sum'-is; look at me, i-sum'-o-kit; look at me, I am ugly, sum'-o-ki-tun'-i-to-kaps; look! he looks ugly, sum'-is-sum'-o-kaps.
lost, a'-tsa.
louse, tut-se-po'-kōk; I am bitten by lice, ni-tai-sik'-si-pūk.
to love, a-ko-mim'.
low, e-kuk'.

M.

maiden, a-ki'-a-ko'-a, (pl.) a-ki'-a-ko'-aks.
maize, or corn, bes-ka'-ta, a word derived from the Arapoho language.
mammæ, un'-i-kis, breasts.
man, or person, ma-ta'-pi; a young, unmarried man, a-si'-ta-pi; also ma-ni-ka'-pi; a white man, na-pi'-ku-un; a black man, sik-sa-pi'-ku-un.
mare, ski'-am.
marrow-bone, i-nun'-i.
mean, as a mean fellow, ma-ksi-num'.
measure, e-ska'-ki.
meat, kai'-yis; meat in small fragments, pi-i'-wa.
medicine, drugs, sa'-am; a medicine man, or doctor, i-su'-ki-wa'-ke; medicine, or mystery, na-tu'-yi.
midday, tut'-se-ka-kris-ta-ku'; midnight, tut'-se-ka'-ku-ku.
middle, as in the middle of the river, tut'-se-kuts.
milk, u-ni'-kis.
mirror, tsa-pi'-a-tsis.
to mix, pa-so'-ko.
moccasins, at-si'-kin-i; top of the moccasins, ntuk'-o-to'-to-nan; shoestrings, sa-pi'-ne-ka'-ats; to tie up the shoes or moccasins, nta'-ksi-naus.
moon, ke-sum'.
more, stik'-i, is-ći-'ka.
morning, ma-to'-nis; early in the morning, ska-na'-to-nis.
mosquito, sūs-kris'-i.
mother (my), ni-krist'.
mould, a-pi-su'-yi; mouldy, a-pi-su'-yi-wa; it will be mouldy, i-a'-ka-pi-su'-yi; to smell mouldy, a-pi-su'-yi-o'-mo.
mountain, mi-stah'-u.
mouth, a-o'-yi; my mouth, na-o'-yi; your mouth, ka-o'-yi.
much, a heap, a-ku'-im, a-kai'-im.
mud, miry, pa-kse'-kah'-u-a.
mule, long ears, o-muk'-sto-ki.

N.

name, nin-ik-ōs′; his name, sin-ti-kōs′.
narrow, e-ki′-o.
navel, o-to′-yis.
near, close, o-tsūst′.
neck, ōh-o′-kin-i; back part of the neck, oh-tun′-is.
needle, large needles, o-muk-o′-to-nau′-ksi-ćis; small needles, o-to-nau′-ksis.
new, ma′-ni; a new arrow, ma-no′-psi.
night, ko-kūs′; the same night, a-nu′-ko-kūs′.
no, sa; also a-ni′-yi.
noon, tut-si-ke′-a-kris′-te-ku′; (pl. -ku-isć).
nose, ōh-kris′-is; my nose, noh-kris′-is.
nostril, o-pis′-ki-sa.
nothing, ma-tsi′-tse, and kris-ta′-pi.

O.

old, na′-pe; a white man, na-pe′-ku-un, literally old people; applied to a female, ki-pi′-ta; an old woman, ki-pi′-ta-a-ki′-wa.
open (imp.), kau-a-pi′-sta; open the door, kit′-sim-kau-a-pi′-sta; open out, spread out, o-po′-tōs.
opinion, plan, se-ni′-stan.
outside, sa-ōhs′.
over, i-sōk′.

P.

paddle, it-i-ah′-e-o-kso-pe; to paddle, as a boat, mai-a′-ki-ōks.
pail, su-yen′.
parfleche, ko-to-ki′-a-no-ko.
pepper, pi-stup′-o-ku.
perhaps, ah-si-kum′; seh′-ti; perhaps he will come, ah-si-kum′-a-sto.
pins, spin-o-to′-nauks.
pine tree, pah′-tōk.
pipe, ah-o-i′-ni-man.
plain, prairie, so-ka′, so-ki′.
to play, e-ku′-e-ni.
plenty, a-kai-im′; a plenty of people, a-kai′-tup-i.
pole, i-ne′-stam; a long pole, i-ne′-ni-stam.
pork, ai′-ksin-i, a grunter, hog.
post, a-kun′-īks.
potatoes, in-su′-mōn.

powder, sa-tso-pa′-ats.
prairie, so′-ki, sometimes so-ka′.
puzzle, ōh′-pi-ska.
pumpkin, ōh′-to-ki-nut′-si, so called when cut and dried.

Q.

quickly, ki-pun′-is-tsi.
quill, ma′-min.

R.

rain, i′-so-ta; rainy, so′-tau; to clear away, as clouds after a rain, ai′-e-pun′-i; the rain has passed away, so-te′-ai-pun′-i.
rattles, on the tail of a rattlesnake, se′-tsi-ko′-to.
ravine, ka-wah′-u-a.
raw, uncooked, ko-te′-tsi.
red, mōh′-si-nut′-si; a red blanket, mōh′-o-pe′-pist; vermilion red paint, mōh-i′-san.
relation, kso′-qua.
rest, sik-si′-ste-ku.
rib, pi-kis′.
river, ni-i-tuh′-ta; a stream or creek, a-se-tuh′-ta; a little run, wa-wa′-ku-a.
road, mo-ksa′-ku-yi; path or road, pa-tōt′-sku-yi.
rock, mis-tek′; rocky, mis-tek′-sku.
rosebuds, ki-nīks′.
rope, a′-pis, a lariat for a horse.
rough, rugged, pi′-wa; bad lands, pi-wah′-o, and si-na-tah′-o.
to rub off, or brush, ta-sa′-tsi-ni-ōk′-sto.
to run, o-ma′-ka; aks′-kas; to run quickly, ka-mōks′-kas; run (imp.), aks-ka′-sit, and, mah-at′; run away, mis-ta-pi′-mah′-at; ni-to-mah′, I run; ki-to-mah′, you run.
rusty, a-psu′-yi.

S.

sacred, holy, kse′-maps.
salt, stik-se-po′-ko.
sandbar, sput′-se-ko; the great sand pile where the dead go, o-muks′-sput′-se-ko.
sash or belt, ma′-pis.
scabbard, a-sto′-tu-wa.

scabby, a-pe′-kris; a scabby bull, a-pe′-kris-stum′-ik.
scalp, sa-o-to′-mu-a.
scattered, ki-a′-pi.
to scratch, ta-ksi-ki′-na-to′-he.
sea, mo-toh′-i.
seat, nu′-o-sa.
searching, a-pa′-su-mi.
to see, na-mu′-i-nu.
seed, e-ni-si′-man.
selfish, avaricious, a-kum-i′-tup-i-o.
sharp, kris-e′-kim; a sharp knife, kris-e′-ki-sto′-a.
to shave off with a knife, ksi-kit-si′-ni-aks.
shears, ste-si′-so-yōp.
shells for earrings, po-kun-um′; to the fossil shells, which occur in that country very abundantly, the Indians give the name o-ćis′-he.
shirt, stah-ti-so′-kaus.
shooting, sku-ni′-ke.
shot, kit-si-ko′-pun-i.
shot-pouch, su-i-a′-tsi-man.
shoulder, o-kut′-si-kin.
sick, ōh-to-ko′-ksi.
sinew, hai-si-pi′.
to sing, e-ni-ki′-o; I sing, ni-tai′-ni-ki; you sing, ki-tai′-ni-ki.
sister, i-sa′-ki-mi.
sit down (imp.), pi′-it.
skin of an animal, to′-kis, and, o-to′-kis; a cow-skin dressed, pakh′-i; undressed, i-ni′-o-to′-kis.
sky, spōhts.
sleep, wai-yo-ka′.
slow, e-tse-tse′-kris-to.
small, ōh-po′-ki-o, and, na-ko′-tsi-o.
smart, active, ku-waps′.
smell, a-mas′; a bad smell, mes-ka′-pa-mas.
smoke, sa-tsi′-wa; smoky, se-nu′-tsu.
to sneeze, a-si′-i-si.
snow, kōn; kōn′-sko; snowing, ōh′-po-ta-o.
soap, sis-ki-o-sa′-tsis.
soft, ki′-ni, also, ih-i-ni′-si.
to soil or dirty, po-mis′.
something, ki-sta′-pi.
sometimes, ni-ta′-tum-i.
son, ōh-u′-a.
soon, skun′-i; come soon, skun′-i-o-po-ksa-po′-at.
soup, o-ko′-pis; goose soup, ap-sin′-i-o-ko′-pis.
sour, eh-i-mu′-i.
to speak, a-pu′-i.
spear or lance, sa-pa-pi′-sta-ćis.
spirit or ghost, o-ni-stan′; Great Spirit, the Great Medicine Man above, na-to′-yi-tup-i′-spo-ma′-pi.
spot, e-na′-ki-o; a yellow spot, o-tōh′-u-i-na′-tsi-o.
spoon, i-nōh′-si-o.
spring, mu-tu′; (pl. -tu-ist.)
spring of water, ma-ki′-kum.
spurs, ta-wa′-wa-ka-piks.
stand up (imp.), ne-pu′-yi-pu-yit.
star, ka-ka′-tōs.
to steal, ka-mōs.
stingy, it-si′-ki-ma′-ats.
stockings, a-to-wa′-ksin.
stomach, no-kin′, o′-ku-un.
stone, ōh′-o-tōk; stony, oh′-o-tōk′-sku.
stop! hi-ka′-o.
straight, kum-o′-e-sim.
to stretch, or yawn, se-pi′-is; I stretch, ni-tai-se′-pi-is; you, &c., ki-tai-se′-pi-is; he, &c., e-tai-se′-pi-is.
to strike, a-wa′-a-ki; I strike, nit-a-wa′-a-ki; you strike, kit-a-wa′-a-ki.
strong, mi-ska′-pi.
to suck, sta.
summer, ni-pu′, (pl. -pu-isć.)
sun, na-tōs′, na-to′-se; sun's rays, se-ki′-so-au.
sweet, me-ne-po′-ko; sometimes, ma-tse′-pu-ku.
swelled, kah′-pi.
swift, e-kum′-i-si; a swift dog, e-kum′-i-si-im-i-ta′-o.

T.

tail, ōh-su′-yis.
take it, mat′-sit.
temples, ōt-skup-u′-na.
tooth, ōh-pi′-a-kin.
then, i-tek′-si; then, in that place, un′-i-it-si′-o.
thigh, u-wa′-pi-sak.
thin, stōh′-i; a thin leaf, stōh′-so-yo′-po-ki.
to think, a-ah-ska′-to-ki.
thread, thread made of sinew, e-si′-pis; cloth thread, ne-pi-stai′-si-pis.

throat, ōh-kris′-tun-i.

thunder, kris-te-kum′.

to tickle, si-kus′-i-ta′-ki, and e-ko′-i-ni-sto′-to.

to tie, isk′-si-ni-stuk′-sim; tie (imp.) sksi′-nit.

tobacco, pis-ta′-kan; Indian tobacco of the best quality, *Lobelia inflata*, ne-ets′-ti-nis; common Indian tobacco, both kinds used in the religious ceremonies of the Indians, e′-nis; cutting-board for tobacco, su-pi′-ksis-tsi-ma′-ćis; a garnished tobacco sack, a-su′-a-ći′-man.

to-morrow, a pin′-o-kōs; I will go to-morrow, a-pi-nuk′-si-ta-ko′-ma-ta.

to-night, ko-kūs′.

tongue, ma-tse′-ne.

tooth, ōh-pi′-a-kin.

top, or summit, si-ko′-ki-tōhis.

to touch, ksi′-nit.

towards, pit-si-ōh′-to.

towel, ste′-sis-ki-o.

travail, ma-nis′-ći.

tripe, o-ku′-un.

true, truth, kit-si′-ma; you are not a man of truth, ki-ma-to′-ma-nīh′-pa.

trunk, or box, a-so′-kai-is; a wooden trunk, mis-ćis′-o-kai′-is.

to twist, a-niks′-ka-pi-kris′-ta-kis.

U.

ugly, muh-si-num′.

under, stahs; it is under something, stahs-mi-it-si′-o; there is something under the stone, ōh-o′-to-ki-stahs-mi-it-si′-o.

up, a-mi-tōks′.

V.

valley, pi-i-stah′-wah-u′-mi-ni-stah′-u-i.

vein, ōs-ći′.

verdigris, ōh-o-mo′-ni-nut-si; ko-na′-no is sometimes used.

very, e-a′, sku-nuts′, e-ku′-i; this very night, a-nu′-ke-a-ksa′-ko-kus-e-ku′-i; a very old man, e-ku′-i-na′-pi-o; very cold, sku-nuts′-tu-yi.

village, a-ki′-ta-pi-sko′; a plenty of lodges, o-ki′-o-kum-i.

villain, ma-kse-tup′-i.

to vomit, o-kit′-skum.

W.

wagon, or cart, a′-na-kaus.

to walk, sik-so′-o; I will walk, nit-a′-ksi-ksi-ni; you will walk, kit-a′-ksi-ksi-ni; he will walk, ta′-ksi-ksi-no.

war, kah′-to-ma; a war-club, ko′-ksa-kin.

warm, kris-to′-yi.

warrior, tsu′-a-pits.

wasp, na′-mo.

water, oh′-i.

weak, ma-tse-kut′-saps.

weeds, ki-sta′-po-tu′-yis; dried grass, ki-pi-ta′-tu-yis.

well, it′-ksu; he got well again, at′-ai-it′-tsu.

wife (my), nit-o-ki′-man.

wind, i′-so-pu; sometimes pronounced, su-po; a strong wind, a-muk′-sa-pu′-yi.

windpipe, o′-ku-stun.

wing, of a bird, o-min′-stra-kin.

winter, stu′-yi; sto′-yi.

within, pi-sto′-tso; without, su-ōh′-so.

wise, mo-ku′-ki-aps.

to wish, te-tsih′-ta.

what? ah-sats′; what more? what else? akh-sas′-ći-ki; what do you say? sa-wa′-ni; when? at what time? sta-nis′-ćis; where? at what place? ći′-ma.

whip, is-ći′-pi-si-ma′-ćis; to whip, is-ći′-pi-sis′.

whiskey, na-pi′-ōh-i, white water.

white, ći-ksi-num′; white cloth, ći-kai-pi′-ći.

who? ta-ka′.

woman, a-ki′-ma; (pl. a-kīks′.)

wood, mis′-tis; stone wood, petrified wood, mis′-tis-oh′-o-tōk; all kinds of hard wood, tsa-si′-ksa; rotten wood, bi′-a-kuk′-si-ksi; split wood, ni-sta′-to-ksaks; a pile of drift-wood in the river, ka-ćis′-ko.

word, e-pu′-o-ksin.

to work, a-po′-to-ki; work (imp.), a-po′-to-kit; I am going to work, nta-ka-po′-to-ki.

to wrap up, a-mo-pit′.

wrist, i-tah′-o-ki-wis-tsi′-pi.

to write, a-sin′-a-ki; write (imp.), sin′-a-kit; writing, sin′-a-ki; books, a-sin′-aks.

Y.

yellow, o-tōh′-u-i.

yes, a.

yesterday, ma-tun′-i-ye.

yet, sa′-ki; he is living yet, sa′-ki-ai-to′-pi-wa.

yonder, o′-mim.

CHAPTER VI.

III. Shyennes.

ETHNOGRAPHICAL HISTORY.

Comparatively little has been published in regard to this tribe of Indians, and their former history is quite obscure. The few facts already recorded seem to render it very probable that they emigrated from the north and northeast to their present location, but I can find no reliable account of their movements or their history, in any works within my reach. How so important and interesting a tribe of Indians has escaped the notice of travellers, is a matter of some surprise. Even the indefatigable Schoolcraft was unable to obtain any extended account of them. From my own personal observations, and from all the sources within my reach, I have constructed the following brief sketch of this tribe.

This nation has received a variety of names from travellers and the neighboring tribes, as Shyennes, Shiennes, Cheyennes, Chayennes, Sharas, Shawhays, Sharshas, and by the different bands of the Dakotas, Shai-én-a, or Shai-é-la, the meaning of which is not known. On the Missouri River, near latitude 45° and longitude 101°, is the entrance of the Great Shyenne River, one of the most important branches of the Missouri. It takes its rise in the divide between the valley of the Yellowstone, and that of the Missouri, and is called by the Dakota Indians, Wash-te'-wah-pa, or Good River. About thirty miles below the eastern base of the Black Hills, is the junction of two important branches, called the North and South Forks of the Shyenne. The South Fork rises far to the northward of the Black Hills, in the arid, tertiary hills which form the dividing ridge between the waters of the Yellowstone and those of the Missouri, and flows around the southern base of the Black Hills, receiving numerous tributaries from the mountains. The North Fork rises in the same dividing ridge, making a flexure around the northern base of the Black Hills, likewise receiving numerous branches, fed by springs in these hills. Uniting, they form the Great Shyenne, as before mentioned. The country bordering this river, from its mouth to the junction of the two forks, is underlaid by the black, plastic, saline clays of the cretaceous system, and is, consequently, for the most part, quite arid and barren. The bottoms, however, forming the immediate valley, are clothed with grass, and furnish a supply of fuel sufficient for all the wants of the Indian. Game is also quite abundant, as elk, deer, and antelope, and in former years, vast herds of buffalo roamed over this region, though at the present time, only now and then a stray bull is seen along this river from mouth to source. In the vicinity of the Black Hills, the clear, beautiful streams that flow from the mountains, swarm with beaver, the prairies are covered with antelope, and the wooded valleys and hills are favorite resorts for elk and deer, the whole rendering

this country one of the most delightful spots to the Indian. We will not at this time describe the country in detail, inasmuch as we shall dwell more at length upon it in our history of the Dakota bands which now roam over it. We now allude to it, from the fact that it seems to be the starting-point in our knowledge of the Shyennes. A little farther up the river, a small stream flows into the Missouri from the north, which is called the Little Shyenne. These streams evidently derived their names, from the fact that they drain the country once occupied by this tribe of Indians.

Those enterprising travellers, Lewis and Clarke, give us no extended account of the Shyennes, and simply allude to them in their Journal.* On their map attached to their report, they locate them near the eastern base of the Black Hills, in the valley of the Great Shyenne River, and state the number at fifteen hundred souls. They also speak of the remains of their old villages along the Missouri (vol. i, p. 149), which seem to show the course of their migrations. Near the mouth of a little stream, named by them "Chayenne" Creek, they observed "a circular work or fort, where the Sharsha or Chayennes formerly lived." There are, also, on one of the banks of the Red River of the North, the remains of an old village of the Shyennes, with an important stream bearing their name. All these forts show quite clearly that the Shyennes either gradually and slowly migrated from the far north to their present location, in search of better hunting grounds, or were driven by the superior strength of their more numerous neighbors. We have the statements of persons now living in that country, that the Dakotas drove them from the Missouri to their present position.

Brackenridge in his Journal of a tour up the Missouri River, in 1811,† says of these Indians that they are a "wandering nation on the heads of the Shyenne River; trade with the Arikaras; speak a different language from any nation I know; their complexion very fair. They trade also with the Spaniards, and have a great number of horses, &c."

During the time of Long's expedition to the Rocky Mountains, in 1819 and 1820, a small portion of the Shyennes seem to have separated themselves from their nation on the Missouri, and associated themselves with the Arapohos, who wandered about the tributaries of the Platte. On page 367, vol. ii: "The Shyennes associated with those wandering tribes (Arapohos, &c.), are a small band of seceders from the nation of the same name, residing upon the Shyenne River. They are said to be daring and ferocious."‡

* Travels up the Missouri, during the Years 1804, '5, and '6, by Captains Lewis and Clarke. London edition, in three volumes.

† Views of Louisiana, together with a Journal of a Voyage up the Missouri River, in 1811. By H. M. Brackenridge, Esq. Pittsburg, 1814.

‡ Account of an Expedition from Pittsburg to the Rocky Mountains, performed in the Years 1819 and 1820, by order of the Hon. J. C. Calhoun, Secretary of War, under the command of Major Stephen H. Long, compiled by Edwin James, Botanist and Geologist to the Expedition. 2 vols., with an Atlas. Philadelphia, 1823.

According to Mr. Morse, in 1822, "this tribe, of 3250 souls, dwell and hunt on the river of this name, a western tributary of the Missouri, a little above the Great Bend."*

We have no means at hand for determining the exact time when these Indians took up their abode in the Platte country. We only know that at the present time they claim, in connection with the Arapohos, the country bordering upon the North and South Platte Rivers. They range, however, in their war excursions and in their search for buffalo, far into the Crow country, along the various branches of Powder River, along the Sweetwater, and even as far to the west and north as the Black Hills, south to the Arkansas, and west to the valley of Green River. Owing to the rapid immigration of white settlers into that region for a few years past, the Indian Bureau has attempted to place these Indians upon a reservation; but they must be taught to cultivate the soil before they will become a contented or a prosperous people.

The writer, attached to a United States Exploring party, under the command of Capt. William F. Raynolds, spent the winter of 1859 and 1860 at the base of the mountains, about a hundred miles above Fort Laramie, on the North Platte. The Indian Agent, who resided at the same place, had several very intelligent Shyenne hunters, from whom much information was obtained. The following extracts are taken from the writer's journal kept at that time.

"There are many instances of Indians possessing several wives, from two to fifteen, but jealousies are constantly arising, and are kept in check only by force on the part of the husband. Every woman rejoices when she finds she is the only lawful wife; and when she suspects that her husband meditates the taking of a second, she throws every obstacle in the way, first by renewed attentions and kindness to her husband, and then by creating difficulties with the intended wife. When an Indian takes several wives, he usually selects one as his favorite. She may be a young woman, or the first wife and the mother of his children. The remainder are intended more as slaves, to dress robes and to perform the drudgery of the lodge.

"Rib, our excellent Shyenne hunter, has been out in pursuit of game for several days, and although one of the best Indian hunters in the country, he has had very poor success. He is very superstitious, like all his tribe, and says it is the moon that is in fault. It is now full moon, and he says that when the moon dies his luck will return again. Thus these people are continually impeded in their efforts by their superstitious notions. The first time he went out hunting during this moon he wounded an antelope; it escaped, and many other chances occurred, yet he returned without meat, to receive the angry looks of the wife, who would give him no supper. Having rested himself he started out again,

* A Report to the Secretary of War of the United States on Indian Affairs. By Rev. Jedediah Morse, D.D. New Haven, 1822.

wounded an elk, and pursued it into the mountains, until it became buried in a snowdrift, from which place it was impossible for him to carry away the meat. The next day he started out again, and found a deer asleep near a little creek: then, too, his gun missed fire. Again he took deadly aim at a deer, and the ball stopped within a few feet of the muzzle of the gun. He now waits patiently for the next moon, when, he says, he will kill an abundance of game.

"Rib has a Dakota wife, one quarter white. She presents the only instance that I have met with among the Indians, in which the woman ruled the man directly. It is very seldom that an Indian allows his wife to gain any power over him, though she may quietly influence him; yet any disobedience of his orders is punished, oftentimes with great severity. In their domestic affairs each one has his or her duty to perform, and there is no interference the one with the other, though the tastes and wishes of the man are consulted, and have the preference. His is the first or principal place in the lodge, usually the farthest from the door. On one occasion Rib ventured to punish his children for some act of disobedience. His wife turned him out of the lodge, and threw all his things out after him. He went away alone quite crestfallen. When rallied for his want of heart, and asked why he did not whip her, he replied that he loved his wife, and did not wish to strike her. So he waited patiently until her wrath cooled, and all was made right again. He says that if he were to punish his wife every time she conducted herself badly, he would be compelled to stand with his whip in his hand all the time, and could not use his gun.

"The Shyennes are a proud race, large and well formed, more like the Dakotas than any tribe I am acquainted with on the Missouri. They are at peace with the Dakotas, and have become so intermarried now, that it is hardly probable that they will ever break their friendly relations. So many of them speak the Dakota language, that their own language is not used at the present time in diplomatic affairs. I have never heard of but one white interpreter for these Indians, and he has long since left them, his knowledge of their language being of no pecuniary benefit to him.

"The Shyennes, like the Dakotas, are quite rigid in regard to the fidelity of their women. When a woman proves false to her husband, which is not common, she is punished with great severity, and not uncommonly with death. When a young man sees a woman fair to look upon, and one which his heart desires, he at once commences to apply his arts. If he succeeds in seducing the woman to elope with him, he immediately escapes to another tribe or band, and if he remains away, nothing is said or done about the matter; but if he returns, in some instances the injured husband kills him, though usually the man who decoyed away the wife gives to the former husband a horse and other presents, and he and a number of their mutual friends gather together at the lodge of the first husband, who hands the latter a pipe, and they all smoke together. The injured husband then

says that his heart was bad, but has now become good, and the past is forgotten. Among the Blackfeet it is not uncommon for a lapse from virtue on the part of the woman to be visited with the worst form of punishment, the cutting off of the nose. A few rare cases have occurred among the Shyennes, but, as Rib says, only bad men do so. In a few cases the women have been killed.

"There is at this time (January, 1860), a serious warlike feeling existing between the Shyennes and the Crows. Each tribe accuses the other of having broken the peace, but, as near as I can ascertain, the Crows are in the wrong. About one year ago, one of the head chiefs of the Crows came to the Platte and stole from the Shyennes about thirty horses. In endeavoring to get them back the latter lost some men and the former some. About a month ago, the Shyennes, in considerable numbers, were encamped on Powder River. The Crows surprised the camp one morning, killed five persons and wounded several others, taking five children prisoners. The Crows being mounted, took the children in front of them on their horses. Being hard pressed by the Shyennes, who were in pursuit, the Crows drew their knives and stabbed the children, and threw them from their horses. The Indians at once removed from the interior to the Platte, near our winter quarters, bringing their wounded with them, most of whom died. One old woman was scalped alive, and though she was not otherwise injured, soon after died. It is considered the greatest insult to a tribe to scalp one of its members in that way. A lad about sixteen years of age, is now with his parents near our camp, with a bullet lodged in his thigh. It is quite uncertain what the result will be. The Dakotas and Shyennes have united against the Crows in a war of extermination. It would seem as though the country which the Crows have so long possessed, and regarded as the finest region in the world, would soon be taken from them. They are surrounded on all sides by enemies.

"At this time (January 25th, 1860), there are several lodges near the Agency. One of the old men has a daughter about sixteen years of age. Near his tent there is a small temporary hut, which is occupied by the girl during her menstrual period. During this time she is not permitted to touch anything, not even a horse, if so, it is considered bad 'medicine,' and unclean. This is a universal custom among all Indians with whom I am acquainted.

"Rib gives me the following information in regard to the religious belief of the Shyennes. He says that they all believe that when a person dies a portion returns to the earth, and another part, the spirit, goes to the Great Spirit, from which it had its origin. It then enters a child again and returns to this world; and should that being at any period during its lifetime walk over the dust of the former body, it also dies. 'Grass, an unusually intelligent Indian, a hunter for the Agent, says, that the Indians are aware that there is a Great Spirit who made the heavens and the earth, but farther than that they know nothing. They mourn for the dead because they are lost to them, and they

know they cannot return. They place food and articles of clothing on the grave, because they think that the spirit continues with the body after death a short period, and then departs for the place where all spirits are gathered together. Grass says that the Indians often hear the spirits of the dead, and know their presence by various noises, but that he himself never saw them, though he has looked for them many times. His own belief is, that when an Indian dies that is the last of him: his body goes to the ground, his flesh to feed the worms, and his bones to form earth. He says also that the other Indians are fools for having any different belief. Is he not an infidel? None of the prairie Indians originally believed in a bad spirit, but have derived that idea from the whites. To sum up the religious belief of the Indians, it is simply an indefinite idea of a great Creator of all things; and farther than that they know nothing.

"The Great Spirit made half of the country for the whites, suitable for raising all kinds of grain, &c. He made the other half for the Indians, mostly prairie, and placed upon it an abundance of game; but that the white men were continually intruding upon them, and would soon drive them into the sea. He illustrates his remark in this way,—that the whites are like ants, and desire to have the whole world for an ants' nest.

"There are no special ceremonies connected with the birth of a child. As soon as a child is born, it is dipped in cold water and wrapped in a blanket. Presents are made to the old woman who acts as midwife. The father desires that the child shall be a boy, to aid him in herding the horses and in the hunt, while the mother prefers it to be a girl, to assist her in carrying wood and in making moccasins. There is considerable ceremony in piercing the ears of the child when it has attained a certain age, say four years. Liberal presents are given to the person who performs the act.

"There is great regularity in the operation of smoking the pipe. The Indians always pass around the pipe, the first man puffing a few whiffs, and then handing it to the one next to him. One person takes hold of the pipe-stem at a certain place, the next one above, and the next below alternately. Should any one fail to observe this order, whether white man or Indian, he cannot get the pipe until he takes hold of it in the proper way. The reason given is, that it is their 'medicine;' that no two men, sitting side by side, shall handle the pipe in the same way. It is also very common for a man, on receiving the pipe, to point the bowl toward the ground, and the stem toward the heavens. There is, perhaps, no more interesting ceremony than that of smoking. It is to them a great luxury, and as they sit in groups around, puffing out large volumes of smoke, and conversing in a low, quiet tone of voice, they present the most perfect picture of happiness and contentment.

"The Indians, both male and female, arrive at the age of puberty at from fifteen to seventeen years, occasionally, though rarely, at thirteen or fourteen. Rare instances are known of females being married at thirteen years of age."

Abortion is produced, to a greater or less extent, among all the Indians. When a woman does not wish to give birth to a live child, she takes a stick which is used for digging the *pomme blanche*, or prairie turnip, and presses the end of it against the abdomen, causing the death of the child in utero. It is very seldom that there is any fatal result to the mother from this operation.

I can find no reliable evidence that any of the prairie Indians are especially neglectful of their aged people. When they become so old that they cannot walk, they are not left to perish, but are provided with horses or a travais, and cared for until they die. There may be cases in which there is a want of filial affection, but the contrary is the general rule. So long as a chief can hunt and go to war, he can maintain his influence in his tribe, but as soon as he fails through age to lead his people to battle, his son takes his place, or some other man who, by acts of bravery, may have elevated himself to the position of chief.

It is not so uncommon for the Indians to have deformed children as one would suppose at first glance. The vicissitudes of a nomadic life usually destroy such children very soon after birth. They are usually cared for in time of plenty, but when food is scarce they are allowed to starve. I was told by the Indians themselves, that many are born deaf and dumb, and blind. An instance occurred of a woman giving birth to four children at a time, two of which were blind. I saw a very pretty half-breed girl among the Crows, who had been deaf and dumb from her birth, otherwise she apppeared bright and intelligent.

There are a great number of dances among the Indians, the most important of which is the sun dance. The names of a portion are given below. Oh-i'-om, the Sun Dance, "to dance and look at the sun." The principal medicine-man gathers all the warriors in the village together at a certain place, and each one makes an offering to the sun, and then they all dance and beat the drum from two to four days, or as long as they can endure without eating or drinking. They do not sing, but whistle a continuous note on a bone instrument, tap the drum, and dance. They also fold the skin in different parts of the body, piercing a hole through it with a sharp knife, insert a stick, and fasten the stick with a cord to a pole above their heads, or the limb of a tree. They then endeavor to break the stick or cord by the pressure of their weight, at the same time giving away a horse, or some other equally valuable present. The fold of skin sometimes tears away, producing a most painful wound. They do this that they may be successful in all their undertakings, have plenty of buffalo, kill numbers of their enemies, have no sickness, &c.

The commencement of this ceremony is brought about by some one in the village having a dream, which informs him that the sun controls all the affairs of life. He then bids all the people to prepare for its performance. The same dance occurs among the Dakotas, and is called by them Wi-wai'-ay-i-wa'-ći.

E-a-ćis-to, Scalp Dance. When a war party goes out against the enemy, and returns with plenty of scalps, all the village, men, women, and children, join in dancing and singing, sometimes for half a day or all night. They also build large fires. The same dance occurs among the Dakotas, and is called by them I-wa'-ki-ći-pi. As the description will apply to the ceremony among both tribes, I quote from the Dakota Dictionary. "This dance follows the bringing home of the scalps of their enemies. A circle is formed, on one side of which stand the young men, with their bodies painted, with their feathers in their heads, and their drums, rattles, and other instruments of music in their hands, while on the other side stand the young women, in their best attire, carrying the scalp or scalps stretched on a hoop. The war song commences, and the women dance around, sometimes advancing towards the men, who are stationary, and then again retreating, and responding at intervals to the music in a kind of chorus. If the scalp is taken in the winter, the dance is kept up, frequently by day and night, until the leaves grow in the spring. If it is taken in the summer, they dance and rejoice over it until the leaves fall off, when it is buried."

O-ta'-mi-mi-sa'-o, Strong Heart Dance. The young men only join in this dance. The Dakotas call it ćaŋ'-te-su-tai'-wa-ći.

E-wōk-si'-hi-wa-to: Dakota, To-ka'-la-wa-ći'-pi, the Fox Dance. The Indians make a large kettle of soup, and dance for good luck. Only the young, unmarried women, that is, virgins, join in this dance.

Ho-tum'-i-ta'-ni-o, Dog Dance; Dakota, I-han'-shi-wa-pa'-wa-ći, the Big Owl Dance. The manner of performance is the same in both tribes. In this dance, all the male sex, and all the virtuous wives join. It is said that not more than four or five women dance.

O-ho-mi-no'-toh-i-o, Soldier Dance; Dakota, Wi'-ćis-ka, the White Belt Dance. Among the Dakotas, the belt that holds all their hunting apparatus is white. Only the young men join in this dance.

O-tu'-a-ta'-ni-o, Bull Head Dance; the same meaning in Dakota, Ta-taŋ'-ka-pa-wa-ći. They perform the most violent gesticulations in this dance. The men form a ring, wearing a bull's head in the shape of a mask, imitating the grunt of a bull. Two women stand inside the ring. It is the most picturesque and exciting of all their dances.

Mo'-he-ta'-ni-o, the Elk Dance; Dakota, He-ha'-ka-wa-ći. This is a sort of Medicine dance. All join, men, women, and children.

Na-ko-yo-su'-is-to, Bear Dance; Dakota, Ma-to'-wa-ći-pi. A man dreams of having a fight with a bear; he awakes in the morning, and if he overcame the bear in his dream, he tells his friends, and they all have a dance. Only the males join. The motions and grunt of the bear are imitated.

As we have before remarked, our previous knowledge of the Shyennes and their language

is very limited. A brief list of the "Words and Vocabularies" of the Shyenne language is given in Ludwig's "Literature of American Aboriginal Languages," to which nothing has been added up to this date. In the Archæologia Americana, vol. ii, p. 379, is a list of the names of the Shyenne chiefs who signed the treaty of July, 1825. It so happens, that all the names were given in the Dakota, and are, therefore, no contribution to the Shyenne.

Reise des Prinzen Maximilian zu Wied, Coblenz, 1839–1841, ii vols., 4to. On pp. 487–489, about sixty-seven words of the Shyenne are given, apparently very correctly taken.

The vocabulary secured by Lieut. Abert, U. S. A., is, perhaps, the most valuable one ever taken, though quite brief. Great use was made of this by Mr. Albert Gallatin, in his Comparison of the Indian Languages. See Transactions of the American Ethnological Society, vol. ii, pp. cxvi–cxviii. It was first published in Abert's Report of his Examination of New Mexico, in the years 1846 and 1847, pp. 467–518, forming a part of Emory's Notes of a Military Reconnoissance, &c., Washington, 1848, 8vo. It seems that it was from Lieut. Abert's vocabulary, that Gallatin first detected the affinity of the Shyenne to languages of the Algonkin stock. "Out of forty-seven Shyenne words for which we have equivalents in other languages, there are thirteen which are indubitably Algonkin, and twenty-five which have affinities more or less remote with some of the languages of that family."*

A vocabulary of nearly three hundred words is published in Schoolcraft's "History and Prospects of the Indian Tribes of the United States," Part III, pp. 346–459. John S. Smith, to whom the credit is given for this vocabulary, is the only white man who ever claimed to have anything like a thorough acquaintance with the Shyenne tongue. He was interpreter and trader for that tribe for many years. He at this time (1860) keeps a trading-house near the mouth of Cache la Poudre creek, on the South Platte.

So far as we can ascertain, the above list comprises everything of an original character, published in regard to the Shyenne language, up to this date.

The following grammatical notes and vocabulary, were obtained during the winter of 1859 and '60, at the Indian Agency on the South Platte, about one hundred miles west of Fort Laramie. I was fortunate in securing the services of a very intelligent Shyenne Indian, who spoke, in addition to his own tongue, the Dakota with almost equal fluency. His wife was a very intelligent Dakota woman, who understood the English language quite well. With the aid of a Dakota interpreter, I would pronounce the words from the Dakota Dictionary, published by the Smithsonian Institution, and the Indian would then give the corresponding words in the Shyenne language. I, therefore, feel much confidence in the accuracy of the materials thus obtained.

* Gallatin, Transactions American Ethnological Society, vol. ii, p. cxi. Langue des Indiens Cheyennes (numerals), Bulletin de la Société de Géographie, Paris, 1846, 8vo. Third series, tome vi, pp. 384–386.

CHAPTER VII.

REMARKS ON THE GRAMMATICAL STRUCTURE OF THE SHYENNE LANGUAGE.

I. Nouns.

1. In the Shyenne language no change is made in the terminations of nouns to indicate their case. The nominative and objective cases are inferred from the position of the nouns in a sentence, and the idea of possession is denoted by fragment-pronouns, which are usually prefixed, and sometimes, though rarely, inserted into the nouns.

2. Nouns have two numbers, singular and plural; and these are usually distinguished by difference of termination, as: (sing.) o'-he, a river; (pl.) o-he'-ist; (sing.) wih'-pōts, a leaf; (pl.) wih'-po-tots; (sing.) mu'-i-no, a horse; (pl.) mu'-i-no-ham; (sing.) na'-e, otter; (pl.) na'-in.

a. There seem to be two forms of the plural number, one of which denotes a moderate number of individuals, and the other a great many; as, (sing.) ho'-ma, a beaver; (1st pl.) ho-ma', several beavers; (2d pl.) ho-ma-e'-yo, a great many beavers.

b. The plural of some nouns is formed by simple change of accent from one syllable to another; as (sing.) ho'-tum, a dog; (pl.) ho-tum'; (sing.) ho'-ma, a beaver; (pl.) ho-ma'; (sing.) no'-man, a fish; (pl.) no-man'.

3. The gender of nouns is denoted by the use of different words; as, o-to-a', a bull; mi, a cow; o-tu'-a-mu, a male elk; mi'-i-mu, a female elk; wo-stun', a man; hi, a woman.

II. Adjectives.

4. In the Dakota, Blackfoot, Crow, and other Indian languages of the Northwest, the adjective usually follows the noun which it qualifies; but in the Shyenne it most commonly precedes, though examples of both cases occur; as, e-ku'-si-si'-o-tum, a sharp-nosed dog; mōh-ta'-o-hum, a black horse; mai-is'-ći, a red shirt. In the following instances, the adjective follows the noun: ho'-i-av-si-wa', bad lands; wo-i'-ha-i-nōt, thick clouds; i-shi'-ni-pit'-siv, a snowy day.

5. Adjectives have two numbers, singular and plural, the same as nouns. There are also two plural forms; as,

Singular.	Plural. 1st form.	2d form.	
na-tōs,	na-to-si-o,	na-to'-sis-to,	cold.
no-mōh'-ta,	no-mōh'-tai-yo,	no-mōh'-tas-to,	well.
i-ha'-i-yōm,	i-ha-i-yo'-mi-o,	i-ha-i-yo'-mis-to,	fat.
e-ho'-ni-ćist,	e-ho'-ni-ćis'-ta-o,		lazy.
e-wo'-kōm,	e-wo-ko'-mi-o,	e-wo-ko'-mo-nist,	white.

6. The cardinal numbers are as follows:

one, nōh.
two, nih.
three, na'-a.
four, ni-pa.
five, nōn.
six, na-su'-tu.
seven, ni'-so-tu.
eight, na-nōh'-tu.
nine, sōh'-tu.
ten, ma-tōh'-to.
eleven, ma-tōh'-to-o-ta-nōh'.
twelve, ma-tōh'-to-o-ta-nih'.
thirteen, ma-tōh'-to-o-ta-na'-a.
fourteen, ma-tōh'-to-o-ta-ni'-pa.
fifteen, ma-tōh'-to-o-ta-nōn'.
sixteen, ma-tōh'-to-o-ta-na-su'-tu.
seventeen, ma-tōh'-to-o-ta-ni'-so-tu.
eighteen, ma-tōh'-to-o-ta-na-nōh'-tu.
nineteen, ma-tōh'-to-o-ta-sōh'-tu.
twenty, ni-so'.
twenty-one, ni-so'-o-ta-nōh'.
thirty, na-no'.
thirty-one, na-no'-o-ta-nōh'.
forty, ni-pu'.
fifty, no-no'.
sixty, na-so'-to-nu.
seventy, ni-so'-to-nu.
eighty, na-nōh'-to-nu.
ninety, sōh'-to-nu.
one hundred, ma-tōh'-to-nu.
two hundred, nih'-a-ma-tōh'-to-nu.
three hundred, na'-a-ma-tōh'-to-nu.
four hundred, ni'-pa-ma-tōh'-to-nu.
five hundred, nōn'-ma-tōh'-to-nu.
six hundred, na-su'-tu-ma-tōh'-to-nu.
seven hundred, ni-so'-tu-ma-tōh'-to-nu.
eight hundred, na-nōh'-tu-ma-tōh'-to-nu.
nine hundred, sōh'-tu-ma-tōh'-to-nu.
one thousand, ma-tōh'-tu-ma-tōh'-tu-nu.

7. Other forms occur, either as numeral adjectives or adverbs.

i-o-ni'-so-wah'-si-o, twice, in two ways.
nīh'-ut-si-na'-wo, a double-barrel gun.
ni-ni-shish', you two.
e-no'-ka, one pair.
e-nih-anst', two pairs.
e-na-hanst', three pairs.
na-sūh'-ta-tsi'-na-wo, six mouths, a revolving pistol.
i-na-sōh'-to-yōs, six toes, a man with six toes.
e'-ni-wo'-wa-tanst', in four ways, four times.

III. Adverbs.

8. Adverbs usually precede the verbs which they qualify; as, po-no-i-wo'-no-o-ist, to throw anything down; i-hav'-siv-i-mi'-i-ōts, to smell badly.

IV. Prepositions.

9. Prepositions generally follow the nouns which they govern; as, ho-ev', on the ground.

V, VI. Conjunctions and Interjections.

10. Of conjunctions and interjections there are but few. Most of the former are connected with other words, though a few are separate; as, ma'-tu, and, also.

VII. Pronouns.

11. The fragment or incorporated pronouns are prefixed to, or inserted into nouns, adjectives, and verbs.

ma, an arrow.
ma-hōts′, pl. arrows.
na-ma′, my arrow.
ni-ma′, thy arrow.
ho-ist′, a fire, or his fire.
na-to′-ist, my fire.
ni-to′-ist, thy fire.
ho-i′-stats, pl. fires, or their fires.
na-to′-is-tam, our fires.
ni-to′-is-tam, your fires.
ma′-ćīk, a bow, or his bow.
ma′-takst, pl. bows.
na-ma′-ćīk, my bow.
ni-ma′-ćīk, thy bow.
mo′-ćīk, a knife.
na-mo′-ćīk, my knife.
ni-mo′-ćīk, thy knife.
i-mo-ćīk, his knife.
mo-takst′, knives.
na-mo-takst′, our knives.
ni-mo-takst′, your knives.

12. The following are the words that denote kindred, and changes are made to denote the person of the relationship affirmed, by prefixing to the nouns the fragmentary personal pronouns; as,

na-ho-e′, my father.
na-ko-e′, my mother.
na′-a, my son.
na-tōn′, my daughter.
na-nih′-a, my grandchild.
ni-nih′-a, your grandchild.
nih′-a, a grandchild.
na-e-ih′-a, my great grandchild.
na-ni′-a, my elder brother (spoken by a male).
na-ta′-ta-nim, my elder brother (said by a female).
nam′-ham, elder sister (said by a male).
hiu′-i, elder sister (said by a female).
i′-he-mi-ōts, she is an elder sister.
na′-he-mi-ōts, she is my elder sister.
ni′-he-mi-ōts, she is your elder sister.
nah′-a-him, my younger sister (said by a male).
ni-ah′-a-him, your younger sister (said by a male).
i-ah′-a-him, his younger sister (said by a male).
is′-i-ma, younger sister (said by a female).
na-is′-i-ma, my younger sister (said by a female).
ni-is′-i-ma, your younger sister (said by a female).
na-hi′-ni-hi′-nōts, my brothers.
na-e′-ka-e′-ni-nōts, my sisters.
ni-to′, brother-in-law.
ni-tam′, sister-in-law (wife's sister).
na-wi′-si, a woman's husband's brother's wife.
him′-shim, a father-in-law.
na-nim-shim′, my father-in-law.
ni-nim-shim′, your father-in-law.

na′-him-shim′-i-nōt.
ni′-him-shim′-i-nōt.
i′-him-shim′-i-nōt.
na′-him-shim′-i-no.
ni′-him-shim′-i-hu.
ni′-him-shim′-i-no.
} (?)

na-han′, his aunt.
na-na-han′, my aunt.
ni-na-han′, your aunt.
it-sin′-ōt, nephew, his nephew.
na-tsin′-ōt, my nephew.
ni-tsin′-ōt, your nephew.
na-it-sin′-o-ta, our nephews.
ni-it-sin′-o-ta, your nephews.
na-ham′, his niece.
na-na-ham′, my niece.
ni-na-ham′, your niece.
na-na-hai′-ha-mi-nuts, our nieces.
na-hai′-ham-i-wo, our nieces.
e-mi-shim′, his stepfather.
na-mi-shim′, my stepfather.
ni-mi-shim′, thy stepfather.
nish′-ki-e, mother-in-law (said by male and female).
hi-hum′, a husband.
hi-hum′-i-wo, pl. husbands.
na-i-hum′, my husband.
ni-i-hum′, thy husband.
e-is′-tsi-im, his wife.
e-is′-tsi-im′-i-o, his wives.

na-tsi-im′, my wife.
ni-tsi-im′, thy wife.
ni-sis′, a man's male cousin.

13. The single pronouns are divided into separate or incorporated, or those which form separate words, or those which are prefixed to or inserted into verbs, adjectives, and nouns.

The following is a list of the principal separate pronouns, personal or otherwise:

na-ni′hu, I.
ni-ni′-hu, thou.
i-ni′-hu, he or it.
na-ni′-hu-in, we.
ni-ni′-hu-in, you.
in-i-hu-wi′-o, they.
na-tsi′-ōts, mine.
nis-tsi′-ōts, thine.
is-tsi′-ōts, his, hers, its.
nat-so-tan′, me, myself.
nit-so-tan′, thou, thyself.
is-tso-wiv′, they, themselves.
nc′-wi-shi′-wōs, both, they two.
ni-wa′-as, who.
ni-wa′-si-o, pl.
hi′-nu-wa′-it, what.
to′-nish, when.
tas, which.
to-nist′, how many.
no′-tsi-to, this.
nis′-i-wo, that.
he-to′, these.
he-to-is′-ta-nuts, those.
no-nis′-to-whews, those.

VIII. Adjectives.

14. Adjectives and adjective-verbs are declined, by prefixing the fragment-pronouns, in the following manner:

na-pi′-wa, I am good.
ni-pi′-wa, thou art good.
i-pi′-wa, he is good.
na-pa′-wan, we are good.
ni-pi′-wan, you are good.
i-pi′-wa-na′-no, they are good.

na-tai′-pa-wan, I will be good.
ni-tai′-pa-wan, thou wilt be good.
e-tai′-pa-wan, he will be good.
na-tai′-pa-wa′-na-nōn, we will be good.
ni-tai′-pa-wa′-na-nōn, you will be good.
e-tai′-pa-wa′-na-no, they will be good.

*na-shi-pau′-a, I am already good or handsome.
ni-shi-pau′-a, thou art already good or handsome.
i-shi-pau′-a, he is already good or handsome.
na-shi-pau′-av, we are already good or handsome.
ni-shi-pau′-av, you are already good or handsome.
i-shi-pau′-av, } they are already good or handsome.
i-shi-pau′-a-na-no, }

na-pau′-hai, } I am handsome or pretty.
na-pe′-whai, }
ni-pau′-hai, thou art handsome or pretty.
i-piv′-hai, he is handsome or pretty.
na-pau′-haim, I am handsome or pretty.
ni-pau′-haim, you are handsome or pretty.
i-pau-hai′-yo, }
i-pau-hais′-to, } they are handsome or pretty.
i-piv-hais′-to, }

na-pi′-wi-e-wi, I am well, or in good condition.
ni-pi′-wi-e-wi, thou art well.
i-pi′-wi-e-wi, he is well.
na-pi′-wi-iv′-nim, we are well.
ni-pi′-wi-iv′-nim, you are well.
i-pi′-wi-iv′-ni-o, } they are well.
i-pi′-wi-iv′-nis-to, }

* The adverb nish is inserted, meaning now, already, quickly.

na-na′-tōs, I am cold.
ni-na′-tōs, thou art cold.
i-na′-tōs, he is cold.
na-na′-to-sim, we are cold.
ni-na′-to-sim, you are cold.
i-na′-to-si′-o, i-na′-to-sis′-to, } they are cold.
na-sa′-na-to-sin, I am not cold.
ni-sa′-na-to-sin, thou art not cold.
i-sa′-na-to-sin, he is not cold.
na-sa′-na-to-si′-him, we are not cold.
ni-sa′-na-to-si′-him, you are not cold.
i-sa′-na-to-si-hi-o, they are not cold.

na-shi-na′-tōs, now I am cold.
ni-shi-na′-tōs, now thou art cold.
i-shi-na′-tōs, now he is cold.
na-shi-na′-to-sim, now we are cold.
ni-shi-na′-to-sim, now you are cold.
i-shi-na′-to-si-o, i-shi-na′-to-sis-to, } now they are cold.

There is a form in frequent use among the Shyennes, which expresses future time by prefixing an adverb; as:

nōh′-a-na-na′-tōs, I will be cold.
nōh′-a-ni-na′-tōs, thou wilt be cold.

na-no-mōh′-ta, I am well (not sick).
ni-no-mōh′-ta, thou art well.
e-no-mōh′-ta, he is well.
na-no-mōh′-tam, we are well.
ni-no-mōh′-tam, you are well.
e-no-mōh′-tai-yo, e-no-mōh′-tas-to, } they are well.

i-mōh-tan′, black.
na-mōh-tan′-wa, me black, I am black.
ni-mōh-tan′-wa, thou art black.
i-mōh-tan′-wa, he is black.
i-mōh′-ta-whai′-yu, black-black (emphatic), like the Dakota sap-sap′-pa.

IX. Verbs.

15. Shyenne verbs have three moods, indicative, imperative, and infinitive; three tenses, present, past, and future; three persons, first, second, and third; two numbers, singular and plural. There are two forms of the plural; the common form meaning a number or several, and the other is probably caused by the addition of a-is′-to, a great many, like the similar form in the Blackfoot verbs, by the addition of a-ku′-a-wa.

na-wi′-ats, I am.
ni-wi′-ats, thou art.
i-wi′-ats, he is.
na-wi′-at-sim, we are.
ni-wi′-at-sim, you are.
i-wi′-at-si′-o, they are.
i-wi′-at-sis′-to, they are.

na-pau′-i-mit, I give liberally.
ni-pi′-wi-mit, thou givest liberally.
i-pau′-i-mitst, he gives liberally.
na-pi′-wi-mi-tain, we give liberally.
ni-pi′-wi-mi-tain, you give liberally.
i-pi′-wi-mi-ta, i-pi′-wi-mi-tai′-yo, } they give liberally.

By inserting the word *nish*, now, at once, quickly, we have the other forms of this verb, conjugated as follows:

na-shi-pau′-i-mit, I give liberally now.
ni-shi-pi′-wa-mit, thou givest liberally now.
i-shi-pi′-wa-mi′-o, he gives liberally now.
na-shi-pi′-wa-mi′-tain, we give liberally now.

ni-shi-pi′-wa-mi-tain, you give liberally now.
i-shi-pi′-wa-mi′-a-to, they give liberally now.

SECOND FORM.

na-pi′-wi-i-shi, I give liberally now.
ni-pi′-wi-i-shi, thou givest liberally now.
i-pi′-wi-i-shi, he gives liberally now.
na-pi′-wi-i-shi′-im, we give liberally now.
ni-pi′-wi-i-shi′-im, you give liberally now.
i-pi′-wi-i-shi′-i-o, i-pi′-wi-i-shi′-is-to, } they give liberally now.

na-mis′-a, I eat.
ni-mis′-a, thou eatest.
i-mis′-a, he eats.
na-mis′-em, we eat.
ni-mis′-em, you eat.
i-mis′-i-o, they eat.

na-shi′-i-ni-mis′-a, I eat quickly now.
ni-shi′-i-ni-mis′-a, thou eatest quickly now.
i-shi′-i-ni-mis′-a, he eats quickly now.
na-shi′-i-ni-mis′-em, we eat quickly now.
ni-shi′-i-ni-mis′-em, you eat quickly now.
i-shi′-i-ni-mis′-i-o, they eat quickly now.

na-mis′-a-tun, I will eat.
ni-mis′-a-tun, thou wilt eat.
i-mis′-a-tun, he will eat.
na-mis′-a-tun-ōm, we will eat.
ni-mis′-a-tun-ōm, you will eat.
i-mis′-a-tun-ōh′-to, they will eat.

mis′-a (imp. sing.), eat. (Dakota, wo-ta-wo′.)
wi′-na-mis′-a (imp. pl.). (Dakota, wo-ta-po′.)

This verb may also be negatively conjugated by the insertion of the negative particle *sa*.

na-sa′-mis-a-tun, I will not eat.
ni-sa′-mis-a-tun, thou wilt not eat, &c.

na-pi′-o-si-man, I think badly of some one secretly in the heart.
ni-pi′-o-si-man, thou thinkest badly, &c.
i-pi′-o-sim, he thinks badly, &c.
na-pi′-o-si-ma′-nim, we think badly, &c.
ni-pi′-o-si-ma′-nim, you think badly, &c.
i-pi′-o-si′-mi-o, i-pi′-o-si′-mo-ći′-sto, } they think badly, &c.

e′-wi-ist (infinitive), to beg.

na-wi-is′-to-mo, I beg.
ni-wi-is′-to-mo, thou dost beg.
i-wi-is′-to-mo, he begs.
na-wi-is′-to-mo′-in, we beg.
ni-wi-is′-to-mo′-in, you beg.
i-wi-is′-to-mo′-i-o, they beg.

mi′-ta-nut, to remember.

na-mi′-ta-nut, I remember.
ni-mi′-ta-nut, thou dost remember.
i-mi′-ta-nut, he remembers.
na-mi-ta′-nut-a-nu, we remember.
ni-mi-ta′-nut-a-nu, you remember.
i-mi-ta′-nut-o, they remember.

na-o′-mo-tōm, I breathe.
ni-o′-mo-tōm, thou breathest.
i-o′-mo-tōm, he breathes.
na-o′-mo-to-mim, we breathe.
ni-o′-mo-to-mim, you breathe.
i-o′-mo-to′-mis-to, they breathe.

o′-mo-tōm (imp. sing.) breathe.
o′-mo-to-mist (imp. pl.)

na′-no-mats, I steal.
ni′-no-mats, thou stealest.
e′-no-mats, he steals.
na-no-ma′-tsim, we steal.
ni-no-ma′-tsim, you steal.
e-no-ma′-tsi-o, e-no-ma′-tsi-to, } they steal.

na-tai′-no-mats, I will steal, I am going to steal.
ni-tai′-no-mats, thou wilt steal.

e-tai′-no-mats, he will steal.
na-tai′-no-ma′-tsim, we will steal.
ni-tai′-no-ma′-tsim, you will steal.
e-tai′-no-ma′-tsi-o, e-tai′-no-ma′-tsi-to, } they will steal.

na-ni′-no-mats, I have stolen, I am done stealing.
ni-ni′-no-mats, thou hast stolen.
e-ni′-no-mats, he has stolen.
na-ni′-no-ma′-tsim, we have stolen.
ni-ni′-no-ma′-tsim, you have stolen.
e-ni′-no-ma′-tsi-o, e-ni′-no-ma′-tsi-to, } they have stolen.

no-ma′-tsi-ōst (imp. sing), steal thou.
no-ma′-tsi-o (imp. pl.)

na-ōh-to′, I trade or barter.
ni-ōh-to′, thou dost trade or barter.
e-ōh-to′, he trades or barters.
na-ōh-to′-wam, we trade or barter.
ni-ōh-to′-wam, you trade or barter.
e-ōh-to′-wa-o, e-ōh-to′-wa-to, } they trade or barter.

na-tai′-ōh-to, I will trade or barter.
ni-tai′-ōh-to, thou wilt trade or barter.
e-tai′-ōh-to, he will trade or barter.
na-tai′-ōh-to-wam′, we will trade or barter.
ni-tai′-ōh-to-wam′, you will trade or barter.
e-tai-ōh-to-wa′-o, e-tai-ōh-to-wa′-to, } they will trade or barter.

na-i-nōh′-to, I have traded or bartered, or I have done trading.
ni-i-nōh′-to, thou hast traded, &c.
e-nōh′-to, he has traded, &c.
na-i-nōh′-to-wam, we have traded, &c.
ni-i-nōh′-to-wam, you have traded, &c.
e-nōh′-to-wa-o, e-nōh′-to-wa-to, } they have traded, &c.

na′-am, I shoot.
ni′-am, thou dost shoot.
i′-a-mo, he shoots.
na′-a-mōn, we shoot.
ni′-a-mōn, you shoot.
i′-a-mōv, they shoot.

na-ta′-am, I will shoot.
ni-ta′-am, thou wilt shoot.
i-ta′-a-mo, he will shoot.
na-ta′-a-mōn, we will shoot.
ni-ta′-a-mōn, you will shoot.
i-ta′-a-mōv, they will shoot.

na′-ni-am, I have shot.
ni′-ni-am, thou hast shot.
i-ni′-a-mo, he has shot.
na-ni′-a-mōn, we have shot.
ni-ni′-a-mōn, you have shot.
i′-ni-a-mōv′, they have shot.

am (imp. sing.) shoot.
ta′-mi (imp. pl.)

na-na′-i-yōts, I am dead.
ni-na′-i-yōts, thou art dead.
i-na′-i-yōts, he is dead.
na-na′-i-yo′-tsim, we are dead.
ni-na′-i-yo′-tsim, you are dead.
i-na′-i-yo′-tsi-o, they are dead.

na′-to-isé, I wrap up anything.
ni′-to-isé, thou wrappest up anything.
i′-to-isé, he wraps up anything.
na′-to-is′-éi-nōn, we wrap up anything.
ni′-to-is′-éi-nōn, you wrap up anything.
i′-to-is′-éi-no, they wrap up anything.

nah′-ai-im, I cry.
ni-ah′-ai-im, thou criest.
i-ah′-ai-im, he cries.
nah′-ai-a-mim, we cry.
ni-ah′-ai-a-mim, you cry.
i-ah′-ai-a-mi-o, they cry.

e-ah′-ai-a-mi (imp. sing.), cry.

na-sa-ah′-ai-im, I do not cry.
ni-sa-ah′-ai-im, thou dost not cry.

nah-po-o′-isć, I bind or tie.
ni-ōh-po-o′-isć, thou dost bind or tie.
e-ōh-po-o′-isć, he binds or ties.
na-ōh-po-o′-is-ći-nōn, we bind or tie.
ni-ōh-po-o′-is-ći-nōn, you bind or tie.
e-ōh-po-o′-is-ći-no, they bind or tie.

e-ōh-po-o′-inst (imp.)

na-ta′-mit, I give.
ni-ta′-mit, thou givest.
i-ta′-mit, he gives.
mi′-tsi (imp.), give.
ni-mitst (imp.), give me.
tsi′-vi-mit (imp.), not give.
nu-ha′-na-ta′-mit, hold on, I give.

i-shi-mansć′, to be done or finished.

na-shi-mansć′, I am done or have finished.
ni-shi-mansć′, thou art done or hast finished.
na-shi-man′-sći-non, we are done or have finished.
ni-shi-man′-sći-non, you are done or have finished.
i-shi-ma′-ni-o, they (a moderate number), are done or have finished.
i-shi-man′-sći-no, they (a great many), are done or have finished.

NAMES OF TRIBES, PERSONS, AND RIVERS.

o-e′-tun′-i-o, the Crows.
so′-so-ni and so′-so-i-ha′-ni, Snakes.
i-tun′-i-wo, the Skymen, Arapohos.
o-o′-ho-mo-i′-o, Dakotas generally.
o-tōh′-sōn, Little Stars, Ogallalas.
mōh-ta′-wa-ta-ta′-ni-o, Blackfeet Dakotas, the Blackfeet people.
ma′-i-sin-as, Sansarcs, No-bows, same meaning as with the Dakotas.
wo-ni-to′-na-his, Brulees, Burnt Thighs.
nih′-a-o-ćih′-a-is, Two Kettle band.
ho-tum′-mi′-hu-is, the Band that eat no dogs.
mi′-sis: one half of the Shyenne tribe call themselves mi′-sis; same name as the Platte River.
po-no-i′-ta-ni-o, the name of the other portion of the Shyennes. Different nations with whom they have been at war, gave them the name, shai-en′-a, shai-e′-la, &c.
na′-to-wo-na, the Mississippi Dakotas.
ho-he′-i-o, Assiniboins.
mōh-tau-hai′-ta-ni-o, the Blackmen, Utes.
ka-ko′-is-tsi′-a-ta′-ni-o, people who flatten their heads; the Flatheads.
po′-o-mas, blankets whitened with earth, Blackfeet.
his-tu-i′-ta-ni-o, Gros Ventres of the prairie, Atsínas. The Shyennes say that the Atsínas call themselves, "men" or "people;" hence, they have another name for them, e-ta′-ni-o, which means a people.
wi-tup-a′-tu, Comanches.
shish-i-nu′-wut-tsit′-a-ni-o, the Rattlesnake people, Kiowas; shish-i-nu′-wut, a rattlesnake.
o-ni′-ha-o, the Drum-beaters, Omahas.
ho-ni′-i-ta-ni-o, the Little Wolf people, Pawnees.
o-no′-ni-o, Arickaras.
mo-no′-ni-o, Mandans.
ma-wi′-o, Red-bodied people, Mormons.
mish-i-si′-wi-o, people with hairy noses, Spaniards.
ka-he′-ta-ni-o, people with white ermines, some people who accompanied the Spaniards to trade with the Shyennes, and tied their hair with strips of white ermine skin.
hev′-hai-ta-ni-o, the hairy people, a band of the Shyennes.
is-is-i-wi′-ho-niv, head chief of the mi′-sis band.
tsi-wi′-o-nirst, the name of a chief.
he-o-ma′-ast, the Red Body, a woman's name.
ni-ni-i′-o-he, the Platte River.
wa-at′-si-wa′-i-yo-he, Deer Creek.
hi-na-i-yu′-he, Laramie Fork.
tsin′-o-o-no, Box Elder Creek, Bad-wood Creek.
ha-ha′-o-he, Very Windy Creek.
nah-o-i-yo′-he, Bear Creek.
ōh-i-i′-o-he, Lodge Pole Creek.
a-wo′-a-na-tsi′-o-he, the creek where the Pawnees cry. The Pawnees went to war with the Shyennes, and had several of their number killed; on their re-

turn, they stayed four days on this creek, and cried for revenge, without eating or drinking.

wi-ta-ni'-o-he, Fat River, South Platte.

mah-i-mi'-no-i-o-he, Plum Creek.

i'-o-mit, Turbid or Muddy Water, Missouri River.

mo-e-i-o'-he, Elk River, Yellowstone.

NAMES OF THE PRINCIPAL MAMMALS.

o-to-a', a male buffalo. *Bos Americanus.*

mi, a female, a cow.

mōk-si-ai', a calf.

is'-i-wan, a herd of buffalo.

o-tu'-a-mu, a male elk. *Cervus Canadensis.*

mi'-i-mu, a female elk.

mu-ki-his', a young elk.

mu-e', a herd of elk.

o-tu'-a-kūs, mountain sheep, male. *Ovis Montana.*

mi'-i-kūs, female sheep.

ku-sai'-i-su, young sheep.

ku-sun', a flock of sheep.

o-tu'-o-wo-ka, white-tailed deer. *Cervus leucurus.*

mi'-i-wo'-ka, female deer.

wo-ka-hais', young deer.

wo-ka'-i, a herd or flock.

mōh'-ta-wi-wast-wa-wo'-tsi-wa, black-tailed deer. *Cervus macrotis.*

mōh'-ta-wi-wast-wo'-tsi-wan, black-tailed deer, (pl.)

wa-ko-tsi-wai-is, small or young black-tailed deer.

wo'-ka, antelope. *Atilocapra Americana.*

wūh-o'. *Lepus artemisia.*

ai'-ni-wo. *Lepus campestris.*

wōh-is', swift fox, kit fox. *Vulpes velox.*

ma-ta-i'-wōh-is', large red fox. *Vulpes macrourus.*

ha'-o, a skunk. *Mephitis mephitica.*

mōh'-ta-wi-na'-ku, a black bear. *Ursus.* Na'-ku, a bear.

mi'-ni-wa-ka'-o. *Spermophilus tridecem lineatus.*

mi-ni-wa-ka'-tsi-po-ast. *Tamias quadrivittatus.*

no-e', red squirrel of the pines.

he-ko'-wit, a porcupine. *Erethizon epixanthus.*

NAMES OF BIRDS, SERPENTS, ETC.

mo (sing.), mo'-e (pl.), magpie. *Pica Hudsonica.*

ma-ka-i-tai'-wi-kis, a humming bird, iron bird.

ni'-po-tats-pi, nighthawk. *Chordeiles popetue.*

ai'-sto-mo-pi, poorwill. *Antrostomus Nuttalli.*

a-o-tsi'-mis-taé, prairie owl. *Athene hypugæ.*

si-wa'-ni-shish, fish-duck. *Merygus Americanus.*

po-pai'-ki-ta-nais, sandpiper. *Tringa.*

mih'-a-is, chickadee. *Parus septentrionalis.*

e-it', Maximilian's jay. *Gymnokitta cyanocephala.*

a-ka-wo'-i-tu is', sap-sucker.

ma-i-shi'-o-nun, robin-redbreast. *Turdus migratorius.*

sus'-ki-wat, a small, gray, winter sparrow.

ko-nah-tum', gray-crowned finch. *Leucosticte tephrocotis.*

mah-e-mis'-ta-a, large eared owl. *Otus Wilsonianus.*

mis-ta-kis', small gray owl. *Nyctale acadica.*

mai'-ya-tak, spatula-billed duck. *Apatula clypeata.*

sis-ta-to'-wi-kis, Say's flycatcher. *Sayornis Sayus.*

o'-i-na, small woodpecker, with a red band on back of the neck.

o-ha'-mi-shish', green-winged teal. *Nettion Carolinensis.*

ha-ma-shish', blue-winged teal. *Querquedula discors.*

mo-he-nuh, a rusty yellow hawk.

hau'-no-wa-wi-kis, butcher bird.

ho-i-no'-si-wi-kis, common snowbird. *Junco hyemalis.*

ha-ćim, mud-hen. *Fulica Americana.*

wōh-a, bald eagle. *Haliœtus leucocephalus.*

ai'-e-no, a kind of hawk.

o'-ko-um, a small screech owl. *Scops asio.*

mo-e'-a, domestic pigeon.

mah-e-min', wild pigeon. *Ectopistes migratoria.*

he-mi-ni'-su, turtle-dove. *Zenaidura Carolinensis.*

shish-to-tu'-wi-kis, cedar bird. *Ampelis cedrorum.*

mai'-e-sai'-e, chee wink. *Pipilo arcticus.*

mat-si'-ni. *Tyrannus Caroliniensis.*

o'-e-ni, little nuthatch. *Sitta Canadensis.*

ma-e-wis', red-breasted grosbeak. *Guiraca melanocephala.*

sus-ki'-wat, a brown bunting.

mi-wa-wi'-kis, butcher bird. *Collyrio excurbitoides.*
e-a-wo-éi-mo-pa, a cuckoo. *Coccygus Americanus.*
mah-ta'-he-in, white-winged blackbird. *Dolichonyx oryzivorus.*
e-nis'-ko-na'-wi-wo-to'-nats, martin. *Progne purpurea.*
shih-o-to'-ne, banded-tailed hawk.
no-man'-to-ki-si-wa'-nōs, a kind of hawk.
mo-ta'-wo-is-tōm, a kind of hawk.
po-pa'-ki-ta-no'-i-sun, a sandpiper. *Tringoides.*
he-i'-mi-e. (?)
shi'-ish, a heron. *Ardea herodias.*
wi-i-e', bittern. *Botaurus lentiginosus.*
mo-o-ko', whooping crane. *Grus Americanus.*
wo'-a, a swan. *Cygnus buccinator.*
he'-na, a brant goose.
wo-ko-mi'-na, a white goose.
mai-a-tauh, a goosander.
shi-wa-ne-shish', red-breasted teal. *Querquedula cyanopteris.*
o-wish', long-billed curlew. *Numenius longirostris.*
pa'-wi-wi-kis, wax wing. *Ampelis garrulus.*
shish-to-to'-wa'-hi-yis, ruffed grouse. *Bonasa umbellus.*
shi-shi-noh'-uts, a rattlesnake. *Crotalus confluentus.*
sas-ko'-wi-tan, a striped water-snake. *Eutainia Haydeni.*
ni-e', large prairie snake. *Pituophis Sayi.*
o-ho'-i-tsi-mim, a green snake. *Bascanion flaviventris.*
ka-ko'-i-mim, a bull snake. *Heterodon nasicus.*
ma'-i-min. (?)
moh'-ta-wi-min, water moccasin. *Nerodia sipedon.*
ais'-tōh'-an, a round turtle that sits on the prairie, looks like a "buffalo chip," and if undisturbed, watches the sun, and turns with it.
ha-ta'-o-wis, a swift, or lizard, found in the sand-hills. *Plestiodon.*

ho'-o-ma, a musquito.
hah'-nōm, a horse-fly.
minst'k-so-ni, small insects, ants, lice, &c.
mi'-shi-min, caterpillars.

NAMES OF PLANTS.

ho-i-nai'-i-mo-i, a plant found near the summits of the high mountains, growing on the rocks in thick masses, like moss.
wih-éi-wa-no, *Sarcobatus vermicularis*, called by the traders "grease-wood." It is a chenopodiaceous plant, grows in thick clumps, three to six feet high, and is often used for fuel by the Indians and voyageurs in their travels over the treeless prairies. It is very abundant throughout the saline clays of the cretaceous and tertiary formations of the Upper Missouri, but more especially abundant in the valleys of the Yellowstone and Missouri near their sources.
tōh-to-i-wih'-i-wa'-no, a shrub somewhat similar to the last.
mah'-i-wa'-no, *Artemisia trifida*, a very abundant shrub along the bottoms of streams, as well as the uplands on the Upper Missouri. It grows sometimes to the height of ten feet, with stems six inches in diameter, and is also useful for fuel.
he'-i-wa-nost', *Artemisia frigida*, wild sage.
kōk-si-wa'-no, a species of *Artemisia* like *A. trifida*, growing on the Big-horn Mountains.
wa-ni'-tsi-pa-i-me'-i-its, a low sage; herbaceous.
mah-i-mi'-ka-ist, *Linosyris graveolens*, a shrub associated with the grease-wood and sage, and used as fuel.
o-i-nai'-i-ko-wōst, *Phlox Hoodi*, a low species; looks like gray, rigid moss.
ha-ma-mih'-a-ist, *Gutierrizia euthamiæ.*
wōh-pi-wih'-i-wa-no, *Eurotia lanata.*
éi-hōs-éi'-a-wo'-e-ist, a *Solidago*, named from its large yellow flowers.
mi-mi'-a-tōn, spruce pine. *Abies.*
wa'-no-wan, *Frasera*, a tall plant growing in the mountains.
ha-ma-sis'-ti-to, *Pinus.*
he-yo-wo'-ist, all kinds of moss.
mah-i-no-a-ni'-o-nuts, *Chimaphila umbellata.*
shi-ni-wa'-tsi-wa-mo'-e, *Potentilla Norvegica.*
ma-ōst', a tall, fine species of *Eriogonum.*
he-ho-wa-nis'-tōts, a yellow moss like lichen, used for dyeing porcupine quills.

he-si'-i-yo-tsi'-mo-ist, *Marchantia polymorpha*, used as a medicine.

tsiĥ-i-wōp-tsa'-a-wo-ist, *Achillea millifolium.*

wo-ko-mi-si'-i-ōts, *Entoca sericea.*

tōĥ'-to-i-wa-nōst, a gray shrubby plant, like *Linosyris.*

tōĥ-to-i-ćiĥ'-i-wo-yast, a common ground lichen.

tsi-waks-tsi'-a-wo-ist, a fire-weed growing on the tops of the mountains. *Erechthites.*

tōĥ-to-e'-o-pais, a fungus, a small puff-ball.

ćiĥ-ća-e'-o-ni'-o-wist, a shrub growing abundantly in the Shyenne country.

mish-kim', box elder. *Acer negundo.*

hais-taĥ-pa-nis'-to-tuts, "white grass or weeds;" a low species of *Erigonum* growing among the rocks.

eĥ'-o-wo-ist, "jagged seeded." *Atriplex.*

i-a-kis'. *Spirea.*

o-ta'-tōn-wi-si'-i-ōts, "green medicine;" a plant growing on the Big-horn Mountains.

ma-ko'-ist, "red-weed." *Epilobium effusum.*

we'-si-wo, a kind of grass, the stem of which is used to clean out the pipe-stem.

na-si'-tsi-wo, "pipe-tail grass," a species of grass.

ho-i-nōs, "bunch-weed;" a species of *Erigeron*, growing in bunches.

hai'-ku-ni-ka-maĥ', "strong or hard wood;" a bush growing in the mountains.

si-wōpst-ći'-a-wo-ist, "gray grass with white blossoms." *Antennaria plantaginifolia.*

ais'-to-mi-wa-nōst, "white weed of the prairie," a woolly plant.

tsēĥ-e'-wo-nist, "rattling weed." *Penstemon.*

he-e-wa-nōst', "woman-weed;" so called because it is used by the women during the period of their menses as a tea. *Artemisia frigida.*

mōĥ-ta'-wi-wa-nōst, "black-gray grass." *Artemisia ludoviciana.*

so-so'-ni-wa-nōst, "snake-weed;" a kind of *Artemisia.*

wi-ōĥ'-i-wa-nōst, "bad-weed." It is called "bad-weed" because it catches the clothes with its thorns.

ksa-ma-tum-ōts, "bush that the big-horn eats;" grows in the mountains; looks like a *Smilax.*

hai-i-so', "prairie-water weed." *Polygonum ramosissimum.*

wis-ki-e'-mi-nōst, "sweet blueberries;" a large-leaved plant growing in the mountains.

mi-ni-mi-nōtst, "rattlesnake bush;" so called because the rattlesnake is supposed to eat the leaves. *Berberis aquifolium.*

shi-sto-to', a spruce pine.

ma-pi'-mo-ist, "weeds that the water flows through." *Parnassia.*

na-ko'-is-ta'-tsi-mi-nu, "bear berry," black haw; so called because the bears eat the fruit.

si-uĥ-i-i'-si-o-te-si'-ist, fox-tail grass; named from the beards which get in the mouth, and work down the throat, and excite coughing.

hōn-ski-wi'-si-wo, "grass with a small stem," a species of grass.

i-ta'-ni-wa-nōst', "man's weed," *Artemisia Canadensis.*

mo-i-ać', "milk-weed," *Lygodesmia juncea.*

mo-tōć', "bitterwood," *Populus*, bitter cottonwood.

ais'-to-mi-mōĥ'-shin, "sweet-smelling prairie weed," *Scrophularia nodosa.*

aīs'-to-mis-ta'-si-mi-nu', "the prickly berry," *Ribes Missouriensis.*

o-i-nōs', "wood that grows in the prairie," *Helianthus giganteus.*

mōĥ'-ta-wi-si'-i-ōtst, "black medicine-weed," *Liatris.*

ho-e-tōĥ'-o-nōst, "gummy weed," *Grindelia squarrosa.*

miĥ-a-haist', "bird-weed," same as the name of a bird.

o'-ta-mi-mi-nōst', "dog bush," *Acer Pennsylvanicum.*

wi-ski-e'-mi-nu, "very sweet berry," *Rubus strigosus.*

wi-ski-e'-mi-nué, red raspberries.

ma-ćaī'-no-was, the burrs of *Glycyrrhiza lepidota.*

ma-ćaī'-no-wa-si-wu', the stalk of the last.

wish-ke', *Populus*, sweet cottonwood.

ma-pi'-mōĥ-shin, "sweet-smelling water-weed," *Mentha Canadensis.*

miĥ-ni-mi-nust', so called because the animals crush the fruit with their teeth, *Celtis crassifolia.*

na-ko-is-ta'-tsi-min "bear-killer," *Crategus coccineus.* It received its name from the Indians, because they say that when the bears eat the fruit, it causes them so great pain, that they try to tear out their bowels.

CHAPTER VIII.

VOCABULARY OF THE SHYENNE LANGUAGE.

A.

above, e-am′, above, overhead.

abominable, si′-e-to-wa′-no, very mean, abominable.

abreast, e-mo-no′-i-o-tsi-o, abreast, in a row.

abstain from, e-ni-ni-ta′-mi-ōts, to abstain from, to leave off when one has eaten enough.

accept, e′-i-stan, to accept or take.

acid, tsi-wi-ki′-i-nu, acid.

acquaint, e-ōh′-ta-han, to relate or acquaint.

acrid, e-wi-ōh′-i-i-no, acrid, sharp to the taste.

across, i-ta-ta′-o-mi, across, by a near way, a cut-off.

adhesive, e-pa′-o-yōts, sticky, adhesive.

adulteress, he-im′-i-sa-ni, an adulteress.

afar off, ta′-a-is, i-ha′-is, ha′-ish, at a great distance, afar off, far away, a long distance.

after, ho-oh′, following after, immediately after.

afraid, shi′-i-pais, to be afraid, to be astonished.
i-mo′-si-o-tōh′-ta, to be scared or afraid secretly.
ni-i-e′-yo, to make afraid by talking to.
na-a′-hi-yo, I am afraid.
na-sa′-a-hi-yo, I am not afraid.
e-e-po-no′-ma-au, to have fear, to be afraid.

ago, o-o-mi′-shi-iv, long ago.

all, ni-ta′-o, all, the whole.
ni-ta-a′, all over, all around.
ho-i-ni′-ta-o, all the world over.

alone, e-ho-wa′-a-haiv, alone, single, unmarried.

always, ho-wōh′-po-nit, at all times, at any time, always.

and, ma′-tu, and, also.

annoyed, in-ha-stun′, bothered, annoyed.

any, nasts-mih′-o-yats, any one, no matter who.

appear, i-mi′-i-ōts, to be visible, manifest, appear.
tsi-me′-i-nis, to appear occasionally, as one passing under a hill, or as the sun through clouds.

arm, he′-ats, an arm; na′-ats, my arm.
ni′-ats, thy arm.
he-a-tsi-ni′-wōts (pl.), arms.
ma-i-tsi′-nōts (dual?), both arms.
e-tsi-nōn′, the armpit.
e-wōh′-ći-ōn, the bend of the arm.
i-ći-na′, the part of the arm above the elbow.
ni-hi′-sta-tan, within arm's reach.
e′-e-wo-ni, an armful of wood.

arrive, i-nih′-o-yōts, to arrive at a place.
e-tam-sto′-i-yōts, to arrive, and remain at home.

arrow, ma, an arrow.
ma-hōts′ (pl.), arrows.
na-ma′, my arrow.
ni-ma′, thy arrow.

ascend, e-i′, to ascend, as a hill.

ashes, pa′-a, ashes.
pa-isć′, (pl.)
o-sta′-pa-a. (?)

ask, ni-midst′, to beg, or ask of any one.
nih′-o-mist, to ask for anything.

assembly, i-mo-hi′-no-is-to, an assembly of men.

astride, i-tsi′-o-i-ta′-ho, straddling, astride.
i-ni′-sko-na, to sit astride of anything.

at, nai′-nu, at or to.

attack, e′-min-hau, to charge on, to attack.
i-ta′-min-ho-wa′-to, to make an attack.

audibly, mah′-i-hast, audibly, with a loud voice.

aunt, e′-ha-hi-sto, to have for an aunt.

awake, tōst, to awake from a sleep, to be awake.

awl, he′-ōn, an awl.
he-o-ninst′, pl. awls.
na′-tsi-ōn, my awl.
ni′-tsi-ōn, thy awl.

axe, ho-ak′, an axe.
ho-ōksć′, pl. axes.
ho′-to, axe-handle.
ho-to′-ist, pl.

B.

back, i-to′-to-nas, a crooked back.
he-na-ōn′, upper part of the back, across the shoulders.
tau-ta-ma-inst′, at or on the back.

bad, av-si-wai′, sing.
av-si-wai′-yo, pl.
ho′-i-av-si-wa′, bad lands.

ball, e′-hu-a-si-wa′-to, to play ball with the foot.
o-ho-ni′-wo-ōh, a ball club, with a hoop at the end to hold the ball as it is thrown.

bare, i-ōks′-ti-a, to be bare of anything, as a bald head.
na-i-kōs′-ti-a, I am bare or bald.
ma-i-ni′-a-si-tak, bare, as an open prairie without thickets, or a tree without leaves.
i-ma′-tau, to become bleak or bare, as the ground when the snow disappears.

beads, o-ni′-a-wōkst, beads.
wōh-pi′-o-ni′-a-wōkst, white beads.
ma-e-ni′-a-wōkst, red beads.
o-ta′-ta-wi-o-ni′-o-wōkst, blue beads.
mōh-ta′-wi-ni′-o-wōkst, black beads.
i-yu-wi-o-ni′-o-wōkst, yellow beads.

bean, mo′-nisk, (sing.)
mo-ni′-ski (pl.), beans.

bear, nah′-u, and na′-ku.
nah′-u-yo, (pl.)

beat, e-po′-po-no, to beat on, as a drum.

beaver, ho′-ma.
ho-ma′ and ho-ma-e′-yo, both plural forms, are in use.

beard, i-mi′-ats, the beard.
i-mi-a′-tsi-nah′-to, beards.
na-mi′-ats, my beard.
ni-mi′-ats, thy beard.
ni-mi-a′-tsi-num, dual, both your beards.
e-hu′-i-mi-ats, yellow beard.
mōh-ta′-i-mi-ats, black beard.

bend, ih-a-ma′-i-yuts, to bend, as the body, forward.
i-to′-to-na, to bend backwards.
e-hi-a-ma′-i-yuts, to bend the head to one side.
i-sta-wōn′, outside of a bend.
mo-mi′-ka-na-nuts, to bend into or around, as a piece of iron.
e-a-wo′-i-yu-ha, to bend away with the foot, as the grass on the prairie.

beyond, a-stu′, beyond, over.
ta-sit-sinst′, more, beyond, farther.

black, i-mōh′-tau, black.
i-mōh′-tau-o-nist, (pl.)
i-mōh′-ta-wa, to make anything black or dirty.
na-mōh′-ta-wa, I make anything black or dirty.
ni-mōh′-ta-wa, thou dost make anything black or dirty.
i-mōh′-ta-wa′-a-no, they make anything black or dirty.

bind, e-ōh′-po-o, to bind or tie.
nah′-po-o′-isć, I bind or tie.
ni-ōh′-po-o′-isć, thou dost bind or tie.
e-ōh′-po-o′-isć, he binds or ties.
na-ōh′-po-o′-is-ći-nōn, we bind or tie.
ni-ōh′-po-o′-is-ći-nōn, you bind or tie.
e-ōh′-po-o′-is-ći-o, they bind or tie.

bird, wi-kis′, a bird.
wi-ksi′-o (pl.), birds.

birth, i-sta′-ōts, the birth of a child.
no-to-mo′-i-nōtst, first-born, if a son.
ma-kōs′, the first-born, when a daughter.

bite, e-i′-wo-ōht, to bite off.
e-wo′-wo-sōht, to bite notches.
i-ku′-ku-ni-mo, to bite or tear anything in pieces.
i-yo-stai′-yu-stōt, to bite a hole in anything.

bitter, i-av′-si-vi-e′-no, it is bitter.
nav-si′-vi-at, mine is bitter.
ni-av-si′-vi-at, thine is bitter.

bladder, ih-ai-no′-kuts.

blanket, wōp′-shi-un, a blanket.
wōp-shi′-u-non, pl.
na-wōp′-shi-un, my blanket.
ni-wōp′-shi-un, thy blanket.
na-wōp′-shi-u-no′-nam, my blankets.
ni-wōp′-shi-u-no′-nam, thy blankets.
mai-wōp′-shi-un, red blanket.
e-tai′-i-wōm, dark blue blanket.
mōkh′-ta-wōm, black blanket.
mo-ku-ta′-wi-ka-ku′-i-shi-ōn, a blanket of fine blue cloth.
o-ta′-ta-wi-ka-ku′-i-shi-ōn, a blue striped blanket.
mai′-ka-ku′-i-shi-ōn, a blanket of fine scarlet cloth.
o-ta′-ta-wi-is′-ći, a blue coat.
nis-ko′-ōm, a blanket of all colors, Spanish.

wōp-shi′-un-o-nis, a small, one-point blanket.

blaze, eh′-o-as, a blaze, burning, prairie fire.
eh-o-a-su′-mi, pl.

blind, i′-ok-ćim, to be blind.

blow, i-ha′-a, to blow, as the wind.
i-wo′-na-a, the wind blows, it blows.
ih-tai′-na-a, the wind blows long and steady.
i-sto-woh′-tūts, to blow, as wind, or with the mouth.
i-a-mi-ni′-to-a-o, to blow into, as wind into a lodge.

blue, e′-hi-wah-so, to become blue or green.

blunt, e-nih-ap′, blunt, dull, bruised up.

boat, sim, a boat.
sim′-o-nōts, pl.
o-i-sta′-sim, a fire-boat, a steamboat.

body, nan′-sti-ni′-to-wa, } the whole body.
he-wi′-to-wa-ni′-to, }
he-wi′-to, the body, or principal part of anything.
ta-yōh′, one side of the body.
po-to-ma′, in the body.

bone, he′-ni-ku.
he′-ni-sta-ta-mo, shoulder bone or blade.
his-ćis-to′-o, underjaw bone.
his-ćis-to′-o-nin, pl.
e-ko-ni′-we-was, the tail-bone.

borrow, is-ći-ōć-na-no′-o-ćisć, to borrow.

both, ne′-ni-shi-wōs, both, they two.
i-ta′-i-sto-we, both together.

bottom, in′-ma-si, bottom upwards.

bow, ma′-ćīk, a bow.
ma′-takst, pl.
na-ma′-ćīk, my bow.
ni-ma′-ćīk, thy bow.
ho-tai-wo′, a bow lined on the back with sinews.

boy, kai-kūn′, a small boy.
kai-ku′-ni, pl.
na-kai-kūn′, my boy.
ni-kai-kūn′, thy boy.
na-kai-kūn′-ham, my boys.
ni-kai-kūn′-ham, thy boys.

braid, e′-sto-tun-a, to plat or braid.

brains, his-ta′-pi, brains of animals.
e-shi-sta′-pi, to brain a robe or skin.
na-shi-sta′-pan, I brain a robe.
ni-shi-sta′-pan, thou dost brain a robe.

branch, kam-hi′-ōts, the branches of a tree.
kam-hi′-o-tsi-o′-e-nats, to break off the branches of trees.
hi-si′-o, branching, or having many roots, as a tree.

bread, ma-ha′.
na-mi′-si-tun-a-ma-ha′, I eat bread.
ko-ku′-ko-ne, a kind of bread.

break, o-ni′-so-wan, to break in pieces, to divide as bread.
e′-po-i-yōts, to break or tear in pieces.
ta′-mi-i-sa, to break off, as the nose.
e-o-ni′-yu-ha, to break a string with the foot.
e-i′-u-ha, to break anything with the foot.
su-a-o-mi′-uts, to break through, as the ice.
i-yo-si′-o-sto, to break out of the shell, as a bird.
i-ōh′-i-wo-he, broken off, as a spoon-handle, or a glass flawed.
i′-yo-ōh, to break in two by striking.
na′-yo-ōh, I, &c.
ni′-yo-ōh, thou, &c.
e′-i-yōts, to break with the hand, as a stick, but not entirely off.
na′-i-yōts, I, &c.
ni′-i-yōts, thou, &c.

breast, e-ta-nun′, a woman's breast, the udder of a cow.
e-ta-nai′-wo, pl.
na-ta-nun′, my breast.
ni-ta-nun′, thy breast.
he-in′, the breast and neck of an animal.

breath, he-o-mi-to′-mi-stōts, the breath of life.
i′-o-mo-tōm, to breathe on.
e-i′-si-i-i′-mas, to breathe hard through the nose.
i′-ha-ha-o-tōm, to pant, to breathe hard after severe exercise.
i-ha-o-to′-mi-ōts, to be out of breath, and in a great perspiration.
na-he′-o-na-a′-sto-wōt, to make the fingers warm by breathing or blowing upon them.

bridle, ōh-ut′-si-na′-si-o, a bridle for a horse.

bring, ih-u-yatst′, to bring wood for a fire.
si-mo-i′-no-mo-i, to bring a boat to shore, or over the river.

brood, ni-si-ća′, a litter, a brood.

broom, mah′-i-wo-ma-o′-yi.

brother, e-ni′-sōn, a brother.
e-ni′-so-ni-wo (pl.), brothers.
na-ni′-sōn, my brother.
ni-ni′-sōn, thy brother.
na-ni′, a man's elder brother.
na-ta′-ta-mim, a woman's elder brother.
na-si-ma′, younger brother.
na-hi′-ni-hi′-nōts, my brothers.
e′-to, a brother-in-law.
ni-to′, your brother-in-law.
he′-wi-to, his brother-in-law.
ni-a-wi′-to-wi′-to-wats, you are my brother-in-law.
ni-sa′-he-wi-to-he-nits, you are not my brother-in-law.
he-wi′-tōst, to have for a brother-in-law, to sustain that relation.

bubble, e-hi′-si-wōt, to bubble up in boiling, as water.
i′-a-niv-si-wōts, to bubble, or flow along with a noise, as water over rocks.
ma-pe-e′-hi-ni-o, to make water bubble up, as water when a stone is thrown in.

buckle, e-o′-we-me-kait, brass buckle.

bud, ho-o′-tsi-si′-mi-nōts, the buds of the trees in the spring.

build, pa-yo′-na-o-we, to build a house, or pitch a tent.
éi-na′-no-is-to-he-ni-to, to build a fence around a corn-field.

buffalo, o-to-a′, a male buffalo. *Bos Americanus.*
mi, a female.
wōk-si-ai′, a calf.
is′-i-wan, a herd of buffalo.
e-mas′, bois de vache, "buffalo chips."
i′-yo-iv, an old, scabby, buffalo bull.

bulky, ta-sis′-to-wo, to be bulky, to hinder or impede, by putting on too many clothes.

bunch, e-po-pis′-tai-i-na, bunches, knots, excrescences, on trees; the Indians make dishes of them.

burn, i-si-to-wa-o, to burn or smoke, as incense, with a smell.

burst, e′-ni-sta-ni-wa′-wōt, to make pop or burst.
e-ōh′-i-wo-yat, to burst, as a boiler or a gun.

bush, mi′-no-éi-a, willow bushes.

button, o-ni-kōm′.
o-ni-ko′-mo-nōts, (pl.)

C.

call, wi-hu-in′-i-min, to call to a meal.
o-no′-o-mi, to call to a feast, to invite.
i-a-no′-ma-éi′-sto, to call each other to a feast.

calm, e′-he-kut, calm, still, without wind.

callous, e′-wo-wi, any hard place formed by a burn or cut on the skin.

candle, wa-ksi′-na-nis-to, a torch or candle.

cap, wi-ōh′-éa.
wi-ōh′-éa-ist, (pl.)

carry, e-mo-he′-he-nōh′-to, to carry or draw.
e′-ni-a-mi-ōts, to carry or bring anything.
mah-pe-i′-nōt, to carry or take on the shoulder.

cat, ka-e-si′-o-tum, a cat, a short-nosed dog. The plural is formed simply by changing the accent from the third syllable to the last.

catch, i-no-ōht′, to catch in the mouth, anything that is tossed.

cause, ta-no-ōnst′, to cause to see.

chair, tah-i-si′-is-tūts.
tah-i-si′-is-to-tūts, (pl.)

champ, ma-kai′-i-ta-i′-ko-nōt, to champ, as a horse his bit.

chapped, i-mo-o′-a, smarting, chapped by the wind.

cheap, e-he′-ya-na, cheap, easily purchased.

cheek, e-wo-ta′-nōts.
e-wo-ta′-no-tse-hik, cheek-bone.

cherries, mah-ōt-sta′-min, fruit of *Cerasus pumila.*

chewed, pe-nōh′-tōts, anything chewed fine, like musk-rats' food.

choke, i′-o-hōé, to choke, to be choked in eating.
na′-o-hōé, I was choked in eating.
ni′-o-hōé, thou wast choked in eating.

clearly, o-ha-éi′-stūts, clearly, conspicuously.
in-sis′-to-wa-a, clear and cold, with particles of snow in the air.

climb, e′-i-wo-ni, to climb, as a tree.

close, ho′-o-sist, to be close to, to press on.

ke-kas′,
kaé, } near by, close.
im′-a-e-kas′,

cloth, ni-na-wo′-i-stūts, clothing of all kinds.

clouds, e-wo-iv′, to cloud over, to be cloudy.
e-wo-iv′, clouds, sky, heaven.
i-mōkh′-tau-wo′-i-yōts, black clouds.
wo-i′-ha-i-nōt, thick clouds.
wo-e-e-he-ni′-wo-ist, broken clouds.
wo-e-e′-a-si-ta, scattering clouds.
en′-i-wo-iv, the sky becoming black with clouds.

coffee, mōh-ta′-whōp, black water, or medicine coffee.
ma-ta′-o-ki-mi-nuts, coffee-grains.

coil, o-ni′-mo-ta′-o-to-nōts, to coil or knot by twisting.
mo-me′-ka-no-ni-a′-nuts, to coil up, as a rope.
e-o-ni′-sta-éis, to lie coiled up on one's side.

collect, i-ho′-sun, to collect together.

cold, i-to-nit′, to be cold.

come, ni′-ni-o-tsi-o, come (imperative mood).
o-hum′, come close.
ni-ni′-o-ist, come towards, come this way, (imp.)
na-ni′-o-tsitst, I come in a hurry.
ni-ni′-o-tsitst, you come in a hurry.
e-ni′-o-tsitst, he comes, or to come in a hurry.
ni′-ni-ats, come on, let it be so, (imp.)
ni-is′-taks, come in, (imp.)
nin′-shi-wi-ōst, come here quickly, (imp.)
ni-wa′-i-si′-ni-i-ko, to come and peep in and then draw the head back.
he-wi-no′-wo-tau-ūtst, to come towards one.

comb, tsi-i-ni′.
tsi-i-ni′-he-yo, (pl.)
i-tsi-i-ni′-a, to comb the hair.

commit, he-wi-no′-nun-o-ho′-ni, to commit murder.

comrade, ni-si-ma-ha′, my comrade.
he-wi′-so-no, thy comrade.

concave, i′-wo-wōs, hollowed out, concave.

concealed, ni′-ha-mōs, out of sight, behind something, concealed.

cook, i-ho-mōh′-to-wo, to cook, as food.
e′-hat, to be cooked or roasted, as meat.

copper, ma-i-ma-kai′-it, copper, red metal.

corn, ma-mi′-nūts.
ho-o′-tsi-mi-nu, cornstalk.
ho-ōts′, an ear of corn.
ho-ōtsts′ (pl.), ears of corn.
ma′-mi-nu-tsi-o-i′-mi-nist, to shell off as corn with the hands.

corral, ni-ma-i′-nuts, the circle or corral formed by wagons at a camp.

covering, e-wi′-shi-main, covering, as clothes or a sheath.
ah-to-ho′-ma-i-nats, to be covered up with earth.
i-a′-to-ho, to cover over with earth, as a grave.
in-i-in′-i-ōht, to be covered with frost, as grass in the morning.

cough, i′-hi-a, he coughs, or to cough.
na′-hi-a, I cough.
ni′-hi-a, you cough.

count, o-is-to′-nist, to count.

court, e-sta-ni-e′-wa, to court a woman.
e-sta-ni-e′-wah-to, (pl.)

cousin, ni-sis′, your male cousin.

crack, a′-po-at, a crack or hole, as in a lodge.
i-o′-sin, to crack a louse.

crawl, he-éi′-a-mist, to crawl up carefully on anything.

creak, he-ni′-to-e-ni′-sto-ni-wun, to creak or grate, like a door.

creep, i-a-mi′-wo-minst, to creep or crawl.
ta-mi′-wo-minst, " "
i-a′-me-wu′-ne-ots, to creep on.

crisped, e-hi′-se-maut, crisped or drawn up.

crooked, e′-wōh, to be crooked, arched.
e-wo-wo′-kit-si-un, crookedly, in an arched manner.

cross, i-ōh′-o-ho, to cross a river.
i-ta′-ko-ho, to wade across a stream.
a-mi-sta′-nōts, crosswise, across something else.

crumbs, mo-es′-te-pīh-pi-ots, crumbs or fragments.

crupper, hōh-i-si′-ni-o.
hōh-i-si′-ni-o-nōts, (pl.)

crush, i-so′-so-is, to mash, or crush.
mih′-ni-min, to crunch, crush, grind, champ, to make a noise with the teeth.

i-po-i-ha′, to break or crush in pieces, as meat or tallow.
na-po-i-ha′, I break, &c.
ni-po-i-ha′, thou breakest, &c.
i-po-i-ha′-o, they break, &c.

cry, ni-ōh′-ai-im, to make cry, by talking to.

cup, to-i-ni′-o.
to-i-ni′-o-nōts, (pl.)
to-i-ni′-o-ni-wi-tōk, a cup with a handle, dipper.

curl, im′-a-ma-kai, to curl, as hair.
ma-mah-ai-e′, curly.

currants, he-sta-tsi′-min, black currants, *Ribes floridum.*

curtain, ni-i′-psi-no′-i-nuts, to curtain, or cover with a curtain.

cut, e-ih′, to cut.
e-wo-ih′, to cut off a string from a skin.
e-pi-ih′, to cut in pieces, to destroy with a knife.
e-po-ih′, to cut off, as a piece of meat.
i′-o-tah, to cut holes in anything with a knife.
i-o′-sis, to cut or rip open.
i-o-ta′-o-mo, to cut a hole into, as in wood.
e′-i-so, to cut in the middle.
ho-o-i-ninst′, to cut tobacco.
pi-nōhts′, to carve, to cut.
e-mi-ko′-yo-kah, to cut or shear off the hair.

D.

damp, e-hi′-ko-o, damp.
e-yo′-i-yats, to be moist or damp.

dance, e-mah′-ta-a, a dance.
e-mah′-ta-o, to dance.
ma-mah′-ta-o, I dance.
ni-mah′-ta-o, you dance.
i-mi-tah′-to, they dance.
i-o-so′-i-to, to dance on anything.
i-ma-yun′-i-so′-i-sto, a sacred dance.
e-ho′-i-o-ćí′-sto, a scalp dance. When the Indians arrive at the camp with scalps, they come in dancing.
e-a′-ćis-to, a regular scalp dance. This dance is conducted among the Shyennes, the same as with the Dakotas.

dark, i′-a-no-nit, to be dark, darkness.
in-sta-e′-wi-ōts, to become dark.
i′-shi-ta-e′-wi-ni, to darken, to shadow as clouds.

daughter, he′-mi.
na-tōn′, my daughter.

day, i′-shi-i-wa.
i-shinst′ (pl.), days.
i′-shi-iv, all day.
si-to′-shi-iv, the middle of the day.
e-pa-wi-i′-shi-o, } a good day.
i-hav′-si-vi-i′-shi-o, }
i-shi-ni-pit′-siv, a snowy day.
i-shi-i-wai′-i-hi-ko, a rainy day.
i-shi′-hi-kōt, a mild, calm day.
e-i-to′-iv, dusk, between sunset and dark.
in-i-wo′-o-ni-yōts, day breaking, daylight.
e-ho-so′-wo-ma-no, broad daylight, full light.

dead, ho-wa-tsi′-e-wish.
i-na′-i-yōts, to be dead.

debilitated, i-ha-mu′-ta, sick, debilitated.
i-ha-mu′-ta-yo, (pl.)

December, e-po-iv′-si-o, the month when the animals shed their horns.

deep, i-ha′-o-tum, deep as water, dense as foliage, thick as hair.
ho-i-ta′-is, deep, far within.

deer, mu-ksa′, young deer or fawn.
mu-ksa′-o-iv, a fawn or deerskin.

defecate, he-mats′, to defecate.

defective, wi′-shi-to-nōst, to be defective, wanting.

deformed, e-nōh-ni-ka, deformed, deficient in any part.

demijohn, i-shi-i′-wi-to, a large bottle.
na-niv′-sit, a glass bottle.

descend, e-ha′-ni-wo-ni, to descend from a tree.

desert, tōh-to′-a, a desert place where no one dwells.

destitute, i-sa-a′-i-nu, to be destitute, to have nothing of.
na-sa-a′-i-nu, I am destitute.
ni-sa-a′-i-nu, thou art destitute.
i-sa-a′-i-nu′-i-nu (pl.), they are destitute.

dew, e-hi-ko-wi′-ni-o.
i-ma-hi′-ko-wi′-ni-o, dewy everywhere.

diaphragm, he-to′-nish, the diaphragm of a deer.

die, ni-in′-a, to die.

na-ni′-na, I die.
ni-ni′-na, you die.
i-na′-tsa-ta-no′-ats, to die of fright, to faint from alarm.

different, i-ni′-ta, he is or to be different, another.
na-ni′-ta, I am different.
ni-ni′-ta, thou art different.
i-ni′-tai-yo, they are different.
na-ni′-tam, we are different.
ni-ni′-tam, you are different.

difficult, i-ho′-wa-nat, hard to do, difficult.
i-ho′-to-wa′-na-tōn, to think anything hard or difficult.

dig, ma-a′-ko, to dig, as a bear, in the earth.

diminished, sik-sta′-ōts, less, diminished.

dip, ni′-hi-a-ta-i-na′-nūts, to dip food out of a kettle with a ladle.

dirty, im-a-si′-a-hōt, to be dirty, as a gun that needs cleaning.

disagreeable, e′-wo-ev, unpleasant, disagreeable, as the appearance of the weather or country.

dish, e-tōk′, a dish or plate.
e-to′-ko-nōts, (pl.)

disposition, nōh-to-wi′-ta-no-tūts, mind, will, disposition.
shu-mi′-a-tu-a, a good disposition.
shu-mi′-hav-sūs, a bad disposition.
i-ta′-ko-wi-ni-hav′-siv, to be of a surly disposition.

displeased, e-av′-si-vi′-tan, to be sorry, displeased, sad.

dispute, i-hi′-si-ta′-tsi-no, to dispute about anything.

dissatisfied, o-wa-no′-isć, not pleased with.

distribute, wo-tsi′-no-o-wa, to distribute.
wo-tsi′-no-ho-ma-kis, the distributor of presents.

disturbed, i-ha′-i-sta, disturbed in mind.
i-ha′-i-sta′-ha-ōts, (pl.)

dog, ho′tum.
ho-tum′ (pl.), only change of accent to form the plural.
ho-tum′-i-na-tōts, my dog.
ho-tum′-i-nis-tōts, your dog.

domestic, wi-o-i-o′-to-a, domestic cattle.
ko-ku′-yah, domestic fowls.
e-nis-tōn′, to tame, to domesticate animals.
na-nis-tōn′, I tame, &c.
ni-nis-tōn′, thou dost tame, &c.

door, he-ni′-to, a door, that which covers the entrance of the lodge.
ći-hi′-to-hi′-o-niv, at the door.
ho′-a-nōts, shut the door.
o-ni′-sta-nūts, open the door.

double, mo-mi′-ka-nōts, to double up with the teeth.

draw, e-nih-o′-ta, to draw tight, as a belt around the waist.
e′-si-a-nōt, to draw in anything with the breath, as dust or smoke.

dream, e′-o-wah, to dream.
na′-o-wah, I dream.
ni′-o-wah, thou dreamest.
i′-o-wah, he dreams.
na-o-wah′-i-nam, we dream.
i-o-wah′-i-nam, you dream.
i-o-wah′-i-na-to, they dream.
e-o-wah′-i-na-o, " "

dress, ho′-is-tōts, a woman's dress.
he-i-wo′-is-tōts (pl.), all dresses.
he-i-ma-ni-he-wo-is-tōts, dresses of an hermaphrodite.

dried, ho-ōh′k′, dried, hard.

drive, a-ma′-o-me, to drive along, as cattle.

drop, e′-hi-ōts, to drop, like rain.

drowned, im-im-stan′, to be drowned.

drunk, in-o-no′-to-wa-sish, to be drunk.

dry, i′-o-un, to make dry, to wipe dry.

dull, e′-nih′-ap, to be dull or blunt.

dumb, i-sa′-no-to-wins′-ći, to be dumb.

duodenum, his-tatst′, the duodenum of ruminating animals.
his-ta′-tōts, (pl.)

dust, hi′-i-pin, dust, powdered earth.

E.

each one, i-ta-shi′-wa-i-no, each one, every one.

ear, sto-wo′-ats, external ear, ear of animals.
i-sto-wo′-ats, his ear, or an ear.
na-sto-wo′-ats, my ear.
ni-sto-wo′-ats, your ear.

ni-niĥ′-a-ist-na-to-wo′-ats, my two ears, both my ears.
na-sa′-to-wo′-ats, not my ears.
ni-sa′-to-wo′-ats, not thy ears.
i-sa′-to-wo′-ats, not his ears.
e-o-ma′-ōts, to prick up the ears, as a horse at a sound.
e-ći′-ći-ist, to move the ears, as a horse.
i-nis-kis-ta′-ōts, to put the ears forward, as a horse.
i′-o-ta-ist, the orifice of the ear, the touchhole of a gun.

eat, i-na′-so-i-no, to be full from eating.
na-na′-so-i-no, I am full from eating.
ni-na′-so-i-no, thou art full from eating.
i-na′-so-i-na′-sto, they are full from eating.
o-tsi-ti′-mi-o, to eat or gnaw wood, as a horse.
staĥ′-o-mats (imp.), give to eat.
niĥ′-o-nist (imp.), give me to eat.

earth, i-ho′-wo-ni, brown earth.
ho-i-tsi-wōĥ′-po-mau, sweet earth, alkaline earth.
ho-i-tsi′-si-to′-wa-o, smoking or burning earth, from the ignition of the lignite beds.
ish-i-ći′-wi-to, an earthen pot, vessel, jug.

egg, wo′-wōts.
wo′-wo-tōts, pl.

eldest, e-nu′-ći-ma-ait, eldest, firstborn.
na-ni′-ći-ma-ait, my eldest.
ni-ni′-ći-ma-ait, thy eldest.
ni-ni′-ći-ma-ai′-tum, pl. your eldest.

elope, i-a′-si-ta-e′-wi, to elope, to run away with a woman, or another man's wife.

eloquent, i-pi′-wi-ist, to be eloquent, to speak well.

empty, i-ma′-tōĥ-i-yōts, to become empty, to decay, as the inside of a tree.

encampment, mōĥ-tanst′, an old encampment, after the lodges have left.

enemies, i-no′-tsi-to-wa-ći′-sto, those who are at variance with each other.

equal, ćit′-ski, not equal.

escape, i-ha′-o-mi-ni, to be unable to escape, to be unable to extricate oneself.

evacuate, i-tam′-si-ka, to evacuate, to ease oneself.
e-mi-si′-to, to evacuate on any one, a term of reproach.

evaporate, e′-po-no-i, as when a creek becomes dry.

even, i-si′-i-sto-to, even, just, exactly.

explain, taĥ-ti-i′-a-mo-un, to unfold, explain, to make bare, as a falsehood.

eye, e-iĥ-anst′, the eye.
na-iĥ-anst′, my eye.
ni-iĥ-anst′, thy eye.
e-iĥ′-ai-i-wōts, pl.
e-we′-e-nōt, eyebrow.
e-iĥ-a′-e-wi′-a-nūt, eye-winker.
e-iĥ-a′-e-wi-a-ni′-a-stūts, eyelids.
e-po-pi-iĥ′-a-nist, the ridge bone above the eye.
is-ćik′-o-niv-iĥ′-a-nist, projection formed by the ridge above the eye.
shi′-ta-sho-tōĥ, as far as the eye can reach.
i-o′-ki-ni-o-sti′-no, to strike and put out the eye.
i-o′-i-nu-na′-wi-ma′-tsin, to grow blind.
i′-ha-i-ma′-tsi-ni-ōts, to wink the eye.
i-o-o′-in, to be blind, having the eyes put out.
e-wo-hin′, to be blind, with the eyeball white.
i-o-ni′-mi-i-kan, to be squint or cross-eyed.
i-nōĥ-ta′-wi-o-in, to be nearsighted.
i′-na-ko-o, to be clearsighted.

F.

fail, e′-wa-ni-ōts, to come to nothing, to fail.

fall, e′-o-hain, to let anything fall.
in-so′-ta-mo, to fall out with, not to be on speaking terms with.

falsifier, i-a-sto-mōĥ′-ta-un, a great liar.
in-i-ći-hi′-o-niv, to fabricate a lie, to falsify about one.

fat, i-ha′-i-yōm.
i-ha-i-yo′-mi-o, (pl.)

father, he′-hu; iĥ is sometimes used.
na-ho′-i, my father.
ni-ho′-i, thy father.
ni-he′-he-nuts, to have a father, to be the child of any one.
he-nim-shim, his father-in-law.
na-nim-shim, my father-in-law.
ni-nim-shim, thy father-in-law.
he-ni′-sa-na-mōn, a man's stepfather.

feast, ma-he-yun′-hōp, a sacred feast.
ma-he-yun′-haist, to make a sacred feast.

fence, i-ni-po-o′, to fence as a field, to fasten or bolt.
na-ni-po-o′, I fence, &c.
ni-ni-po-o′, thou dost fence, &c.
ferment, po-a-ha′-i-nis-tūts, to ferment, as yeast.
field, i-na-no′-is-tūts-tsi-mo′-na, a new field, one in which there is a new crop.
no-ni-na-no′-is-tūts, an old field, where the crop has been removed.
fight, pi-so-mi′-o-tats, to fight over anything.
file, wi-o-yo-ksi′-im, a file.
finger, na-ni′-so-to-yōs, the fore finger.
na-no′-to-yōs, the second finger.
na-so′-to-yōs, the third finger.
na-to-oh′-i-yōs, the fourth or little finger.
na-to′-a-no-ni-mo′-i-yōs, finger nails.
finished, i′-shi-ma-nisé, to be done, finished.
fire, ho-ist′.
ho-i′-stats, (pl.)
na-to′-ist, my fire.
ni-to′-ist, thy fire.
na-to′-is-tam, my fires.
ni-to′-is-tam, thy fires.
his-to-is-ta′-mi-wo, different fires of other people.
e′-no-si-sto′-wo, burning coals.
ho-sta′-wi-no, a firebrand.
ho-i-sta′-wa, in the fire.
i-ha-ha′-i-si, sparks of fire.
i-no-to-wa′-ōtst, to extinguish the fire.
e′-nu-to, there is no fire.
ai-sto-a-si-na-nis′-tūts, a fireplace, a chimney.
ma-kai′-tai-sto-a-si′-na-nis-tūts, a stove or iron fireplace.
ih-o-wa′, to draw near and warm oneself by the fire.
first, ni-i-ni′-ta, at the first.
fish, no′-man.
no-man′, pl.
no-no-no′, a fish-line.
no-ma′-he-mīk, fish-head.
no-maik′-sūn, small fish.
no-ma′-he-hīk, fish-bones.
ma-i-tsa-nōn′, red-fin, a kind of fish.
he-to-to′, a crayfish.
fit, i-tai′-ist, to cause to fit; to fit well, as a bullet in a gun.
na-i-tai′-ist, I make it fit well.
flank, his-tsi-to′-ni, the flank of an animal.
flat, i-kah′-o-no, to make flat, like a board.
flesh, he-ma′-e, flesh that clings to a skin.
flimsy, e-hi′-sis, flimsy, not firm; elastic.
e-hi′-si-so-ni′-o, pl.
float, e′-i-wo-it, to float along, as on the water.
in-o-mo′-i, to float down a stream, to drift by the wind as a leaf.
i′-pi-no, to rise to the surface and float, as on water.
flood, i-ya-mi-ōh-whit′ (last syllable pronounced strongly), to flood with water.
flow, in′-shi-wit, to flow or run, as water.
fly, i-ya′-mi-ha-ōts, to fly, as birds.
foam, e′-ta-wo-niv-ōm′, to froth or foam, as when anything is thrown into the water.
fog, ma-i-ni′-ni-po-is, to become foggy, as when a white fog arises, and obscures the sky.
fold, e′-i-mits, to fold up the arms.
foliage, i-ha-i-wih′-pōt-siv, dense foliage.
follow, e-ta-ni′-hi-ōt, to follow after anything.
ta-ni-he-whi′ (the last syllable strong), to follow after one is gone, to pursue an enemy.
food, e-mi′-sa.
foolish, im-a-sa′-ni-o, foolish, to be foolish.
foot, ma′-is, a foot.
na′-is, my foot.
ni′-is, thy foot.
ma-hai′-sōts (pl.), feet.
no′-tsi-ma-is, another man's foot, the foot of a man of a different nation.
mo-mah′-a-ta, a large foot.
ha-po′-si-wa, a crooked foot.
wa-ni-sa′-ta, the feet turn out.
wo-wōh′-ća-ta, feet with the toes turned in.
po-pe′-ha-ta, the ball of the foot.
to-tam′-ha-ta, foot with no toes.
hau-o-no′-is-ćist, big-heeled foot.
tōts-ki-ćis′-to-na, small-heeled foot.
o-iv′-ha-ta, scaly foot.

forbid, he-wi′-no-e′-wi-ho-ist, to forbid one's house, to prevent persons from coming in.

forget, e-wa-ni′-ta-nūt, he is, or to be forgetful, to forget.

na-wa-ni′-ta-nūt, I forget.

ni-wa-ni′-ta-nūt, thou dost forget.

forked, i-ni′-so-wa-ats, forked, as a stream.

i-ni′-sko-nat, forked, as a stick; a stream double or forked.

i-ni-sko-na′-wi-wo-tōn, a forked tail, as of a fish or martin.

foundation, i′-wa-ha, a foundation, a place to stand on.

fracture, e-o-ta′-ni-ōs-to-no, a fracture, wound, rent.

freeze, i-o-ma′-o-mōt, to freeze over, as ice on the river.

e′-ko-nōht, stiff, hardened, frozen.

o-tse′-to-e′-ko-no-si-o, wood when hardened by frost, frozen.

friend, ho′-wa.

he-wi′-so-nist, to have for a special friend.

e-na′-no-wa-ćis′-tōm, to be friendly, to be friends.

nis-in′, your friend.

full, i-o-to′-mo-in (adjective).

i-o′-to-mōt, to be full.

i-na′-so-i-no, to be full or satisfied, as with food.

i-sa-i-na′-su-i-nōn, not full, empty as to the stomach.

G.

gap, i-to-wo′-i-yo′-i-sats, to gap, to break out a piece from the blade of an axe.

gather, ma-i-ni′-nūts, to gather up.

gentle, i-o-wan′-ha (adjective).

girl, he-i′-kai-kūn, a small girl.

he-i′-kai-ku′-ni, (pl.)

girth, o-tu tai′-shi-o, a girth.

give, i-ta′-mit, to give.

o-wa-he′-wi-i-stūts (imp.), give it to me, let me have it.

glad, i-a′-i-yo, to be glad, thankful.

glisten, i′-o-ha-se, to glisten.

glove, na-to′-a-e-ni′-wo-a-na′.

gnaw, ih′-i-wa-nōts, to gnaw on.

go, tai′-i-mōnst, to go off on a journey.

ta-no-inst′, to go together.

ta-mi-o-nanst′-st, to go before to break the road.

tau-akst′, to go out of doors.

he-um′, to go up, to ascend.

wi-tsin′, to go directly to anything without a medium.

ōh-ta′-tau-wo-wo′-ist, to cause to go before.

e-ho-i-wi′-o-ći-sto, to go on a war party.

e-ni-so-wa′-o-hi-yo, to go different ways, separately.

a-stu′-ta-tsi-ōtst, to go beyond, or over a hill, or any place.

ta-ōt′-sti-ta′-no-ōtst, to go home and lie down to sleep.

no-no′-to-ha-ninst, to take one's all and go away and live in another place.

ta-si′-ōsć, go, (imp.)

i-tau′, go out, (imp.)

tau-wakst, go away, or go out, (imp.)

gold, wi-ho′-ni-ma-kai′-i-ta-tsi′-i-ho, yellow iron.

good, e-pi-whai′-sto, a "heap" good, very good.

e-po′-pi-wha′-e-wi-sōn, goodness, kindness.

grab, i-si-va′-i-ni, to grab at, to catch at, as at a person.

i-ći′-o-si-ōts, to seize or grab at, as a fish in water, or a fly.

grandchild, nih′-a.

na-nih′-a, my grandchild.

ni-nih′-a, thy grandchild.

grass, mo-isć′, grass, herbs, hay.

e-si′-i-ho-nūts, grass, roots, &c.

wa-nōt′, gray grass or herbs.

mah′-e-wa-ma-ōts, clear of brush or long grass.

e-ōh-o-si′-o-ta-tau, green, like grass.

graze, e′wi-nōts, to graze, as cattle.

grease, um (noun).

e′-ko-ma-nōts, to grease over anything.

great, tsi-ma-ha′-a, great, large.

tsi-ma-ha′-o-ist (pl.)

ground, ho-ev′, on the ground.

grouse, wa-ko-yis′, a sharp-tailed grouse.

wa-ko-yis′-i-ma′-is, the feet of the sharp-tailed grouse.

wa-ko-yis′-is-ći-wa-to-nisć, the tail of the sharp-tailed grouse.
wa-ko-yis′-e-min, the wing of the sharp-tailed grouse.
wa-ko-yis′-i-mi-k, the head of the sharp-tailed grouse.

gun, ma-ai-tun, a single-barrelled gun.
ma-ai-tun-o′-ist, (pl.)
na-ma-ai′-tun-o, my gun.
ni-ma-ai′-tun-o, thy gun.
nih′-ut-si-na′-wo, a double-barrelled gun.
to-no-wo′, a rifle-gun.
mah-i-mai′-i-tun-o, a long, iron gun, a cannon.
no-tah′-i-wo, a musket, a soldier's gun.
tsi′-ma-ha-is-ćis-to-nōt, breech of a gun.
e′-to-i, loaded as a gun.

H.

hair, he-i′-wa, also he-i′-wōs, hair of the head, scalp.
mi′-ko-nōts, the whole scalp with the hair.
nōh′-pa-e, white head of hair.
he-ho′-wa-e, yellow hair.
ma′-o-wi-sa, red hair.
ōk′-ći-a, thin hair.
ma′-ma-ka-e, curly hair.
ha′-is-ta-e, long hair.
ćik′-sta-e, short hair.
wo′-his-ći-a, to be bald on the front part of the head.
e-ki-i′-wo-to-na, hair braided with strips of otter skin.
e′-wa-wo-to′-nu-stōts, scalp-lock, on the back of the head.
i-o-ko′-tak, to cut hair.
na-o-ko′-tak, I cut hair.
ni-o-ko′-tak, thou dost cut hair.
i-o-ko-ta′-ki-o, they cut hair.
e′-ni-mo-iv, a lock of the hair on the side of the head tied up.
e′-a-no-no-ish, to hang over, as the hair over one's face.
eh-o-wa′-ōts, to take the hair off by rubbing or shaving.
i-ha-wa′-wi-ōt, a bunch of hair growing on the inside of a deer's leg.

half, ōh, ta-yōh′.

hallo, nōh-a′, hallo, look here.

hammer, tōn′-ho-i-nis-tōts.

handsome, i-pi′-wi-wi-to, he is handsome.
na-pi′-wi-wi-to, I am handsome.
ni-pi′-wi-wi-to, thou art handsome.
i-pi′-wi-to-wah′-to, they are handsome.

hand, o-wo-si′-to-yi, to raise the hand to strike.

handful, e-to′-si-ōh-i-ćis′-i-ōts, a handful, what can be held in the hand.

hang, e-ho-is′-ćin-ōts, to hang from, to be suspended from, as a tree.

haul, e-mo-he′-na-ninst, to haul or transport, as a cart.
i-tam-han′, to haul wood from a great distance.

haw, na-ko-is-ta′-tsi-min, "bear-killer," red haws. The Indians say that this fruit causes the bears so much pain when eaten, that they attempt to rip open their bellies.
e-ta-ni-mi′-nuts, black haws.

head, mik'k.
mi′-ko-nōts, (pl.)
na-mik'k, my head.
ni-mik'k, thy head.
wo-ka-he-mik'k, a deer's head.
si-to-sta′, top of the head.
e′-i-ho-wa, yellow head.
e′-ta-pes-ći′-a, a big head.
i-to-i-no′-hiv-tsi-a, a line running over the middle of the head, caused by the parting of the hair.

heap, ha′-is-tu, a heap, a great deal, a great many.

healthy, na-sa-ha′-ma-to, healthy, sound in body, not sick.

hear, i-ni′-sto-mōn, to make one hear, or he makes one hear.
na-ni′-sto-mōn, I make one hear.
ni-ni′-sto-mōn, thou makest one hear.
i-a′-to-mōn′-sto, they make one hear.
na-sa-ni′-sto-mōn, I do not hear, or make one hear.
ni-sa-ni′-sto-mōn, you do not hear.
i-sa-ni′-sto-mōn, he does not hear.

heart, hais-ćist′.
hais-ćis′-ta-wōts, (pl.)

heavy, i-ha′-a-nun (adjective).

heel, hes-ćist′, the heel.
ma-ćist′-to-nōts, (pl.)
na-ćist′, my heel.
ni-ćist′, thy heel.
no-tsi′-ma-ćist, the heel of a person of a strange nation.

helpmeet, his-to-tsi′-o-nam, a helper, helpmeet, laborer.

hew, e-kaĥ-o-no, to hew a long log on one side, and then on the other.

hermaphrodite, he-i′-ma-ni.

hiccough, a-i-so′-wa, to hiccough.
na-i-so′-wa, I hiccough.
ni-i-so′wa, thou dost hiccough.
i-so-niĥ′-to, pl.

hide, no′-o-ist, to hide or conceal.

high, ha′-shi-um, high, very high, lofty.

hill, o-ha-ni-no′, piled up as a hill or a mound of stone.
o-si′-wa-ta-ōtst, at the hill.
e′-ta-tak, country with many hills, like Bad Lands.
hi-na-it′-sit-a′-wi-o-tum′, what did you see on the hill?

hipbone, ai-si′-tsi-o, ilium.

his, his-ći′-ōts, his, her, its.

hiss, wi-ho-i′-shi, to hiss at, as a dog.

hog, e-ku′-si-si′-o-tum, a sharp-nosed dog, pork, bacon.

hold, i-ho-ist′, to hold back, to withhold, to retain.

hole, woĥ, a deep hole.
ho-i-i′-o-ta-o, a hole in the ground.
i′-o-ta-in, to bore or make a hole in anything.
i′-o-ta-i-sta, to make a hole, to bore or pierce the ear.
e-pin′-o-ist, full of holes, as cloth.
e-wīĥ′-pi-o-in, holes in an animal's head, communicating with the nostrils.

hollow, i-ha′-o-nōn, the hollow in the leg behind the knee.

honor, i-pa′-wo-e, to honor, respect, reverence.

hop, i-ku-ka′-ak, to hop as a grasshopper.

horse, mu′-i-no.
mu′-i-no-hum, pl.
mōĥ-ta′-o-hum, a black horse.
mōĥ-ta′-o-hum-i, pl.
wōĥ′-po-am, a white horse.
wōĥ′-po-a-mi-i′-o, pl.
i-san′-stai, a wild, prancing horse.
ma′-o-wai, a bay or dun horse.
ma-o-wai-i′-yo, pl.
mo-e′-i-hai-tu, a yellow or sorrel horse, with hair like that of an elk.
mōĥ-ta′-wi-wo′-a-si, black and white spotted horse.
mo-ći′-nu-a-mis′, a colt.
e-ho′-wo-hum, a red-haired horse.
ha-ma′-no-wa, a chestnut bay horse.
i-ta-ni′-hum, a stallion.
i-i′-hum, a mare.
i-i-ham′, pl.

house, i-ha′-i-no-no, a village, or cluster of houses or lodges.
hai-sta-nūĥ′, council-house.
wi-i-tsi-ma′-yu-nim, a church, a sacred house.
i-nōĥ′, at the house, at home.
i-no-ći′-o-mi-nu, away from any house.
ho-to-ma′-ni-ta-o, household, including persons and things.
wiĥ′-po-tsi-mai′-yo, to make leaf houses or booths.
wiĥ′-po-tsi-mai′-yo-na-to, pl.
na-wiĥ′-po-tsi-mai′-yo, I make, &c.
ni-wiĥ′-po-tsi-mai′-yo, thou dost make, &c.

how, i-to′-ni-ta′-i-ni-ōt, how far round, how extensive.

howl, e′-ho-pits, to howl, as a dog or wolf.

hunt, i-o-mo′-o-ni′-sto, to hunt buffalo, to surround and kill, as in a buffalo hunt.

husband, hi-hum′, a husband.
hi-hum′-i-wo, pl.
na-i-hum′, my husband.
ni-i-hum′, thy husband.

I.

ice, ma′-ōm.
ma-o-minst′, (pl.)

illiberal, i-mi′-o-ta-nūć, to be stingy or illiberal.

immediately, e′-i-sak, suddenly, immediately.

inconstant, sći-wi-i′-o-si-vi-ōn, inconstant, unchaste.

ink, is-ta-ni′-i-hōs.

intestines, iñ-ai'-i-man, the large intestines of animals.

iron, ma-kai'-it.

ma-ka'-i-tai'-wi-kis, iron bird, humming bird.

wi-ho'-ni-ma-kai'-it, white iron, silver.

wi-ho'-ni-ma-kai'-i-tai'-wo-at, silver medal.

moñ'-ta-wi-ma-kai'-it, black metal, iron.

itch, i-si-si'-i-nats, to have one's body to itch all over.

J.

jealous, e-o'-si-wi'-o-ni, to be jealous, envious.

joint, ći-hu'-na-i'-o-na-as, joints of animals.

journey, i-ōñ'-o-wi-stan, to be journeying or travelling.

ni-wa'-is-ti-ōñ-o-wi'-stan, who is that journeying?

jump, e-ko'-ka-an, to jump.

i'-ka-ak, to jump over, as a horse.

in-ha', to frisk or jump about, like a spirited horse.

i-no'-i-tsi, to make a jump, prance about, wild.

o-na-is'-i-an, to plunge or jump into water, as a frog.

K.

kettle, ma-ai'-ta-to, a kettle.

ma-ai'-ta-to'-o-nōts, (pl.)

mōñ-ta'-wi-to, a black kettle, iron kettle.

e-ho'-ni-to, yellow iron, brass kettle.

ma'-i-to, red iron, a copper kettle.

wo'-ni-wi-to, white iron, a tin kettle.

ka-e'-wi-to, a kettle with a spout, a coffee-pot.

e-wañ'-i-ni-to, frying-pan, "pan with a tail."

tsi-ōñ-i-wi'-sho-is-to, gridiron, cooking-iron.

is-to'-wo-kuts, the ears of a kettle.

o-ni'-o-na-ti-ni'-ma-o-i, the rim of a kettle.

key, wi'-o-i-mañ, a wooden key.

ta-ta-ho'-i-yo, to turn a key, to unlock, as a trunk.

ta-ta-ho'-i-nis-tōts, turning a key.

kick, ōñ-ta'-o-wi, to kick.

i-ōñ-ta'-o-wo, to kick one or something.

i-o-ni'-niñ-an, to kick in pieces.

kidneys, ist-si'-tat, kidneys of a buffalo.

kill, e-ha-na'-o-wo, to kill by pressing or lying on.

kindle, e-natst', to build or kindle a fire.

kinnic-kinnic, ma-ko'-mi-his, a mixture of one-fourth tobacco and the remainder the bark of red osier (*Cornus*), or the leaves of the bear-berry (*Arctostaphylos uva-ursi*), dried and made very fine; used by the Indians for smoking.

kiss, e'-wo-sim, he kisses, or to kiss.

na'-wo'-sim, I kiss.

ni'-wo'-sim, thou dost kiss.

e'-wo-sim-a-tsi'-o, they all kiss.

knee, en-stan', kneepan, patella.

nan-stan', my kneepan.

nin-stan', thy kneepan.

en-sta'-nio, en-sta'-ni-i-wo } (pl.)

is-tsi'-ma-ni-wa', between the knees or feet.

knock, i-ha'-ni-o-sto'-no, to knock on the head, to kill or stun by striking.

he-siv', the fleshy part of the leg below the knee of an animal.

knife, mo'-ćik, a knife.

na-mo'-ćik, my knife.

ni-mo'-ćik, thy knife.

i-mo'-ćik, his knife.

mo-takst' (pl.), knives.

na-mo-takst', our knives.

ni-mo-takst', your knives.

knob, to'-ni-a-hu'-yo, a knob, button, head of a pin or nail.

know, i-he'-ni-in, to know.

ni-tōn'-shi-wi, to make oneself known, to tell one's name.

L.

lake, tsi-ma'-o-mo-i, a lake.

lame, i-no'-ni-kai'-yūts, to go lame, to limp.

i-no'-ni-ka, lameness.

large, im-a-ha'-o, large, great in any way.

na-ma-ha'-it, I am large.

ni-ma-ha'-it, thou art large.

im-a-ha'-it, he or it is large.

im-o'-ma-ha-i-ta'-o, they are large.

i-to'-ni-ta'-o, how big? how large?

last, hi-stōñ'-is, the last.

lately, e'-kas, lately, very near, very soon.

laugh, i'-ho-hats, to laugh at, to make fun, to ridicule.

i'-ha-na'-tum-a-o, to laugh immoderately.

lay, i-na'-nūts, to lay anything aside or down.

lazy, e-ho'-ni-ćist, lazy, laziness.
e-ho'-ni-ćis'-ta-o, pl.

lead, wi'-ho-i-ma.

leaf, wih'-pōts, a leaf.
wih'-po-tōts, pl.
e-ho-wi'-wih-po-tsi-wat, when the leaves are falling, dead.

league, no-tah'-i-o, league, covenant, communion, fellowship, a church, society, community.
no-tah'-iv-sto, pl.

lean, in-o-wo'-i-yo, to lean, as one tree against another.
e-ni'-mi-ōt, leaning, or not perpendicular.
e-wih'-pu-na, to become poor or lean, as cattle in the spring.

leave, wi-hūh'-i-a-no, to leave the lodge, said when the women and children leave the tent, for the men to partake of a feast.

leech, wih'-o, a leech.

leeks, ha-o'-i-tah'-i-wōts, leeks, onions.

leggins, e-wōh'.
e-wōh'-to-iv, and e-wōh-to'-i-wōts, pl.

lend, i-ta'-ho-ho, to lend, as a horse.

length, e-a'-i-sta.

lie, e-he'-ni-o, to lie flat on the side, as animals do.
ho-ta-mi-pau'-o-nast, to lie with one's back to the fire.
i-ōh'-tai-in, to lie in wait, to spend the night out, while hunting or killing deer.

lightning, i-o-i'-tsi-ōts.

limber, e-ći-kōht', to make limber or pliable by biting, as leather.

lip, hists; nats, my lips; nists, thy lips; mats, his lips.
his-ći'-ni-o, } pl.
his-ći'-ni-wōts, }
i-to'-no-wats, pouting lips.
i-to'-no-wa-tsi'-na-o (pl.)

listen, i-a'-to-wo, to listen.
na-a-tōh', I am listening.
ni-a-tōh', thou art listening.
na-sa-a'-to-wa, I am not listening.
ni-sa-a'-to-wa, thou art not listening.
a-ha-sći'-ōts, to listen, to hearken to or for any one.
ni-ha'-to-wōts, } you listen to or for any one.
ni-ha'-to-mo-ni, }

live, e-wa-wo-sta'-niv, to live again, to return to life, to revive.
im-a-yu'-nim, to live or dwell apart, as a woman in her menses.

liver, he, liver of animals.

lodge, we'-e; na'-no-wan, our lodge; ni'-no-wan, your lodge.
wi'-e-nōts (pl.), a good many lodges.
i-to'-wo-ni-sto, to build, pitch, or put up a lodge.
ho-ha'-mi-wi'-e, sides and roof of a lodge or house.
wi-e-no'-tsi-ne-shi'-tanst, on both sides of the tent.
wi'-i-he-wi-no', that one's lodge.
he-wi-no'-tsi-nōts, those lodges.
ći-ma'-mo-o-no-wi'-e, top of the tent or lodge, hole where the smoke goes out.
si-ma'-mo-wa'-e-hum, top of a tent, ridge of the house, the crossing of the top of the poles of the lodge.
he-wi'-no-e'-wi-nōt, the pole of a tent left standing, the skeleton of a tent.
si-to-wi-mi'-o-niv, between houses.
na-tai'-wa-si-ōts, from a place or lodge.
ni-ni-wa'-si-o-tsi, to be in a place or lodge.
e-shi'-yu-nit-hu'-a-tu'-wa-o, hole in the lodge for the smoke to escape.
sih-pa-te'-i-ho-nūts, the place in front of the lodge, which is fastened with pins.
tsi-wi'-sto-na'-ta-ōts, to a place or lodge.
ći-sti'-i-naus, household, or all the things in a lodge.
wah-tum', place opposite the door.
ho-whi', lodge-poles.
no-tah'-i-um, a soldier's lodge.
no-tah'-i-um-mi-to'-i-ni-sto, to make a soldier's lodge.

look, to-to'-ats, to look, to look at.
no'-tsi-wi'-tōts, to look into.
i-ko'-o-tōts, to look with a spy-glass, to reconnoitre.

o-no′-e-yo-tōts, to look upon, to have an oversight.
e′-i-ko, to look into a house.
a-mo′-o-ma-ćis′-tōts, a looking-glass.

lose, e′-ho-nist, to lose, to have lost.
ha′-shi-e-wa′-ni-ōts, to be lost, disappear.
i-sa′-wo-nish, not to be lost.

louse, s-ta′-im.
s-ta′-im-i-wo, (pl.)
mi-shin, a wood louse.

M.

maid, mah-i-e′-ne, an old maid. There is one old woman among the Shyennes, who never has had a husband.

mallet, to′-o, an Indian stone mallet.

man, wo-stūn′.
wo-stūn′-i-o, (pl.)
e-wo′-stu-ni-wa-o, to have attained one's growth, to have reached manhood.
si-vi-o-nivst-'sh, a chief, a great man.
e-si′-i-o′-tsi-tan, medicine-man.
ksu-wa′, a young, unmarried man.
ksu-wa′-i-he, (pl.)
ma-a′-kis, an old man.
ma-ak′-si, (pl.)
ai-ta′-ni-kai-kūn, a boy 12 or 14 years of age.

mane, e-ma-ta′-o-in-o-to′-un, mane of a horse.

many, to-nist′, how many.
e-tōnst′-tanst, how many? how much?
e′-ni-sta-nist, only so many, only so much.

mark, to-tōh-tsih′-wōts, to mark, to cut gashes in mourning.

marry, e-wi′-stōm, he marries, or to marry.
na-wi′-stōm, I marry.
ni-wi′-stōm, thou dost marry.
na-wi′-sto-mōn, we marry.
ni-wi′-sto-mōn, you marry.
e-wi′-sto-o′-mo, they marry.
i-tais′-tsi-im, he desires to marry, or wishes a wife.
na-tais′-tsi-im, I desire to marry.
ni-tais′-tsi-im, thou desirest to marry.
i-tais′-tsi-im-i-o, they desire to marry.
na-tais′-tsi-im-im, we desire to marry.
ni-tais′-tsi-im-im, you desire to marry.
im-a-yun′-i-wi-sto-i-ma′-tsin, to be married according to the customs of the whites, a sacred marriage.
i-sa-mai′-yun-i-wi′-sto-i-ma′-tsin, to be married after the manner of the Indians.
he-na-tau-hai′-nōts, to be old enough to be married.

matches, o-ha-si-ha′-si-o-nōts.

meat, o-e′-wōh-ōts, fresh meat.
o-no-wōh′, dried meats.
o-no-wōh′-o-nōts, (pl.)
i-ho′-so-tūh′-i-mi′-i-ōts, tainted meat.

medicine, e-si′-i-hav′-si-wats, red medicine, poison.
tsi-ma-he-yo′-ni-vist, a doctor, or medicine-man.

meet, i-to′-wi-o-wa′-ćis-tōm, to meet, as persons travelling.

melt, i′-ma-tau, to melt or dissolve away, as snow.
his-tas′-i′-ma-tau, the snow melts, or dissolves away.
i′-hōh-pet, to fuse or melt, as metal.

merciful, i-shi′-wats-tai′-yo, merciful, to be merciful.

middle, tai′-si-to.
si-to-wōm′, in the middle, midst.

milk, ma-tun′.
ma-tun′-ai-yum, milk grease, butter.
im-i-ta-so′-a-mi, thick milk.
ma-tun′-a-e′-hi-kun, hard milk, cheese.
ma-tun′-i-oh′-i-ōts, hardened or frozen milk.
wi-ho-i′-o-to-a-ma-ta-na′-nist, a cow that gives milk.
e-hi′-wo-i-tan-han′, to draw milk, as from a cow.

mirage, i-e′-no-nu-hat, mirage, glimmering of vapors in the sun's heat.

miss, e′-wo-nish, he misses, or to miss the road, to wander and get lost.
na′-wo-nish, I miss the road, &c.
ni′-wo-nish, thou dost miss the road, &c.

mittens, i-to′-a, and to′-a.
na-to′-a, my mittens.
ni-to′-a, thy mittens.
i-to-a′-i-wo (pl.), their mittens.

mix, he-ko′-ma-o-wo′-tsūts, to mix, as mortar.

moccasin, i-mōk′-ći.
i-mōk-ća′-ni-wōts, (pl.)
na-mōk′-ći, my moccasin.
ni-mōk′-ći, thy moccasin.
e-wo-kōn′, to put tops on moccasins.

molasses, pa-nu′-i-ha-su′-i-ōt.

money, mi-ho-ni′-ma-kai′-it.

moon, i′-wo-nit, the moon rising.
i-shi-i′-a-min, the moon passing over the sky.
i-shi-i′-ta-in, the moon passing down into the west.

morning, en-i-wo′-ni-ōts, daylight, dawn of morning.

morose, shu-mi′-i-whai′-i-sin′-ōs (adjective).

mosquito, ho′-o-ma.

mother, ish′-k.
na′-ko-e, my mother.
nih′-ku, your mother.

mourn, i-ah′-ai-im, to cry or mourn for the loss of a child.

move, im′-o-mo′-ōts, to move about, moving about.

much, e-wo′-ta-ha′, very much.

mule, a-ki′-i-wa.
a-ki′-i-wa′-ham, (pl.)

musk, e-ni-si-me′-hast.

muskrat, i-yōh′.
i-yōh′-i-o, pl.

mystery, ma-he′-yo, mysterious, medicine, mystery, spiritual. Anything that the Indians do not understand they consider supernatural, or "medicine."
e-ma-wi′-hu, Great Medicine, Great Spirit.

N.

nail, is-to′-a-no-ni-mo′-i-o-sūn, the nails of the fingers and toes.
e-mi′-si-mi-ōs, the dirt under the finger-nails.
mi-si′-mi-o-sūn, pl. form.
e-ni′-to-i-to′-ni-o, nails of iron, so called because first used in a door.

naked, i′-o-is-tōs, naked, nearly naked, poorly clad.

near, kaksh, near, near by, soon, presently.

neck, ći-hu′-na-ōt, nape or end of the neck.
is-ći′-ōts, back of the neck.
e′-ko-tsi′-na, by the neck.
is-ći-ōts′-to-i-shi, to tie around the neck, as a rope.

needles, e-ko′-wo-is-tōts′, and wi-ho-ko′-wōst.

nephew, it-sin′-ōt, his nephew.
na-tsin′-ōt, my nephew.
ni-tsin′-ōt, thy nephew.
na-tsin′-o-ta, my nephews.
ni-tsin′-o-ta, thy nephews.

nest, who′-is, a bird's nest.

never, i-sa-ho-wōh′-po-nit, at no time, never.

new, e-ho-hai′-it.
mo-ni-ma′-niststst, to make new, to renew.

news, ni-ni′-o-tsi-is, to tell the news, to take word to any one.
nih-o′-tsi-is, to arrive with the news.
e-hi-ōh′-ta-o-wa, to bring word or news to any one.
tai-yōh′-ta-o-wa, to have gone to carry the news.

night, ta-e′-wa.
ta-asts′, pl.
ōh-ta′-e-shi-to′-iv, beginning of the night, dusk.

nod, i-o-a′-wa-e, to nod or swing the head, as in sleep.
na-wa′-wo-e, I nod.
ni-wa′-wo-e, you nod.
i-a′-wa-i-sto, they all nod.
he-i-e-tai′-yūts, to nod the head, to bow to any one.

noise, i-ha′-i-no-wi′-o, noise, clamor, tumult.
shi-o-ha′-o-no-as, a humming noise, bustle.
hi-ah′-po-ni-ni′, to make a grating noise with the teeth.

nose, e′-iv.
e′-iv-o-ni′-wōts, pl.
na′-iv, my nose.
ni′-iv, thy nose.
e′-i-ni-ōts, to wink the nose.
e-he′-e-im, to blow the nose.
he-e-em′, the excretion of the nose.
e-si-e′-ma-si-ōts, to sniff or snuff up the nose.
i-ku′-ko-no-me-i-sis′-tūts, the external parts of the nose.

nothing, i′-ho-wa-an.
e-ho-wa′-ni-ni-he′, to become nothing.

O.

obliquely, i-tah-ah′, obliquely, from corner to corner.

obstinate, sti-wi′-nis-to, to be obstinate, resolute, to have a mind of one's own.

old, in-o-no′.
i′-tu-si-i-na′-o, to become old.
e-pi′-i-ōts, to become old or rotten, as old clothing.
ma-tum′-ha, an old woman.
im′-ōs, old, worn out.
im′-o-sōts, pl.
ni-ta′-im-ōs, all old, very old.

on, he-am′, on or upon.

ooze, ma′-pi-im-i′-ōts, to run or ooze out, as sap or water.

open, i-o-ni′-ain, to open anything, as a bundle; to untie, as a shoe.
si′-to-wo, an open place, a yard.
e-ta′-ōts, to open the mouth, in yawning or gaping.
i-ish-tsin′, something that is open, as cloth.
na-ish-tsin′. 1st person sing.

oppose, ev-hav-si′-va, to check, to oppose, put a stop to, forbid.

ornaments, hi-wo′, a man's ornaments.
na-wo′, my ornaments.
ni-wo′, thy ornaments.
ho, brass rings, used as ornaments around the wrist.
ho′-ho-nōts, pl.

orphan, niħ-hais′, an orphan.
niħ-hai′-sōn, pl.

overflow, i-mi′-ish, to overflow, as a flood.

P.

pack, i-sho-po-o′-inst, a pack or bundle of furs.

paint, i-ho′-wo-ni, to paint one's self yellow.

pair, e-no′-ka, a pair.
e-niħ-anst′, two pairs.
e-na-hanst′, three pairs.

pantaloons, wi-shi-su′-nist.

pare, i′-a-tōħ, to pare anything with a knife.

pass, i-ta′-a-ain, to pass over, as a hill, in going home.
e′wo-iv, passing off, as clouds.

patient, o-wai-hai′-is-ći-wi′-mi-ist, to count as nothing, to be patient.

paw, e-shi′-ći-tsi-wai′-yōst, to paw up dust, to throw up earth as cattle do.

people, his-tain′, a people, tribe, nation, band.
hi-man-hai′-stōts, his people.

pepper, mi′-i-mi-nūts.

perhaps, mu′-i-ni-su′a-ni, hi-ya′-i-nis, } perhaps, probably.

pimple, i-ho′-pi-in′, a pimple, a rough place on the skin.

pipe, he′-ōk, a pipe.
he-o′-ko-nōts, pl.
na′-tsi-ōk, my pipe.
ći′-ōk, your pipe.
na-tai′-to-an, I will fill my pipe myself.
he′-pōts, to take the pipe.
si-o′-kis-to-mis, small end of the pipe-stem, which is taken into the mouth.
ha-he-yo′, a stick to press the tobacco down in the pipe when smoking.

pitch, o-ho′ma-ni-niħ′-a-mo-ćist, to come and pitch one's tent.

pithy, e-wi′-na-ōts, pithy, spongy.

place, tu′-sa, at what place?
tu-sa-ni′-ta-ōts, where, in what place is it?
si-nōts′, to place under the girdle, as a hatchet or knife, to wear around the loins.
na-taħ′-o-wi-stan, from one place to another.

plain, i-tōħ′-tōn, a plain, level.

to pluck, o-ko-wa′-ni, to pluck out, as the hair on the head.

plums, maħ′-i-mi′-nōts.
maħ′-i-mi-sta′-im, plum pits or stones.
maħ′-i-mi-no′-isć, plum bushes.

plunge, i-i′-i-yōts, to plunge or sink down, as in water.

polish, i′-o-wa′-si-to, to rub and make shine, to polish.

poor, nsta′-mi-no, poor, miserable, destitute.
nsta′-mi-no′-he-hiv.
nsta′-mi-no′-hi-o, (pl.)
i-tōħ′-o-na, poor, not fat.

pop, e′-ni-sto′-ni-wa, to make pop, as in blowing a leaf.

porcupine, he-ko′-wit.
he-kōst′, porcupine quills.

possess, he-ni′-sćo, to possess anything, to have for one's own.

pound, e-pin′-ha-nōts, to pound, as corn in a mortar.
pe-nōts′, to pound anything fine.
i-si′-o-i′-yats, to ram or pound hard in a hole.
powder, wōh′-i-wusts, a powder-horn.
wōh′-i-wit, (pl.)
e-pa′-im, what remains after powder is exploded.
na-pa′-im, my powder.
ni-pa′-im, your powder.
e-pa′-im-iv, (pl.)
pox, i-wa′-ni-i-ist, small-pox.
i-ōsh′-ki-win′, pitted with the small-pox, a pitted face.
prairie, wi-e′-no-tsi′-o-ko-manst, out in the prairie.
preserve, e-ōh′-po-o-ist, to keep or preserve anything with care.
press, o-e′-to-i, to press down on.
e-ko′-no-ho′-e-nōts, to press on, be tight on.
e-nih′-pe-si′-o-wats, to press close together with the mouth.
to prick, e-he′-wōh-so, to prick or dot, as marks on the skin.
proud, e-hi′-is-ta, proud, vain.
pulverize, i-ći′-wa-to′-i-yo, to pulverize, to plough the ground.
i-pin′, powdered, pulverized, fine.
pumpkin, ma′-o.
ma′-ōn, (pl.)
punch, i-ōh′-i-wo, to punch a hole, or to make a hole by punching.
mah-o′-yi, to punch to death in a hole.
purpose, e-ōh′-i-mo, to purpose evil against, to desire to take the life of any one.
push, sim-o-ta′-so-ōts, to push, as a boat out from the shore with a paddle.
ai-so-o′-wo, to push against, to push along.
i-i′-e-yōts, to push under and pry up, as a root.
tsi′-i-ne, to push or jog any one with the elbow.
wo-wo-tut′-si-mi-nōts, to push into, as a stick into the sand after turtles' eggs.
put, e-o-tats′, to put on and wear, as leggins.
e′-hi-ma′-ma, to put on, as clothes, to wear, to be clothed.
mi-sih′-o-pa′-i-wōh, to put anything (as a child) on one's back under a blanket.

Q.

quarrel, mi′-o-tats, to quarrel or fight with any one.
quarter, niv-sta′-ni-wo-e′-hist, one of the four quarters of anything.
quit, i-ni-sto′-i-no, to quit the lodge, to leave it.
quiver, i-stūs′, a quiver.
na-i-stūs′, my quiver.
ni-i-stūs′, thy quiver.
i-stu-sūn′ (pl.), quivers.

R.

rain, i-ho′-ko, to rain.
i-wo′-o-no-ko, a long-continued rain.
no-no-no′, rainbow.
e-ōh′-tat, a kind of lizard that is supposed to fall with the rain.
raspberries, ōts-ći-e′-i-hew'h.
i-wi′-po-tsi-wa, raspberry bushes.
rattle, in′-is-to′-ni-wa′-nōts, to rattle the feet when walking.
e-shi′-shi-nōn, nails and hoofs of animals used as rattles.
ravish, i-na′-ko-nan, to ravish, to commit a rape.
ready, no-no′-to-ho-sinst, ready, prepared for anything.
recoil, na-po′-i-shi-ni′-o, to recoil, as a gun.
red, im′-a-o, to become red, reddish.
im-a-o′-nist.
en-i-ma-ho′-i-na, redness of the dawn.
rhubarb, e-si′-i-o-tsi-hōh, yellow medicine.
reject, tsi-wi′-wi-ōm, to reject, to despise, to turn away from.
na-ta-wi′-wi-ōm, I reject.
ni-ta-wi′-wi-ōm, thou dost reject.
remember, mi′-e-ta-nōts, to remember, to recollect.
rest, o-so′-to-mo-ist, rest, to rest.
resemble, i-si-i-shi′-ni-o, to be like, to resemble, to have its father's face.
restore, mi′-tsi, to restore to any one, to give to one what belongs to him.
na-ta′-mit, I restore.

ni-ta′-mit, thou dost restore.
ni-ta′-mi-tats (pl.), they restore.

rice, e′-hi-sōn.

rich, i-ha′-o-wa, to be rich.
i-ha′-o-wai-yo (pl.), they are rich.
na-ha′-o-wai-yo, we are rich.
na-ha′-o-wa, I am rich.
ni-ha′-o-wa, thou art rich.

ring, iȟ′-i-wa-ōts, to ring as a bell, to make ring.
na-a-ni′-a-to-mats, a ringing in the ears.
na-sa-a-ni′-sto-mo-ni, I have a ringing in my ears.

rise, i-o-ha′-a, to rise or get up.
na-o-ha′-a, I rise.
ni-o-ha′-a, thou dost rise.
na-o-hain′, we rise.
ni-o-hain′, you rise.
i-o-ha′-i-o, they rise.
i-a-ha′-ni-sti′-wa-ha, to rise up again, to recover itself, as grass, that is bent down.
im′-i-an, to rise up in sight, as one in the water.
a-to′-ni-wa-ni, to rise up, to stand up like the hairs on an animal.

river, o′-he.
o-he-ist′, (pl.)
o-he-kis′, a small river or creek.
o-hik-so′-nōts, (pl.)
maȟ-i-yo′-he, a large river.
maȟ-i-yo′-hist′, (pl.)
o-he-i′-ho-hōm, mouth of a river.
i-ōȟ′-o-we, } crossing a river.
e-ōȟ′-o-who, }

road, mi′-o.
mi′-o-niv.
oȟ-o-wi-sta′-mi-o.
o′-ha-mas, by the way, on the road, between one place and another.

roast, mōȟ′-ta-wōȟ′-po-no-tōts, to roast or parch, as coffee or corn.
i′-ma-shi′-ni-hu, to be partially or wholly roasted, to be covered with red spots from going too near the fire.
na′-ma-shi′-ni-hu, I roast.
ni′-ma-shi′-ni-hu, thou dost roast.
na′-ma-shi′-ni-hu-i-sto, we roast.

robe, ma-tsi′-o-mi-wōȟ′-tsit, a summer robe.
tsi-wo′-kōm-hōm, a white robe.

rock, o-o-na′.
o-o-na′-i-o, (pl.)
o-o-na′-tsōn, small water-worn pebbles.
o-o-wai′, white, crystalline gypsum, selenite.
wo′-i-sta′-o-na, white rock, or white, smooth rock, quartz.
mōȟ-ta′-wo-na, black rock, a primitive rock.
tsi-o′-ho-ist, "the rock that water cuts," cut rock, forming a cañon.
shi′-i-e, sandstone.

roll, e-wo-wo′-ki-tsi-un, to roll anything.
e-a-mo′-in, to roll over and over, as the wheel of a wagon.

room, mi-to-mev′, to make room for, as in a tent, to give place to.

rosebud, he-nin′.
he-ni-ni′-o-he, the Rosebud River.

rotten, a-he′-ko-taȟ, rotten, as wood.

rough, i′-yo-iv, rough, roughened up.
iȟ-iv′-a-o, rough, as a country.

row, mi-o-na′-nist, a row, as of corn.
mi-o-na′-ni-sto, (pl.)

rub, i-o′-wo, to rub or brush off, as dirt or dust.
ni-o-nis′-to-kan, to rub in the hands.
e-ho-nin′, to rub skins with the hand in dressing.
i-aȟ-e-ish′, to rub or scratch the back against anything.
i-o-ōȟ′-i-maȟ′-i-e, to rub a robe or a skin on a rope or cord in dressing.
na-o-ōȟ′-i-maȟ′-i-ist, I rub, &c.
ni-o-ōȟ′-i-maȟ′-i-ist, thou dost rub, &c.
i-o-ōȟ′-i-maȟ′-i-is′-ći-na, they rub, &c.
na-o-ōȟ′-i-maȟ′-i-is′-ći-no, we rub, &c.
ni-o-ōȟ′-i-maȟ′-i-is′-ći-no, you rub, &c.
e-shi-ōȟ′-i-maȟ′-i-e, to be done rubbing a robe on a cord.
e-sho′-ni-o, to rub a robe or skin with the hands.
na-sho′-ni-ōȟ, I rub, &c.
ni-sho′-ni-ōȟ, thou dost rub, &c.
na-shi-ōȟ′-ta-nōn, we rub, &c.
ni-shi-ōȟ′-ta-nōn, you rub, &c.

run, i-a-mi-mi′-o, to run.

i′-a-mah′, to run away, flee, retreat.

rump, aist′-shi-o, the lower part of the back.
nast′-shi-o, my rump.
nist′-shi-o, thy rump.

rush, i-wi′-sto-i-ni-sto, to rush on the buffalo.
o-ha′-i-si-yūs′-ta-i-si-takst′, to rise up and rush, as one excited.

rustle, wīh′-po-to′-tsi-ih-i-no′-ninst, to make rustle, as leaves.

S.

sacred, i-a-ma′-wi-hōt, to regard as sacred or holy.

sack, ho′-e, an empty bag or sack.

saddle, o-au-kis′-tōts.
o-au-kis′-to-tūts, (pl.)
na-to-au-kis′-to-tōts, my saddle.
ni-to-au-kis′-to-tōts, thy saddle.
o-wa′-ki-stōts, a pack-saddle.

sail, ev′-si-o, to sail round, as an eagle.

scabby, i-yo-iv′, scabby, scabbed.
i-yo-iv′-i-o, (pl.)

scales, o-ni′-sta-na-nōts, scales, steelyards.

scampering, e′-wo-so, scampering like colts, unrestrained.

scare, e-a-si-ha′-wo, to scare away by stamping.
i-o-a′-si-ta′-o-wo, to scare all away.

scattered, e′-he-ni-anst, scattered or fallen from, as a rock.

scowl, e-he′-hi-ōh′-tan, to scowl, to make wrinkles on the forehead by raising the eyebrows.

scrape, i-shīh′-o-i-ain′, to scrape, as a robe.
na-shīh′-o-i-ain′, I scrape, &c.
ni-shīh′-o-i-ain′, thou dost scrape, &c.
ni′-ta-i-shīh′-o-i-ai′-ni-sto, they all scrape, &c.
i′-ni-to, to scrape the hair from a hide.
na′-ni-to, I scrape, &c.
ni′-ni-to, thou dost scrape, &c.
i′-ni-to-i′-sto, } they scrape, &c.
i-ma′-ni-to-i′-sto, }
e′-shi-ni-to, to be done scraping, as a skin.
na′-shi-ni-to, I am done scraping.
ni′-shi-ni-to, thou art done scraping.
i-shi-īh′-o-i-sto, they are done scraping.
e-shi-īh′-o-ni-o, he was done scraping, &c.
na-shi-īh′-o-ni-ōht, I was done scraping, &c.
ni-shi-īh′-o-ni-ōht, thou wert done scraping, &c.
na-shi-īh′-o-ni-ōh′-ta-nōn, we were done scraping, &c.
ni-shi-īh′-o-ni-ōh′-ta-nōn, you were done scraping, &c.
} Past tense.
i-si′-si-no, to scrape a skin.
wōht-sit′, the scrapings of skins.
o-ni′-o-tōts, to scrape the hairs off a skin.

scratch, ah-e′-i-nats, to scratch, as one itching.
i-ah-e′-i-nats, he scratches.
i-ah-e′-i-stai-im, they scratch.
i-ho′-ta-o, a scratch.
ah-i-a-ta′-o-wats, to scratch with the toes.

screw, ni′-to-yo, gun screw or worm.

scum, i-ta-wo′-ni-wi-siv, to have a scum.

seam, i-a′-mo-to′-i-no, seam in a buffalo robe.

season, i-i-mi′-a-niv, next season, next year.
a-i′-ni-shi′-i-kas, the season when the days are short.
an-sta′-i-ha-as, the season when the nights are short.

see, i-o-ha′-ćist, to see clearly.
na-o-ha′-ćist, I see clearly.
ni-o-ha′-ćist, thou seest clearly.

see-sawing, in-o-no-po′-i-o-a-tsi′-o, see-sawing, an up and down motion.

set, wi-kis-in′-o-o-na, to set, as a bird.

sew, a-po-nōts′, to sew or mend.
i′-ha-pi-nōht, to sew on, to patch.
o-im′-sko-nūts, an Indian woman's sewing-bag, which contains all her sewing apparatus.
e′-po-i-nōt, to sew on a round patch.
e-ah′-pi-no, to sew on a long patch, over a rent.

shade, i-ho-wi′-o-o, shade, or shadow.
e-ya-wi′-a-o, a shade, as branches of trees; an umbrella.

shake, ma-ko′-mi-is-i-a′-si-to-to, to shake, to clean by shaking or blowing, as kinnic-kinnic.
i-o-wai′-i-yōts, to shake the head.
i-yo′-ma-ish, to motion with the head.

e-yo′-ma-e′-ūts, to wag the head.
in-is′-to-ni-wa, to be shaken by the wind.
ka-mah′-i-i-ni′-mo-tōt, to shake with the mouth.

sharp, e-e′-kūs.
ći-e′-kūs, } sharp-pointed.
ći-e′-ka-kūs, }

shears, ōh-to-wa′-mo, a pair of shears.
ōh-to-wa′-mo-takst, pl.

shed, wi-ći′-su-i-ni′-si-i-na, to shed quills.

sheep, wo-ka′-i-tsi-wo′-ko-mast, white deer, a sheep; also, kos, a sheep.

shells, ći-mi′-o-na, shells of the genus *Dentalium*, used as ornaments.
ni-mać′, a land-shell, *Helix*.
ni-maći′-o, pl.
ma-pi′-ni-mać, water-shells.

shirt, is′-ći, a shirt.
na′-is-ći, my shirt.
ni′-is-ći, thy shirt.
e′-is-ći, his shirt.
is′-ći-in, pl. shirts.
mōh-ta′-wi-is-ći, a black shirt.
wo′-ko-mi-ka-ku′-is-ći, a white shirt.
ka-ku′-is-ći, a yellow calico shirt.
o-i-shi′-nai-wai-o′-tōts, a vest, a shirt with the sleeves cut off.
kah-o′-i-shi-ōn, calico cloth.

shoes, hōh-tsim′-o-ki, round snow-shoes.

shoot, i-ha′-ni-mas, he shoots.
na-ha′-ni-mas, I shoot.
ni-ha′-ni-mas, thou dost shoot.
i-pi′-im-hist, to shoot in pieces.

shore, to-tu-kōm′, at the shore, by the shore, at the edge.
ōh-i-en′, said of a bluff shore, where the water is deep.

short, ćik-sta′.
i-ćik′-sta-yo, pl.

shot, shi′-shi-ma-hōts.
mah-i-wi′-hu-i-ma, large shot, balls.

shoulder, i-sta′-ta-mo.
i-sta′-tsi-i-ma′-mōh-o-yi, between the shoulders.
i-tsi-o′-is-tak, to shrug up, as the shoulders.

shout, no′-o-nōst, to shout out to any one.

sick, i-ha′-mōh-ta.
i-sa-ha′-mōh-ta, not sick.

side, is-ći′-a-mah′-ist, on one side.
ha-stu′, on the other side.
ho-hōm′, on this side.

sight, e′-ni-mi-in, to come in sight, as people from over a hill.
ta-si′-a-me-inst′, in sight of, afar off.

silently, e-tsi′-a-mi, stilly, silently, as if approaching game.

simmer, i-to-si′-i-so-wōt, to simmer, or make a slight noise just before boiling, as water.

sinew, ho′-tauh, taken from the back of an elk or deer.
he-sis′-tōn, large sinew in the neck of animals.

sing, ni-minst′, to sing.
na-ta′-ni-min, I sing.
ni-ta′-ni-min, thou dost sing.
i-ta′-ni-min, he sings.
wa-wa-o′-si-mi, to sing in a low tone, in a whispering, drawling manner, as the Shyenne women do when lulling their children to sleep.
e′-ni-min, to sing in praise of any one.

sink, o-na′-i-hi-ko, to sink down, as a stone.

singe, wi′-he, to singe off, as the down from a fowl.

sister, is-ta-ta-nim′, a sister.
is-ta-ta-nim′-i-wo, pl. sisters.
nah′-a-im, my sister.
i-ah′-a-im′-i-wo, pl. my sisters.

sit, en-sta-ni-wa′-e-ni-i, to sit with the knees bent up.

skim, mo-mōht′, to skim off, as grease from a pot.

skin, en-o-iv′, all kinds of skins.
o-ev′, a green skin, one just taken from the animal.
i-o-ōh′-a-niv, dried skin, parchment.
wo′-ka-e-wōts, all kinds of deerskins.
o-ho′-kuts, a deerskin with the hair taken off.
i-no-ta′-ni-sto, a skin bottle, for holding water.
e-wa-e′-hu-wa, an instrument for scraping skins.

sky, wo-e-i′-a-ta-tan, blue sky.

sleep, i′-o-wish, to sleep.
i-na-au-si′-tan, to sleep or be sleepy.

i-ma′-no-shin, to sleep side by side.
tai-o-wisć′, to sleep out, away from home.

slide, i-a-no′-i-o-whit, to slide, as on the ice.

slip, e-sōh′-i-yu-ash, to slip, as on the ice.
e′-ho-ha-in, to let anything drop or slip from the hand.

slippery, e-i-sōh′.
e-ih-o′-a, slippery, ropy, slimy.

slits, o-he-wi′-o-tah, slits cut in a skin when stretched.

slushy, e-mōh′-tsi-e′-no, as snow when soft.

small, e′-ta-ki, anything small.
i-ći-ta′-o, how small? of what size?

smell, i-hav′-si-vi′-no, smelling badly, stinking.
i-hav′-si-vi-mi′-i-ōts, to smell badly, as tainted meat.
in′-a-tōn, to smell.
o-ōh′-i-mi′-yōts, a strong smell.
si′-to-wun, to burn incense, to make a good smell by burning.

smoke, i′-vi-nōt.
im-a′-vi-nōt, smoky, full of smoke.
im′-a-wi-ta′-nist, to smoke.
e-wi′-no-ta-wo-ma′-no, smoky, air filled with smoke.

smooth, i-a′-to-no-wi′-si-nats, to smooth down the hair.

snap, i-a-i-si′, to crack or snap, as fire.
i-ōh′-o-ma, to snap or crack as ice in walking over it.

sneeze, e-he-ta-in′, to sneeze.

snow, is′-tas.
im-a′-is-ta-siv, all kinds of snow, all the snow.
i′-ho-i-it, falling snow, to fall as snow.
is-ta′-si-ōh′-i-a-no′-iv, a snow-drift.
i-wo′-o-ni-it, to snow in.
i-ho-it′, it is snowing.
i-a′-ih-to′-e-in, to snow on anything.
im-a-ya′-to-in, everything covered with snow.

soak, e-shi-ki′-o-wo, to soak a robe for dressing.
na-shi′-ko-wōts, I soak, &c.
ni-shi′-ko-wōts, thou dost soak, &c.
e-shi′-ko-wo′-tsi-no, they soak, &c.
i-su′-a-ni-ōts, to soak through and come out on the other side.

soap, shi-shi′-wo-iv.

soft, e-haić′, soft, fine.
em-ah′-e-e, to make soft, as bread.

soldier, no-tah′.
no-tah′-i-yo, (pl.)

something, he-no-wa-e′-tōn, is that something?
he-ni-na′-wo-ni-o-is-ći′-no, to lose something.

sometimes, na-tu′-as, na-tu′-sa, tu-sa-nin′-hiv, na-ni′-shi-ni-na, na-tas′-tsi-nis-tōm, tu′-a-sūs, } sometimes, once in a while, now and then.

sores, in-o-to′-i-yōts, itch sores.
i′-ma-hi-ma′-nit, to be covered with sores.
na-ni-o-i′-wi-uts, to come out on, as sores or pimples, to break out in sores or spots on the skin.

spatter, wi′-si-ōts, to spatter, to fly out, as grease.

speak, i-mah′-i-ha, to speak with a loud voice.
i-wih′-pi-ha, to speak, growl, or sing in a hoarse voice.

spill, e-ni-a′-tsits, to spill, scatter, throw broadcast.
i-hi′-i-yu-ha, to spill over anything.

spit, o-si-a′-nits and o-si-a′-nōts, to spit.

spirit, ma′-hi-o-o-hap′-si-vast, bad spirit.

split, i-ōh′-o, to split, as wood.
i-ōh′-o-nōv′, they split.
na-ōh′-o, I split.
ni-ōh′-o, thou dost split.
ka-mah′-i-i-oh′-i-wo, to split wood.
e′-o-kah, to split with a knife.
ōh′-i-yu-stats, to split by shaving.

spoon, a-mi′-ku-a-mik′, a horn spoon, made from the horn of the mountain sheep.

spread, o′-i-yatst, to spread out anything to dry.
i-tsi′-o-i-ta, to spread the knees apart.
o-no′-ko-nanst, to make or spread down a bed for one.

spring, wo-tainst′, a spring or well.
o-a-me′-wa, a bubbling spring.
o-a-mest′, pl.
i-ai′-no, to have spring come to any one.
e-shi-ih′-o-o, coming up, springing up, as grass.

sprinkle, ma-pi-i′-ni-ats, to sprinkle, as with water.

staff, is-tōh′-to, a staff used in walking.
i-hōh′-to-yōts, to use a staff in walking.

stand, ih-a-ma′-yo, he stands bent forward.
nah-a-ma′-yo, I stand bent forward.
nih-a-ma′-yo, you stand bent forward.
ih-a-ma′-yo-i-sto, they stand bent forward.
i-ni-ho′-wi-o, to stand up, to stiffen up, as the hair.
e′-yu-ha, to stand up, rise up, to stand still.
e-ha-tōs′-tsi-a, to stand up, as the hair on the front portion of the head.
e′-po-po-ōt, standing apart, separate, as blades of grass.

stars, o-tōhk′.
o-tōh′-i-o, pl.
mōh′-uts, Little Dipper, seven stars.
si-a-me-yu′, the Milky Way in the heavens, or the road where the dead walk.
wo-wo′-i-wo, morning star.

start, na-no′-ćist, to start to come, to come.

steal, e′-no-mats, to steal; also, ćūh′-i-no-mats.
na′-no-mats, I steal.
ni′-no-mats, thou stealest.
na′-no-ma′-tsim, we steal.
ni′-no-ma′-tsim, you steal.
e′-no-ma′-tsi-o, e′-no-ma′-tsi-to, } they steal.

steam, e-i′-shi-o.

step, tau-nist′, a step or pace.
tau-ni′-sto, pl.

stern, i-ta′-ko-win, to be stern or cross.

stick, e′-pa-o-i-ōts, to stick, or make stick, as mud.
e-hi-ku′-ma-o, to mire, to stick in the mud.
i-sa′-ha-to, to stick to, as an opinion, continue to assent.
ha′-nōm, sticky, clammy.
na-po-pah′-o-i-na′-ots, sticking, like molasses.

stiff, e-hi′-ko-nōs, to become stiff or hard, as a dead body, or clothes.
i-na-tsi-o-na′-wōs, to have the hands stiff or numb with cold.

stir, hi-yo′-yo, to stir up the earth, to plough.

stirrups, tōh-pa-o′-o-nōts.
tōh-pa-o′-a-na-sit, stirrup-straps.

stomach, wi-no-ho′-ōts, the stomach of animals.
e-wōh-ta′-si-ōm, the fat around the stomach.
e-to′-nish, the gizzard of fowls.

stone, o-i-sin′, a stone for sharpening a knife.
o-a-na′-tsōn, small stones, gravel.
tsi-ma-ma′-o-ist, red stony hill.
tsi-mōh-tau′-o-man, black stone that is used for fuel, lignite and coal.

stoop, ha-ma-e′-yūts, to stoop down.

stop, ta-ha′-yu-hi′-tu-wi, to stop, to obstruct, to hinder one.
i-si-va′-i-ni, to lay hold on, to stop one.

straighten, si′-pi-o-naut, to straighten out, as the arm bent at the elbow.

strange, e-nōt′-siv, belonging to another tribe.
nōts, a stranger, an enemy.
no′-tsi-o, (pl.)

strangle, e′-ko-ta-nu, to strangle with a rope, to hang.
e′-ko-tsi-a, to be hung, or strangled with a cord.

stretch, e-si-pa′, to stretch, yawn.
i-si′-ho-e-is′-to, to stretch out, as a hide with pins.

strike, ta-si-in′-o-nu′-to-wa, to strike, to make stagger.
no-no-pōts′, to strike a stake or pin, so as to loosen it.
e′-o-mo-no-e′, to make cry by striking.
e′-i-ho-ni′-sto, to strike a ball with a club.

string, wu-ka-he′-wuts, a leather string, a thong.

strokes, e-ho′-e-wa, strokes or beats, as the ticking of a watch or clock.

strong, i′-mah-i-ta-niv, a strong man in the prime of life.
na′-mah-i-ta-niv′, I am strong, &c.
ni′-mah-i-ta-niv′, thou art strong, &c.

to stuff, e′-to-i-a, to stuff in, as hay in moccasins when travelling in cold weather.

succession, i-no-o-wo′-ne-i-shin, in succession, Indian file.

suck, e′-nin, to suck, as a child its mother.
ta′-mi-tsi-a-tsi′-ni-o, to give suck, as a nurse or mother her child.
i-no-ōh′, to suck up, to make a noise with the mouth in eating soup.

ni-ta-nun'-he-po-she, to suck a teat.
ni'-shi-wai'-i-ni, a teat.

sugar, nish'-ki-mai'-i-map, so called from the color that it gives to water, like soup.

summer, i-mi'-a-ni-o.
mi'-a-ni-a-si'-to, midsummer.

sun, i'-shi.
ta-e'-i-shi, night sun, moon.
i-shi-im'-i-e, after the sun is up.
i-shi'-tai-e, sun going to sleep, sun setting, west.

Sunday, i-shi'-ma-yu'-nu, medicine-day, Sunday.
i-shi'-i-ma-he-yu'-niv, a sacred day.

suppurating, i-o-nīh'-u-no, suppurating, as a sore.

surfeited, na-in-hu'-i-nu, I am surfeited by eating; to be made sick by eating too much.

suspect, e-ni-ta'-wa, to suspect, to have an inkling of.

swamp, e-he-ko'-ma-o, when the surface of the country is low, wet, or under water.

sweat, i-ho-pi'-ōts, to sweat, to pant or give out, including the idea of sweating.
e'-ma-o, to take a sweat.
e'-ma-to, (pl.)
im-a'-am, a sweat-house, sweat bath.
e'-ha-nan, to sweat very profusely.

swell, e'-yu-ha, to swell, as from a wound, inflammation.
e'-yu-ha (noun), a swelling.
i-o'-i-ta, a protuberance or swelling, as a bubo.
e-po'-a-hant, to swell, as corn soaked.

swift, i-ha-ta'-a-o, swift, fast.

swim, it-o-ham', to swim.

swing, i-wa'-wa-a, a swing for lulling a child to sleep.

T.

tadpoles, i-shi'-in-o-tōt.

tall, o-ōtst'-tsi-sto-o, a tall tree or wood.

take, i-ha'-a-na-i-nōts', to take up and feel the weight, to weigh.
nish-ta-no'-i-ōtst, to take home with one.
no-wa' (imp.), take it.
ta-sta'-nōts (imp.), take.
he'-tsit (imp.), take all.
he-tōh'-o-nūts-his-ta'-nūts (imp.), take those.
he-to-he'-si-va-nūts (imp.), take these.
o-tai'-is-ta-nūts (imp.), do not take these.

talk, ma-ha-e-yi'-ists'sh, to talk roughly or loudly about anything.

taste, i-tōn'-shi-mi'-a-ōts, to have a taste or smell.
i-sa-tōn'-shi-mi'-a-ōts, not to possess taste or smell.

tattooing, e-he'-wi-so, tattooing on the body, blue stained.

tea, wīh'-po-tōts, all leaves, a great many leaves.
wīh-po-tsi'-ho, the tea used as a drink.

tear, ōh'-a-ōts, to tear, as cloth or leather.
o-ni'-ni-ha'-nūts, to tear in pieces, to destroy.

tears, i-ha-ni-hi'-ho-to.
i-hai'-ni-ōh'-i-no-wa'-i-to, the eyes full of tears.
i-mo-ma'-pi-i-ma'-tsin, to make the tears trickle down.

tie, i-to-isć', to tie anything on to something else.
o-pu'-i-si-vist, to tie up and make into bundles and packs.

tired, i-ha-ni'-wa-wo-ish, to be tired or weary, as in walking.

that, nis-i-wo', that one; even that.

thaw, ma'-o-me-i-ma'-tōt, to thaw, as ice or snow.

them, en'-shi-no-ka, only them.

there, he'-to.

thick, i-ha'-o-nōt, to be thick, as a skin or board.

thief, shi-no-ma'-tsi-o-nivst, a thief, a stealer.
in-o-ma'-tsi-o, to steal, to be a thief.

think, i-ta'-o-wo, to think, to meditate.
i-hap-si'-vi-sta, to think very badly, to have a bad heart.
ni-i-hap-si'-vi-sta, you think very badly, you have a bad heart.

this, no'-tsi-to.

those, e-to'-is-ta-nūts, and e'-ći-sta-nist.
in-o-ka', those alone.
ta-to-nis'-to-whews, } all those.
no-nis'-to-whews, }

thread, ho'-ta-nun.

throat, he-o-tsik'.

through, so'-i-yatst, through all, through the middle.

throw, i-wo'-ho-o-ist, to throw away.
ho-no-i-wo'-ho-o-ist, to throw anything down.
no-mah'-i-mi, to throw over one, as a blanket.

o′-o-mi, to throw at, to pelt with stones.
ta′-o-mi, a great many throw at one person.

thrust, e′-hi-ku-a, to thrust into with a knife.

thumb, na-ma-a-im′-o-ik.

thunder, no-no′-ma.

tobacco, tsin-im′-o.
tsin-im′-ōn, (pl.)
na-tsi′-ni-mo, my tobacco.
ni-tsi′-ni-mo, your tobacco.
peh′-o-wa-tōts, a cutting-board for tobacco.
peh-o-wa′-to-tōts, (pl.)

tongue, e-wi′-ta-nu.
e-wi-ta-nu′-wi-wōts, (pl.)
na-wi′-ta-nu, my tongue.
ni-wi′-ta-nu, thy tongue.
mi-hi-wi′-ta-nu, a buffalo cow's tongue.
wo-sta′-ni-wi′-ta-na, the tongue of a man.

tongs, ah-pa-ni′-o, tongs, pincers.

tooth, e-wi′-e-sūts.
e-wi′-e-si-wūts, (pl.)
na-wi′-e-sūts, my tooth.
ni-wi′-e-sūts, thy tooth.
e-yo′-tōts, to untie with the teeth.
ih′-o-nōt, to peel off with the teeth, as the rind of a turnip.
i-pa-wi-ōht′, to peel or shell off with the teeth.
i-ko′-no-mo, to crack with the teeth.
i′-ni-sta-ni-wa-wōt′, to clatter with the teeth or gnash.

touch, mo-nah′-a-ni, to touch, to lay the hand on.

towards, i-ta-si′-o, also e-wi-nōh′.

track, si-a-mōts′, a track, footprint, trail.

trade, e-ōh′-to, to trade or barter.
na-ōh′-to, I trade.
ni-ōh′-to, thou dost trade.
e-ōh′-to-wa′-o, } they trade.
e-ōh′-to-wa′-to, }
na-ōh′-to-wam, we trade.
ni-ōh′-to-wam, you trade.

travel, tam-wo-wo′-ist, to travel ahead.
i′-a-me-his′-to, to travel backwards and forwards.
ho-i-na-pi′-ni-i-hōt, I travel on good land.
e-ni-o-who′, to travel in the water.

tread, tsi-i′-o-wi, to tread on, to pinch with the toes.
ih-a-wo′-i-yu-ha, to tread or mash down the grass with the foot.

tree, mih-ni-min-ust′, hackberry tree, so called because the animals crush the berries.
hi-sta′, limbs or branches of a tree.

trinkets, e-nu-wa′-sin, small articles, trinkets.

trot, i-o-ni′-kai-yots, to trot, as a horse.

troubled, ma-pe′-i-ha, to be rough or troubled, as the waves of the sea.

trust, i-ni′-sta-sta-nin, to trust in trade, to give credit.

turn, e-o-si′-nōts, to turn over, as the leaves of a book.
tau′-i-sta-hats, to turn out of doors.

turtle, ma′-in.
ma-i-nōn′, pl.

twice, i-o-ni-so-wah′-si-o, twice, in two ways.

twins, hi-sta′-ki, his twins.
na-hi-sta′-ki, my twins.
ni-hi-sta′-ki, thy twins.
ni-hi-sta′-ki-wo-in, your twins.
a-po-na-hi-sta′-ki-ni-wo′-in, I myself have twins.

twist, e-o-ni′-mo-tau′-in, to twist or wring a skin in dressing it.
na-o-ni′-mo-tau′-in, I twist, &c.
ni-o-ni′-mo-tau′-in, thou dost twist, &c.
e-o-ni′-mo-tau′-i-ni-sto, they twist, &c.
o-ni′-mo-ta-o-i′-nuts, to turn or twist around with the mouth.
e′-wi-ōht, to twist anything with the mouth.

twitch, e′-hi-sak, to twitch or jerk involuntarily, as the flesh of animals.

U.

uncovered, i-no-ma′-ha-mi, to be uncovered.
i-no-ma′-ha-mo, (pl.)

under, ah-to′-no.

undertake, sho-me′-a-to-ais-e′-ma-ist, to be willing to do anything, to undertake anything.

unload, e-ho′-ma-nu, to unload, to unharness.

untie, o-ni′-ha-e-nūts, to loose, untie, unharness, release from confinement.
i′-o-ni′-ha-i-ōts, to come untied of itself.

urinate, ih′-a-a, to urinate.

V.

value, im′-i-hōt, to value very highly, to be very hard with anything.

vermilion, ma-i-tōm′.
ma-i-to′-mōn, (pl.)

very, e-sōs′, (last syllable quite emphatic.)

W.

wade, i-huh′-o-wo, to wade, as in the water.

walk, i-ho′-yōt, to walk or follow after.
in-shi′-wi-ōts, to walk rapidly.

wandering, e′-wo-nish.
e-wo-ni′-shi-na-o, (pl.)

war, i-wi′-o-éi′-sto, to make war, to lead a war party.

warm, nan-sho′, hot, very warm.
nan-sho′-i-o, (pl.)
in-so′-o-mit, lukewarm, tepid as water.

ward, ho-ha′, to ward off danger, to defend.

warp, im-o-mi-ka′-nant, to warp.

wash, in′-shi-shi-un, he washes, or to wash, as the hands.
nan′-shi-shi-un, I wash, &c.
nin′-shi-shi-un, thou, &c.
nan′-shi-shi′-o-nam, we, &c.
nin′-shi-shi′-o-nam, you, &c.
in′-shi-shi′-o-na′-o, they, &c.
i-o′-he, to wash, as clothes.
na-i-o′-he, I, &c.
ni-i-o′-he, thou, &c.
na-ho-nin′, we, &c.
ni-ho-nin′, you, &c.
i-ho-ni′-ni-sto, } they, &c.
i-o-his′-to, }

water, ma′-pi.
ma-pists′, (pl.)
ma-pi′-shi-wit, swift-running water.
ma-pi-mōh′-skin, water mint. *Mentha Canadensis.*
ma-pi-i-wo′-ho-ni-o, water, raised into waves.
i-ha′-o-tum, deep water.
i-éo′-ki-tum, shallow water.
wōh-po′-ma-ōts, salt, sweet-water.
im′-a-ni-tun, to desire water.
in′-a-o, to fall on in drops, like water, to trickle.

watch, ta-wi′-a-o-mi, to watch for, to look out for one's coming.

wave, e′-is-tōn, to wave the hand.

wear, e-ōh′-i-ni-a, to wear, as a crown or fillet around the head.
i′-o-ta-o, to wear a hole in the moccasins by walking.

wearied, e-ka′-ni-ōts, wearied, exhausted, tired and sleepy.

weasel, ha′-a, white weasel.
ha′-i-yo, (pl.)

weave, mo-éi-im′-a-ha-o, to weave, as snow-shoes or a blanket.

web, wi′-ko-no′-no-no, spider's web.

well, i-no-mōh′-ta (imp. sing.), be thou well.
i-no-mōh′-tai-yo (imp. pl.), be ye well.
shi′-pau-a, well, done well.

what? he′-nu-wa-it.
hi′-no-wa, what? what is it?

when? to′-nish.
to-nish-niv′-hiv, when was it? when did it occur?
i-to′-ni-is, when, at what time?
im-a-i-to′-ni-is, at what times?
to-as′, when, when is it?

where? to-nish-ni′-ta-in, where is it?

whet, i-i′-ha-sin′, to whet a knife.

which, tas.

while, i-si-ha′-i-shi-wi′-ha-tsi, for a little while.

whip, o-ha-me′-wo-ōh.
o-ha-me′-wo-ōhst, pl.
nish-ka′-ha-me′-wo-ōh, a large whip, the handle of which is made like a saw.

whiskey, wi′-hu-ma′-pi, the Frenchman's water.

whisper, ni-ni′-a-tsi-o, to whisper.

white, e-wo′-kōm; also, si-wo-kom′.
e-wo′-ko-mo-nist, pl. si-wo′-ko-mo′-ist.

whistle, e′-ish, to whistle, to call by whistling, as a dog.
na′-ish, I whistle.
ni′-ish, thou dost whistle.
i-i′-shi-o, they whistle.
e′-i-shi-nōn, to whistle a tune.
i-ni-sto′-ni-wa′, the whistling or whizzing sound of a bullet.

wi-ho′-i-ma-i′-ni-sto′-ni-wa, to whizz or whistle, as a bullet through the air.

who, ni-wa′-as.
ni-wa′-si-o, pl.

widow, ōt-ĥa-e′, a widow.
ōt-ĥa-e′-i-o, pl.

wife, is-tsi′-im, wife, his wife.
na-tsi-im′, my wife.
ni-tsi-im′, thy wife.
ni-na′-tsi-im′, there is my wife.
ta-ma′-ni-tsi-im′, that is your wife.
e-is′-tsi-im, to have a wife, to be married.
e-wi′-ōnst, to have more than one wife.

wind, a-ha′, wind, windy.
a-ha′-ish, a windy day.
i-sa-ha′-a-han, no wind.
ma-ta′-in-is-to′-ni-wa′-o, the wind whistles.
e-wo′-wi-tas′, whirlwind.
e′-hi-kōt, calm, still, no wind.

window, i-ko-ōts′, window, port-hole, or any place to look out.

winter, e-yai′-nu, to come winter to one.

wipe, na′-nōts, to wipe or cleanse, as dishes.

withered, e′-he-kōnst, withered, dead, dried up, as leaves.
wīĥ′-po-to-tse′-a-na, to wilt, or wither, as leaves.
i-ma-he′-hi-no-it, withered, palsied, numb.

within, ho-to-ma′, within an inclosure.

without, a-no-sim′, out of doors.

woman, hi.
hi′-i-o, pl.
ksi-e′, a young unmarried woman.
ksi-e′-i-he, pl.
wi-o-ai′-wo-i-stōts, white woman's dress, long gown.
ma-tum-a′, old woman.

womb, is-ta-po′-a-nōt, womb, for a child, or animal.

wood, ka-mah′.
ka-mah′-i-ōts, pl.
na-ka-mah′, my wood.
ni-ka-mah′, thy wood.
na-ka-mah′-i-ham, our wood.
ni-ka-mah′-i-ham, your wood.
ka-mah′-i-ha′-is, long wood.
e-a′-ma-ta-wi′-sta, wood of all kinds in the sacred language.
ma-ta′-a, a great deal of wood, a forest or grove.

work, i-ho′-tsi-ma-nist, to work at a difficult thing.
i-hi′-ko-na, to work hard or industriously at anything.

worms, i-nūh′-niv, intestinal worms.

worthless, ni-wa-ni′-sta-tu, to be worthless, vile; a term of great reproach.

wound, is-a′-a-na, wounded, a wounded person.
wi-na′-a-mi, to wound without killing.
i′-to-si-i-na′-o, to recover from a wound.

wrap, e′-to-isé, to wrap up anything.
o′-he-i-shi, to wrap up, as a babe in a blanket.
e-ōh′-po-o, wrapped up or around, for safe-keeping.

wrestle, e′-wa-so, to wrestle, or play like two persons wrestling.

wrinkled, e-o′-si-ōts, wrinkled, not smooth, pitted.
e-he′-hi-no-it, to be wrinkled or shrivelled.

wrist, sin-ih-o′-wi-ats.

write, mōh′-i-ōts, to write, paint, sketch, figure.
mōh-is-to′, a book or writing.
mōh-is-to′-o-nōts, pl.
mōh-is-to′-nis-tūts, a writing pen.

Y.

yard, i-tai′-i-wun, a measure of a yard used by the traders.

yell, ta-no′-a-nōst, to yell, to shout as the young men do.

yellow, e′-i-yōh.
e′-i-yo′-wo-nist, pl.
i-ho′-wo-ni, to paint oneself yellow.

yes, he′-hin.
na′-he-hin, same as Dakota, ćin′-to.
he′-i-he, certainly, yes, rather emphatic.
ni′-hi-tōm, it is good, yes.
na-hi′-na, yes, Dakota, to, tosh.

young, he-na-kis′, young of ducks and geese.

ARAPOHO GROUP, B.

CHAPTER IX.

IV. Arapohos.

ETHNOGRAPHICAL HISTORY AND REMARKS ON THE GRAMMATICAL STRUCTURE OF THEIR LANGUAGE.

The past history of the Arapohos is as little known as that of their relatives, the Atsinas. The former regard themselves as constituting the parent stock, and believe that the latter separated from them. We will now attempt to trace their previous history, as far as it is contained in any of our written records.

I have searched all the works within my reach, and I cannot ascertain with certainty their track of migration. Gallatin speaks of them as a detached tribe from the Rapid Indians, which has wandered as far south as the Platte and the Arkansas, and formed a temporary union with the Kaskaias and some other erratic tribes. At the present time the Arapohos are divided into two portions or bands. The first portion call themselves na-ka-si'-nin, "People of the Sage," and number one hundred and eighty lodges. They wander about the sources of the South Platte and the region of Pike's Peak, also northward to the Red Buttes on the North Platte. Sometimes they extend their journeyings in search of buffalo along the foot of the Big-horn Mountains in the Crow country. They spent a large portion of the winter of 1859 and '60 on the branches of Powder River, near the base of the Big-horn Mountains. The second band call themselves na-wuth'-i-ni-han, the meaning of which is obscure. It implies a mixture of different kinds of people of different bands. They number two hundred lodges, and range along the Arkansas River and its tributaries.

From the fact that Pike in his journals speaks of the Atsinas as the "Minnetarees of the Yellowstone," and does not allude to the Arapohos, we may infer that they did not occupy their present district at the time of his explorations in the Arkansas country. There may be, therefore, some ground for the belief that the Arapohos and Atsinas were at one time all united, and resided together in the region of the Saskatchewan. This point requires still farther investigation. It would seem from "Long's Expedition to the Rocky Mountains," that the Arapohos occupied nearly their present district in 1819 and '20.

Rev. Dr. Morse thus speaks of these Indians in 1820: "Their number is estimated at 10,000. Their country extends from the headwaters of the Kansas, south to the Rio del Norte. They are a warlike people, and often making predatory and murderous excursions on their eastern and northern neighbors." Since that time very little notice seems to have been taken of them.

During the winter of 1859 and '60, the author, attached to the United States Exploring Expedition, under the command of Capt. William F. Raynolds, T. E., remained several months at the Indian Agency in the valley of Deer Creek, about one hundred miles northwest of Fort Laramie. The Arapohos visited the Agency on their return from the Crow country, for the purpose of receiving a portion of their annuities still due them, and spent some days in that vicinity. Among them was an intelligent Indian, called by the white traders Friday, who had been taken from his people when a small boy, and brought up at one of the trading-posts, where he learned to speak the English language with fluency. When he became a man he returned to his tribe, adopting their habits and costume, and is now the most influential personage among them, acting as a medium between the Arapohos and the whites. From him I obtained the vocabulary given in this work, and all the information I possess of their present condition. A brief account of the early history of this man, as given by himself, cannot be devoid of interest or out of place. He says, that at the time of the separation of the Atsinas from the Arapohos, they were all encamped together on the Cimarron. The Mexicans usually came up from the south to trade with them. At this time thirty of the Mexicans came, and the chief of the Atsina band wished them all to remain at his camp. The chief of the Arapoho band said, "Let half of the traders go to one camp and half to the other." A contest of words grew out of this, and finally the Atsina chief stabbed the Arapoho chief, and killed him. The brothers and sons of the murdered man immediately killed the first chief, and a battle commenced, but the difficulty was settled before a great number were slain. The two bands then agreed to separate, one portion ranging along the South Platte and Arkansas Rivers, the other passed through the North Park to Bridger's Pass, thence along the mountains to the Three Tetons. There they fell in with the mountain trappers, with whom they had a contest, and were driven toward the Yellowstone, where they were again attacked by the Crows, a large number killed, and many taken prisoners. The remainder escaped to the Blackfeet. It will be seen that the above account harmonizes very nearly with that given by the Atsinas.

It was at the time of the separation of the two tribes or bands, that Friday, with several lads, became separated from their people, and lost their way. They had been wandering about for three days, when a Mr. Fitzpatrick, an old mountaineer, and for some years a United States Agent for the Arapohos, as he was taking a train of wagons across the country saw Friday, and thinking him to be an enemy, raised his gun to shoot him. The boy at once rose up, and Mr. Fitzpatrick saw that he was but a child, and took him to his own house. He gave him the name of Friday because he found him on that day of the week.

Friday relates a tradition in regard to the origin of the Red races. The Great Spirit made the Indians all one nation in the beginning. At first He made a woman, then a

man. At the beginning the world was covered with water, and then a large mountain was made, on the summit of which the Great Spirit placed the man and the woman. The water continued to rise up toward the top of the mountain, until they were in danger of being drowned, when the woman said to the man, "Let us shut our eyes, and when we open them again there will be no water." They closed their eyes for a large part of a day, and then the woman opened hers, and saw no water; she then said: "We are safe: the water is passing away!" After this, a girl was born to the woman, then a boy. At the proper age the boy and girl were married, and from them sprung the human race. When the Indians became so numerous that they could not live together, the Great Spirit said they must separate. He also said that they should not speak the same language, and so He gave them different tongues. At first He intended to make them white men, but afterwards changed His mind, and made them red. He gave to the red men the game, buffalo, deer, elk, &c., and showed them how to kill the game. He also gave them wood for arrows, and showed them flint for arrow-points and knives. But He says: "I will make a race of white men, who shall be a superior people, who will know everything." The Great Spirit then turned Himself white, and said that the white people He should make, would resemble Him. "I will give you sense enough to get along well in your mode of life, but the superior nation shall be the whites."

When the Arapohos had the cholera, they would take small pieces of rotten wood, and thrust them into the flesh on the painful portion of the stomach, and then set fire to them, and burn them into the wounds. Friday says that many of them recovered by this treatment.

They do not throw away a horse when the children's ears are bored, as the Dakotas do. They cut off one or two joints of the little finger of the left hand in mourning, but do not mutilate themselves after the manner of the Crows.

OBSERVATIONS ON THE GRAMMATICAL STRUCTURE OF THE ARAPOHO LANGUAGE.

1. Arapoho nouns have two numbers, singular and plural, but the terminations of the plural are of varied forms; as (sing.) bet-éa′, a leg; (pl.) bet-éa′-wa; (sing.) bet-a′, heart; (pl.) bet-a′-ha; (sing.) bēsh, a nose; (pl.) be′-tha.

2. So far as is yet known the gender of nouns is indicated only by the use of different words to denote the sexes, and the case of a noun is distinguished by its position in a sentence.

3. The pronouns are divided into simple or independent, and inseparable or fragmentary.

4. The simple or independent pronouns are as follows:

nen-an′-a, I.
nen-an′-iu, thou or you.
in′-it, he, she, or it.
na-ne-ni′-na, we or ours.
ne-na′-nin, you.
in-it′-a-na, they.
in′-a, this one, this.
in′-i, that.
in-i-na′-ni, those.
an-i-shin′-a, both.
a-na-a′, who? who is it?
to-shi′-hi, how is it?
ta-ti′-na, where is it?
to-u′-hu, when?
to′-is-a, what?

5. The inseparable or fragmentary pronouns are used in connection with nouns, adjectives, and verbs.

1st. In connection with nouns; as,

waḥ′-a, a knife.
waḥ′-a-ha, knives.
na-waḥ′-a, my knife.
a-waḥ′-a, thy knife.
i-waḥ′-a, his knife.
na-waḥ′-a-hin′-a, our knives.
a-waḥ′-a-hin′-a, your knives.
in-a-waḥ′-a-hin′-a, their knives.
ka-ko′-i, a gun.
na-ka-ko′-i, my gun.
a-ka-ko′-i, thy gun.
i-ka-ko′-i, his gun.
na-ka′-ko-yun′-a, our guns.
a-ka′-ko-yun′-a, your guns.
i-ka′-ko-yun′-a, their guns.

2d. Pronouns in connection with adjectives; as,

i′-tha-ti, good.
i-tha-ti′-hi (intensive), pretty.
i-thi′-na, I am good.
i-thin′, thou art good.
i-thit′, he is good.
i-thi-hin′-a, we are good.
i-thi-hith′-in, you are good.
i-thi-hith′-i, they are good.
at-i-hi′-thi-na, it is pretty; looks well.
at-i-hi′-ni-e′-na, he looks gay or pretty.
naḥ-e-e′-i-thit, I expect he is good.
naḥ-e-e-i′-thin-a, I will be good.
wa′-sa, bad.
waḥ′-in, I am bad.
waḥ′-it, you are bad.

3d. Pronouns in connection with verbs; as,

ta-wi-thi′-na, to eat.
a-tun′-wun-bi-thi′-na, I eat.
wun-bi-thi′-hi, you eat.
a-ta-wun′-bi-thit, he eats.
a-tun′-bi-thi-hin′-a, we eat.
wun-bi′-thi-a-nŭ′-it, you eat, all eat.
a-ta-bi′-thi-hith′-i, they eat.
a-tun′-bi-thi′-hith-i, they are going to eat.
i-si′-wi-thi′-na, I have eaten, or I have done eating.
wa-wa-nis′-wi-thit, he is done eating.
wa-wa-nis′-wi-thi-hin′-a, we are done eating.
i-ni-shi-wi-thi-hin′-a, you are done eating.
ni-shi-wi′-thi-hith-i, they are done eating.

na-sa′-wi-thi′-na, I am going to eat, or I will eat.
a-tun′-bi-thi′-na-a, we are going to eat.
bi-thi′-hi (imp.), eat.
a-nŭ′-it-bi-thi′-hi, all eat.

6. The following miscellaneous phrases may be of service in illustrating the grammatical character of the language.

un-a-hu′, warm yourself, you are cold.
a-tun′-ći-ni-bi′-thin, it is going to stop snowing.
na-ka′-ye-na, I am dry or thirsty.
ći-na-ka′-nić, get some water.
ći-na′-ko-hc′, get a bucket of water.
ni-he-ća-hi′-se, come here, woman.
ba-ya-ćc′-ta, come straight here.
ni-to-win′-a, call to them.
ći-tan-a′-is-ta, get some fire.
a-tun′-a-nūh′-ti, we are going to run a race.
će-na′-hat-e, he killed himself.
ku-i-na-ha′-wa-wūh-u-ha′-ha-bi, did you see the horses?
kat-nath′-ab-i-sa, are you going?
bi-ha′-tha, I am loved.
bi-ha′-thith-in, I love you.
bi-ha′-hin, you love me.
ath-a′-bi-ha-thin, he loves you.
bi-ha′-tha-tin-a, I love myself.
bi-ha′-ta-wa, I love.
bi-ha′-than-tus′-i-a, I love my wife.
bi-ha′-than-e′-ha, I love my child.
bi-ha′-that-i′-ha, he loves his children.
bi-ha′-that, he loves any object.
na-tun′-i-ni-a-ta′-nan-a, I have sold my horse.
i-tha-i′-tan-u, at the village.
i-tha-bab-i′-ta-wu, in the ground.
ta-shi-bi′-ta-wu, on the ground.

7. The Arapoho numerals are as follows:

one, ća-se′.
two, nis.
three, nais.
four, yen.
five, ya-thun′.
six, ni-ta-tōh′.
seven, ni-sa-tōh′.
eight, nai-sa-tōh′.
nine, thi-a-tōh′.
ten, me-tai-tōh′.
eleven, ća-se′-in.
twelve, ni′-sin.
thirteen, nai′-sin.
fourteen, ye′-nin.
fifteen, ya-thun′-in.
sixteen, ni-ta-tōh′-in.
seventeen, ni-sa-tōh′-in.
eighteen, na-sa-tōh′-in.
nineteen, thi-a-tōh′-in.
twenty, ni-sa′.
twenty-one, ni-sa-ća′-sa.
twenty-two, ni-sa′-ni-sin.
thirty, nai′-sa.
forty, ye′-ya.
fifty, ya-tha′-ya.
sixty, ni-ta′-to-so.
seventy, ni-sa′-to-so.
eighty, nai-sa′-to-so.
ninety, thi-a-to′-so.
one hundred, me-ta′-to-so.
one thousand, mai-si′-me-ta′-to-so.

8. NAMES OF DANCES, ETC.

A′-tha-wi, Dog Dance. This is not a common dance, but when a man has a relative sick, and fears his death, he promises to make a feast and a dance if the sick person recovers. Only the young men join in this dance. They are marked with the sign of the dog. Among the Indians, a feast always accompanies a dance.

Ni-na-tah′-wan, War Dance. All the braves join in this dance. The Arapohos dance and sing less than any Indians I have yet seen.

Ben-a-ti'-sin, Buffalo Woman Dance (ben'-a, a buffalo, and is'-in, a woman). Only the women join in this dance. They have a peculiar costume or dress, the head-dress of which is a buffalo's head.

ća'-ha-wi', Little Dog's Dance. The men form a circle, and the women dance in the ring.

Bi-tai'-hi-nin, People that scrape robes (hi-tai'-hi, an instrument for scraping robes). Only the men join in this dance.

A-tha-hu'-ha, Foolish Dog's Dance. This dance is performed by a band of young men, about the same age, called the Foolish Dogs.

A-ha'-kai-nin, Foolish People, is a band of young men, about the same age. At one time they numbered fifty persons, but the small-pox reduced them to about thirty. They have a dance peculiar to themselves.

9. NAMES OF INDIAN TRIBES, RIVERS, ETC.

nat-e-ne'-hin-a, Dakotas, people that cut their enemies heads off, cut throats.

a-i-nun', Crow people, Crows; a-i-na', a Crow, Corvus.

ka-wi'-na-han, Blackfeet, black people.

it-us-shi'-na, Shyennes, the scarred people, from their having so many scars on their arms and breasts.

wa-tan'-a-hith-i, black people (ith'-i, people, wa-ta'-ya, black).

ni-ći'-he-nen-a, water men or people, Kiowas (ni-ći'-a, water, nen'-a, a man.

ća'-tha, Comanches. The Arapohos formerly called them the Snake people, but they now call them a name derived from the fact that they have plenty of horses.

e-wu-ha'-wu-si, Snakes; Sho'-sho-ni, people that use grass and bark for their lodges or huts.

ah-i'-hi-nin, Wolf people, Pawnees; ah-i', a wolf.

ka'-nan-in, people whose jaws break in pieces, Arickaras.

ka-ka'-i-thi, Flathead people.

thah-a-i-nin', Apaches, people who play on bone instruments. Buffalo ribs are used; notches being cut in one of the bones, the other is rubbed continually backwards and forwards over it.

to-i-nin'-a, people that beg, Gros Ventres of the prairie, Atsinas.

wa-nuk'-e-ye'-na, Minnetarees, lodges planted together.

be-in-i-ći'-a, Shell River, pearl shells used in trade, Platte.

bas-ni-ći'-a, Large River, Yellowstone.

a-hai'-ni-ni-ći'-a, Flint River, Arkansas.

ni-nun'-i-ni-ći'-a, Fat River, South Platte.

a-a-ha'-i-te, "River with a lone house on it," Cache la Poudre.

i-shit'-ćun-ni-ći'-a, Deer Creek, Antelope Creek.

ha-hu'-i-sin-i-ći'-a, Box-elder Creek.

i-nah'-in-i-ći'-a, "River with many crossings," Sweetwater.

thah-a'-ih-ut-un'-i, Hammer Mountains, Medicine Bow Mountains.

o-i-nin-i-ni'-ni-a'-ha, Crow Mountains, Big-horn Mountains.

će-than'-i-ći-a (će'-tha, powder), Powder River.

10. NAMES OF ANIMALS, PLANTS, ETC.

na-kah', a white bear.

wa-tai'-nah, a black bear.

wah'-a, a badger.

is-i'-ća, an antelope.

bi'-hi, a deer.

a-ta', a big-horn, mountain sheep.

ah'-i, a-wa'-ta-tas, } large wolf.

ka-a', ka-a-wo'-ŭ, } prairie or medicine wolf.

ai-wa-ta'-ka, large hare. *Lepus campestris.*

na-wa-ta'-ka, small rabbit. *Lepus artemisia.*

a-bas′, a beaver.

i′-ha-ha, a muskrat.

si′-a, a weasel.

ba-hŭ′, a large fox. *Vulpes macrourus.*

no′-a-ha, kit fox. *Vulpes velox.*

bah-un-i′, large squirrel, ground hog. *Arctomys flaviventer.*

ho-hoi′-yun-i, spotted-backed squirrel. *Spermophilus tridecem lineatus.*

na-ŭ′, striped squirrel. *Tamias quadrivittatus.*

ća-thun′-i, prairie dog. *Cynomys ludovicianus.*

ća-thun′-i-si-a, ground weasel. *C. Gunnisoni.*

hu,
na-ku′-ha, } spotted-backed polecat.

o′-hu, porcupine.

yeh, otter.

ba-ha-ku′, "large rat." *Neotoma cinerea.*

ka-ka′-sa-ni, "scar bird," so called from the spots on the head, which look like scars. *Charadrius montana.*

sus-ku′-it-o, a ground sparrow, a bird that frequents the edge of a stream or bank.

tuth′-e-i-the′-ka-na, "a bird that the heron carries on its back;" from tuth′-e, a heron, and i-the′-ka-na, to carry on the back.

a-wuth′-na-ku′-we-e, white-nosed duck. *Mergus Americanus.*

ba-bi-thin′-a-he, "little red-winged bird." *Leucosticte tephrocotis.*

bas-nak-than′, a bush growing near Fort Bridger, and used by the Arapohos as kinnic-kinnic.

ni-ha-na′-i-na, "yellow flower." *Ranunculus glaberrimus.*

ća-nat′-an-a-i′-na, "blue flower," blue bell. *Mertensia Virginica.*

ća-e′-i-hi, "wild potatoes." *Dicentra.*

i-tuh-ŭ′-ŭ, "sharp leaves;" a small species of *Phlox.*

i-ćun′-i, pomme blanche. *Psoralea esculenta.*

ka-i-ya′-i-no, "yellow flowers, with gum on them." *Grindelia squarrosa.*

sath-i′-win, "little pine berries," a species of trailing *Juniperus.*

bis-ći′-hin, a species of *Eriogonum*, growing on the gravelly hills; word derived from bi, a cow, and ći′-hin, smoke, buffalo smoke, a weed used for smoking meat.

ni-ća′-ćut-e, a chenopodiaceous shrub, salty weed or shrub.

ni-ća′-in-a, a plant growing on rocks in the mountains.

thi-kun-bi′-tun, a kind of moss, "dead man's porcupine work."

bi-te-ba′-yak, a kind of ground lichen.

ći-wan-i′-na-ka′-si, "half sage." *Artemisia Canadense.*

si-si′-yi-wish, "snake-bush." *Sarcobatus vermicularis.* Word derived from si-si′-ye, a snake, and bish, a bush.

wōh-u-ha′-bi-thi-it, "bush that horses eat." *Obione canescens.*

ba-će-wi′-she, red willow. *Cornus sericea.*

it-a-he′-win-a, "hot berries." *Arctostaphylos uva-ursi.* The leaves of this shrub form the real kinnic-kinnic of the Western Indians, which they mix with their tobacco in preference to the leaves or bark of any other plant. The bark of *Cornus sericea* is used as a substitute only in the absence of the *A. uva-ursi.*

sath, common pine. *Pinus ponderosa.*

tha-ki′-sath, spruce pine. *Abies Douglassi.*

a-hat′, sweet cottonwood. *Populus.*

a-ha′-tin-wi′-tin, bitter cottonwood. *Populus.*

bi-tin′-a, quaking asp. *Populus.*

ha-hu′-is, box elder, "the hollow wood." *Negundo aceroides.*

CHAPTER X.

VOCABULARY OF THE ARAPOHO LANGUAGE.

A.

above, nan-aĥ-u′-it-e, above, up the river.
afraid, i-ni′-aĥ-a, to be afraid.
afterwards, taĥ-u′-ŭ.
again, ći′-a, again, once more.
ago, wa-ni′-hi, not long ago.
agreeable, ya-ni-sat′, pleasant, agreeable.
ahead, a-tha′-i-nin′-a, before, ahead.
alive, i-nin-ek′-ti-na, to be alive.
all, a-nŭ′-it, all, the whole.
always, é-nai′-yi-wu′-hu, always, forever.
angry, a-na-wiĥt′, to be angry.
another, a-na-thiĥt′, different, another.
antelope, is-i′-ća.
apples, ka-hu′-win-a, red thorn apples.
arm, in-ush′, his arm.
nen-ush′, my arm.
un-ush′, thy arm.
be-nuh′-a, the whole arm.
bath′-a-in′-a, the armpit.
around, ka′-i-na, around the lodge.
arrow, ath.
ath-i′ (pl.), arrows.
ne-nić′, my arrow.
e-nić′, thy arrow.
in-ić′, his arrow.
ashamed, a-tut-iĥt′, modest, ashamed.
a-ti-ti′-na, to be ashamed, bashful.
ashes, će′-tha, ashes, the same name as powder.
asp, bi-tin′-a, quaking asp.
assemblage, a-e′-sa, a council, an assemblage of chiefs.
assemble, či-wa′-a-nis′-a, to assemble together.
asunder, na-ye′-si-he, far apart, asunder.
autumn, ta-yu′-ni.
away, a-si′-sa, to go away.
axe, a-ha-naĥ′, an axe.
na-ta′-ha-naĥ′, my axe.
a-ta′-ha-naĥ′, thy axe.
it-a′-ha-naĥ′, his axe.
ći-ho′-a-na, hatchet, axe.
ka-ho′-i-te′-na-naĥ, a ground-axe, a hoe.

B.

back, na-ku′-ha, spotted back.
tut-a′, back-bone of an animal.
i-thi-ka′-na, to carry on the back.
bad, wa′-sa.
badger, waĥ′-a.
bag, ća-a-tha′, a bag or sack.
banks, a-hut-a′-na, banks of a stream.
bark, ben-a′-bat, to bark as a dog.
beads, ća-nat′-ai-yu.
bear, waĥ.
na-kaĥ′, a white bear.
wa-tai′-naĥ, a black bear.
beard, bi-si-tin′-a-na.
beat, wat-e-ha′-ye, to beat on a drum.
ta-ta-win′-a, to beat, as to beat a person.
bottle, ćen-ith′-ća, a glass bottle, vial.
bottom, i-tha′-be, bottom upwards.
bow, bat′-a, a bow.
bat′-e (pl.), bows.
na-bat′-a, my bow.
e-bat′-a, thy bow.
i-bat′-a, his bow.
bowels, wa-nut′.
box elder, ha-hu′-is, the hollow wood.
boy, ni-a-tho′-i-sa, a white boy.
brains, i-tać, brains of an animal.
brave, ni-ha′-ha-niĥt′, to be brave, courageous.
break, ka-i-na′, to break open.
ta-wi-ku′-ti, to break in pieces.
bridle, ći-wi-te′-wi.
bright, i-ya′-a-na-kus′-a, bright, shining, glistening.
breast, aĥ′-a-bĕ.
breathe, a-wuth′-ōn, to breathe.
brother, ni-thi-sa′, my brother.
ni-thi-sa′-wa (pl.), my brothers.
in-a′-ha-wa, his elder brother.
na′-ha-va, younger brother.
ko-hu′-ni′-sa, half brother.
i-ni′-thi-san, father's brother.
ya, brother-in-law.

na-ya′, my brother-in-law.

beaver, a-bas′.

a-bes′-na-yat′, a beaver trap.

bed, a′-a, a bed.

beg, ni-ta-win′-a, to beg.

behind, ka′-ba.

belly, in-ut′-a, a belly.

na-nut′, my belly.

bend, na-ho′-i-si′-na, to bend.

na-nu′-i-sa, to bend forward, stooping.

a-ba-ho′-a-ta, a bend in a river or stream.

berries, it-a-he′-win-a, hot berries. *Arctostaphylos uva-ursi.*

bind, ći-ta-ya′-kut-i, to bind up, bandage.

bite, tai-yo-win′-a, to bite.

bladder, na-nis′.

black, wa-tai′-yo, black.

wa-ta′-nit, it is black.

blind, nan-i′-na-kut, to be blind, blind.

blood, ba.

ba-e′-ni, bloody.

ba-e′-nit, to bleed.

na-nat′-i-o-it, to be besmeared with blood.

blow, ći-ta′-thi, to blow, as the wind.

blue, ća-net′-ai-yo, ća-net′-oi-nit, it is blue.

board, kun′-i-uh′-u-na, a board for cutting tobacco.

boat, thi′-wa.

body, bet-un′-e-ya′, body.

net-un′-e-ya′, my body.

et-un′-e-ya′, thy body.

it-un′-e-ya′, his body.

boggy, ćith-si-wa′, boggy, marshy.

boil, a-na′-na-wak′-thi-nat, to boil over, as water.

bone, ih.

both, an-i-shin′-a.

to brush, ku-e-tith′-e-ha, to brush away, as with the hand.

burn, ka-ha′-he, to burn or blaze, as fire.

ba-tuh′-a-ha′, to burn anything.

burst, ka-na′-in-a, to burst open.

bury, ka-tai′-yat, to bury, as the dead.

bush, bish, a bush.

buy, a-ta′-na-ta, to buy, purchase anything.

C.

calf, wa, a calf turning black, or six months old.

wa′-ū, a red calf, just after birth.

candle, ai′-se-ya, a light, a candle.

care, wa-ta′, take care.

careful, ni-ya′-ho-in, careful, to be careful.

cat, beh-a′-ka, a wild cat, small panther.

cherries, bi′-na.

chew, ses-i-ya′-ta, to chew fine with the teeth.

child, te-ya-na′, a child.

te-ya-na′-ha, pl. children.

na-ni′-sa, my child.

a-ni′-sa, thy child.

i-ni′-sa, his child.

a-te′-ya-ne-win′-a, your children.

na-te′-ya-ne-win′-a, our children.

it-e′-ya-ne-win′-a, their children.

a-ći-hi′-sa, a child just born.

a-si-nat′, to give birth to a child.

ni′-na, sister's child.

a-tun-ćin′-i-sit, a young child, soon after birth.

chin, wa-tah′-a.

wa-tah-an′-a, pl. chins.

na-tah′-a, my chin.

a-tah′-a, thy chin.

i-tah′-a, his chin.

choke, a-thit′, to choke, to be choked in eating.

cholera, a-sit′-at, sickness in the belly.

climb, ou′-ha, to climb a tree.

close, i′-će-wa, close, near by.

cloth, wat-an′-i-hath-a′-yu, black cloth.

wu′-it, breechcloth.

clouds, a′-na.

i-ni′-na-nai′-tu, cloudy.

i-na-nait′, moving clouds.

cluster, ban-i′-ni, a bunch, cluster, as of beads or grapes.

coals, wa-as′, burning or live coals.

coil, a-hi-′-a, to curl or coil about.

coffee, wa-tai′-yo.

wa-tai′-na-wo, coffee for drinking.

comb, ća-ta-e′-hi, to comb the hair.

come, na-he′-ća, come here.

ci'-te, to come in.

confusion, na-tun'-a-he'-na, trouble, confusion.

cook, bi-thi-ba', to cook food.

cool, ta'-a-ta, to cool anything that is hot, by blowing.

cord, san'-ak, cord, twine, thread.

cottonwood, a-hat', sweet cottonwood.

a-ha'-tin-wi'-tin, bitter cottonwood.

cough, i-shi-si'-ve.

count, na-ye'-thi, to count.

countenance, tah'-a-wi'-un-e, face, countenance.

court, ne-wi'-a, to court a girl, courting.

cousin, na'-si, male cousin.

na-tha'-the, female cousin.

cow, bi, a cow.

bi'-hi, pl. cows.

cowardly, kun-a-nit'-ut, cowardly, easily scared.

crack, ta-ta-nat'-a, to crack, as the ground.

ko-huth'-an, to crack or snap as wood burning.

ha-ya-win'-a-a-te, to crack with the teeth, as lice.

cramp, i-nić-thin'-a-a-at, the cramp.

crazy, na-ni-sin'-o-at, to be crazy.

creep, će-wa-ki'-sa, to creep up to, or approach, as game.

crooked, na-ho'-is-a.

crupper, ći-thi'-hi-na'-ya.

cry, ben-i-wa'-it.

cup, bas-na'-i-ni'-i-ben'-a, a drinking vessel, cup.

currants, ne-e'-win-a.

cut, na-ho-ći'-ah-a, to cut up fine.

ći-ah-a', to cut slices.

na-hi-ha', to cut notches, notched.

ba-ya-ka'-ah-a, to cut in two in the middle.

D.

dance, bet-at', to dance.

ća-a-tit', a scalp dance.

daughter, na-ta'-na, my daughter.

i-si'-ni-shi-a, my granddaughter.

at-a-net'-a-ni-ha, an adopted daughter.

na-siv', my daughter-in-law.

day, i'-shi.

ćin-a-a'-kak, daybreak.

na-kus-ćć, daylight.

thun'-a-tha-ni'-se, about the middle of the day.

debility, i-a-nat'-i-hu'-in, weary with heat, debility on a hot day.

deaf, a-ye'-ći-ta, hard of hearing, deaf.

decayed, tha-nu'-sa, rotten, decayed.

deceive, nan-ta'-yi, to tell a lie, to deceive.

deep, ta'-wi, deep, as water.

deer, bi'-hi, a deer.

wa-tan-bi'-hi, black-tailed deer.

a'-tha-wa-ni'-hi, white-tailed deer.

die, na-ća', to die.

a-tun'-i-ćin-a, we will die.

dig, koh-o-ha', to dig in the ground.

dirty, će-hath'-a, to be dirty, as a gun.

disappointed, ći-ni-ith'-ća-na, sorry, disappointed.

discouraged, how-wu'-it-a, to be discouraged, disheartened.

distance, ći-ni-ha'-i-te, a long distance.

ditch, ben'-i-tha-ka'-ne, a ditch, hollow, ravine.

dive, i-i-ka'-hu, to dive as a duck under the water.

divide, će'-a-na, to divide.

dizzy, ne-in-e'-na, to be dizzy, lightheaded.

do, ćin-in-in'-i, I cannot do it.

dog, eth, a dog.

eth'-e-wi (pl.), dogs.

na-ha-ta'-ni, my dog.

ka-ha-ta'-ni, thy dog.

double, a-wai'-e-na, to double up.

dream, ka-nat', a dream.

ka-na'-na, to dream.

drink, na-a-ben', to drink, as water.

drive, a-ta-ha', to drive in, as tent-pins.

drop, ća-ni-a', a drop, as of water.

drown, na-ta-ka'-nat, to drown, to be drowned.

drunk, nan-si'-he-wi, to get drunk.

dry, ni-ha-na'-ta.

duck, si'-sić, a duck.

dull, i-ha'-o-ća'-ya-nis, dull, blunt, not sharp.

dusk, ta-wa'-be-ni'-hi-ya.

dust, ka-na-a'-i-ta-si.

dye, bah-o-hai'-yi, to dye or color red or scarlet.

E.

eagle, nat-sa'-i, bald eagle.

in-a-kuth′-un-it, the war eagle.

ear, wun-a-tun′-a, the ear.

bi-hi′-haĥ, a mule, big ears.

earth, bi-ta′-wa, earth, dirt.

a-mŭ′-it-bi′-ta-wa, all the earth, all the prairie.

eat, a-ta′-wi-thi′-na, to eat.

echo, bat-ath-u′-ni-tu′-hi-nith, an echo.

elk, wuh′-a, a female elk.

wuh′-a-he, a male elk.

elbow, i-ći-a′-na.

empty, ou-it-ćai′-es, to be empty.

end, na-nah′-ū, the end of anything.

enemy, et-sha-the′-win, an enemy, of a hostile nation.

envious, i-ni-a-ya-thin′-a, to be jealous or envious.

equal, tu-se-na′, to be equal, equal to.

esteem, na-tan-at′-a-wa, to esteem highly, to think well of any one.

evening, ith-o-ak′, in the evening.

expect, ais-tha-ća′-na, I expect so.

explain, na-tith′-i-ća-win, to explain anything.

eye, besh-i′-se, an eye.

nesh-i′-se, my eye.

esh-i′-se, thy eye.

ish-i′-se, his eye.

ći-ni′-wak-ut, squint-eyed, cross-eyed.

na-kak′, white-eyed.

na-u′-i-sa, to shut the eyes.

ka′-na-ki, to open the eyes.

F.

fan, na-nas-i′-ha-wa, a fan.

na-nas′-i-ha, to fan oneself.

fall, ća-ni′-sa, to fall down, as any object.

fasten, a-ta′-ha, to fasten, as a door.

father, ni-ha′, father.

ni-sun′-a, my father.

e-sun′-a, thy father.

i-sun′-a, his father.

na-shith′-a, my father-in-law.

feast, na-o′-het-e, to call to a feast.

fence, ni-tha-hai′-ya, to make a fence.

fill, i-ha′-ka-ha, to fill the pipe.

find, ben-i-in′-a, to find.

fingers, ba-ćit′-in.

wah′-a, finger nails.

fire, sta.

i-shit′-a, a fire-place, fire-bed.

ai′-ćis, a fire-steel.

fish, neb, a fish.

na′-wa, pl. fishes.

flat, sa′-a.

flavor, ni-ya-ni′-ćit-a, taste, flavor.

float, na-wo′-a, to float, as upon water.

flock, nath-i-tuk′-a, a flock, a herd.

flower, na′-i-na.

fly, ća-wi′-at, to fly, as a bird.

fold, ni-si′-ta-na, to fold, as cloth.

follow, tha-ku′-i-na, to follow after one.

foolish, a-ha-kai′-nit, to be foolish.

foot, na-he′-tan, my foot.

ford, ni-i′-ta-ka′-ni, a ford, crossing.

a-kai′-e, to cross, as a stream, to ford.

forehead, ni-tah′-a-wi.

forget, na-ni′-hi-no, to forget.

forked, ni-su′-ni, forked, as a stick or stream.

fountain, ah-ub′, a spring or fountain.

fox, ba-hŭ′, a large fox.

no′-a-ha, kit fox, animals that come out of holes.

to freeze, ni-a′-ta, to freeze, as ice.

friend, ni-tai-he′, my friend.

ni-ni-tai′-eth-e′-ćat, to be friendly.

frog, ći-nat′-an-a′-ka-be, a green frog.

full, a-na-tha′-a-he, to be full.

G.

gallop, na-ha′-kut-e, to gallop, as a horse.

gashes, i-tus′, to cut gashes, to make marks in the flesh.

gather, a-no′-i-tun-ći-ni′-na, to collect or gather together.

get, ko-hai′-e, to get up.

girdle, ka-ya′-ta, girdle or belt.

girl, is-i′-he.

is-i′-hi-ha, pl. girls.

give, a-ta-wi′-ni-thin, to give.

a-tun-be′-no, to give, to bestow for nothing.

glad, bab-i-in′-a, to be glad.

a-tha-wa′-wi-in-a, I am glad.

gnaw, ha-ha-yu′-it, to gnaw.

go, na′-e, to go out.

a-si′-sa, go away.
a-tha′-na-na-wi′-a-ta-si, to go against the wind.

gonorrhœa, ba-ha′-kai-ya.

good, i′-tha-ti.
i-tha-ti-hi′, pretty (intensive form).

goose, na.
tuh-u-wi′-na, gooseberries.

gopher, ći-tat′-si-hi.

grapes, ta-ta′-ći-win′-a, grapes, berries that grow on vines.

grass, woh-u′-i-na.
ni-ah′-u, sweet-smelling grass.
ni-a-će′-he, a grasshopper.
se-na-se-yat′-a, to graze, to eat grass, like cattle.

gravel, ći-hi-na′-kai-na, gravel, earth.

grease, ni-nun′-i.

grind, mo-ku′-i-ti, to grind, as coffee.

ground, i-tha′-ba-bi′-ta-wu, in the ground.
ta-shi-bi′-ta-wu, on the ground.

grow, bi-shi′-a-ha, to grow, as grass.

growl, ses-iht′, to growl like a dog, or a cross person.

gum, ku′-i-ya, a gum or resin.

gun, ka-kih′, a short gun.
ni-si-ti′-ne-na, a double-barrelled gun.
ha-ha-it′-in-an, a rifle-gun, one with creases in the inside of the barrel.
na-sa′, a gun-flint.

H.

hackberry, na-tai′-ye-ći-wish.

hair, bi-tha-a′.
bi-tha-a′-na, (pl.)
ne-tha-a′, my hair.
e-tha-a′, thy hair.
in-i′-tha-a, his hair.
ći′-nan, all kinds of hair.

half, ka-u′-he, half of anything.

hammer, thah-a′, a stone hammer, to drive pins.

hand, ba-ćet′, the hand.
na-ćet′, my hand.
a-ćet′, thy hand.
i-ćet′, his hand.
ba-ćet′-in-a (pl.), hands.
ba-wa-tha-ta-wi′-na, to wave the hand.
ka-hu-it-o′-i-no-wat, a handful.

hard, bath′-a.

hasten, na-ha-ni′, to hasten, to be in a hurry.

he or **it,** in′-it.

head, i-ni′-thi-a.
i-ni′-thi-a′-na (pl.), heads.

health, nat-un-a-ya′.

hear, ni-tun′-a, to hear.

heart, bet′-a.
bet′-a-ha (pl.), hearts.
net′-a, my heart.
at′-a, thy heart.
it′-a, his heart.

hiccough, i-tha-nat′, to hiccough.

hide, ya-ti′, to hide from, to conceal anything.

high, ća-o′-it-a, high, anything high.

hill, ća-ut′-e-yu, a hill.
na-ha-hu′-he, up hill.
ćen-a-hu′-he, down hill.
ah′-a-bi, a side hill.

hiss, si-win′-a, to hiss.

holes, ći-nat-un′-a-ti, full of holes.

horn, ni′-nis.
a-ta′, big-horn.

horse, woh′-a-hah, a horse.
woh′-a-hah′-a-wi (pl.), horses.
na-ta′-ni, my horse.
a-ta′-ni, thy horse.
i-ta′-ni, his horse.
na-ta-ni′-ha, my horses.
a-ta-ni′-ha, thy horses.
i-ta-ni′-ha, his horses.
na-kit′, a white horse.

house, a-a′-wi.
ya-huth′-it-ni′-na, a good house.
ći-ta-wu′, in the house.

how is it? to-shi′-hi.

hungry, ash-i-nan′-a, to be hungry.

hunt, i-na′-e, to hunt, as for game.

husband, ih.
nas, my husband.

hush, te-ta-nuk′-ŭ, hush! be still!

I.

I, nen-an′-a.
ice, wa′-o.
implements, ći′-na-te, tools, implements.
inquire, ta-ti′-na, to inquire, to ask a question.
iron, be-ćith′-a.
na-ku′-wi-ćith′-a, white iron, silver.
ni-ha-ni-be-ćith′-a, yellow iron, brass.
ba-ah′-a, red iron, copper.
itch, yun-ćis′-it-sha, to itch.

J.

jump, ćen′-a-a, to jump.

K.

kick, tah′-un-a, to kick, as dust.
kidney, ti′-thith.
kill, ne-hin′-a, to kill.
kindred, in-i-ni′-tun-a, family, kindred.
knee, ba-ća-e′-tai-yi.
ba-ća-e′-tai-yi-ih′-o-na, kneepan, patella.
knife, wah′-a.
wah′-a-ha, (pl.)
knock, tat-a′-ta, to knock, as on a door.

L.

lake, ni-ać′, a little lake or pond.
lame, ći-ni-ihi′.
large, ben-a′-sa, great, large.
ben-a-si′-tha, very large.
na-ath-i′-a, so large.
lariat, a-ni-tha′-tan.
last, tah′-sa, last, youngest.
lately, wa-ni′-hi, lately, a little while ago.
laugh, a-ho′-an, to laugh.
laziness, tha-nu′-it, lazy.
lead, ka-ku′-ya-na′-thi, balls, lead.
leaf, bi-ćish′, a leaf of a tree.
leak, thi-ni-i′-kut-e, to leak, as a vessel of water.
lean, ni-ha′-shi, to lean against anything.
leg, be-ća′, the leg.
be-ća′-wa (pl.), legs.
ne-ća′, my leg.
e-ća′, thy leg.
it-ća′, his leg.
wa-a′-ta, the whole leg.
leggins, wa-ta′.
lend, ni-ća′-ta-nan-an, to lend anything.
lengthwise, ba-ya-tha′-tha-ni-hi.
less, ni-ta-ći′-i-ni.
lick, ni-sa-ta′, to lick, as with the tongue.
light, wut-un′-e, to make or light a fire.
lightning, ći-ha′-ko-hu′-it, to lighten, lightning.
like, bi-ha′-tha, to be like to, like anything.
lip, is′-is.
listen, ći-hath′-te, to listen.
little, a-ka-ći′-hu.
lizard, san-i′-wa, a rock lizard.
load, bi-na-tha′, to load up, as horses.
lodge, ne-i-nun′, a lodge or tent.
ne-i-nun′-a (pl.), lodges.
na-ye′-i-hi, my lodge.
a-ye′-i-hi, thy lodge.
i-ye′-i-hi, his lodge.
na-ye-hin′-a, our lodges.
a-ye-hin′-a, your lodges.
i-ye-hin′-a, their lodges.
ne-i-nun′-a-ben-e′-ni-se′, only two lodges.
shi′-sin-a, to take down the lodge.
i′-tan, a cluster of lodges, a village.
i-sa′-a-ta, the door or entrance to the lodge.
a-kah′-in, lodge-poles.
nith-nu′-it-a-ćith′-it-a, the hole in the top of the lodge for the smoke to pass out.
look, na-ni′, look here!
lose, a-nuth-i′-na, to lose anything.
an-i-ti′-na, lost.
loud, a-nun′-a-un-et′-i, to speak loud.
loved, bi-ha′-tha, I am loved.
low, ta-ko′-it-a, low, low down.
lungs, i-kun′-a, lungs, lights.

M.

magpie, wo-u′-he.
make, nish′-ti, to make anything, to form.
man, in-en′, a man.
in-en′-a (pl.), men.
ni-a′-tha, a white man.

married, ni-wi′-na, to be married, to take a wife.
meat, wa-na-se′-na, fresh meat.
a′-wa-na, dried meat.
medicine, woh′-in, medicine or mystery.
bat′-at, a medicine-man.
melt, taé′-hu-ha, to melt, as lead.
middle, na-i-thi′, in the middle.
midnight, na-hi-thi′-tut-éi.
mine, ni-nis′-tat (pronoun).
mire, ka′-thi-éa, miry, muddy.
kath-éi′-si, to mire, to get stuck in the mud.
mist, éin-i-a-sa′, mist, fine rain.
mix, nah′-ut-i, to mix, mingle together.
moccasins, wa′-na.
more, ni-has′-i-ni, more, over, more than.
morning, na-ku′-seé, this morning.
mother, na′-a.
ne′-na, my mother.
e′-na, thy mother.
i′-na, his mother.
na-he′-ha, my wife's mother.
na-tus′-i-ha′-ni-wa, my wife's grandmother.
mould, ni-na-ku′-si, mould, mouldy.
mountain, a′-he.
a′-he-ni (pl.), mountains.
mourn, as-e′-shit, to mourn for the dead.
mouse, a-ku′, a rat or mouse.
mouth, bet′-i.
bet′-i-na (pl.), mouths.
net′-i, my mouth.
et′-i, thy mouth.
i′-ti, his mouth.
ni-thi-a′-ta-wa-ni, a mouthful.
mud, ah-ush′.
muskrat, i-ha-ha, named from the melt in cattle.

N.

name, a-si′-hit, a name, names of persons.
navel; ith, beth.
neck, bes-un′-a, the neck.
nes-un′-a, my neck.
es-un′-a, thy neck.
is-un′-a, his neck.
wai-e′-nun-a, a necklace of beads, &c.
never, a-ti-na′-a-sin′, never, ever.
night, bi-ka′.
no, éi-ni′-ni.
ka-ko′-yun, nowhere.
nodding, ni-si′-nun-ai′-a-ha′-na, nodding as in sleep.
nose, bēsh, the nose.
be′-tha (pl.), noses.
nēsh, my nose.
ēsh, thy nose.
ish, his nose.
na-ho-ish′-i-va, crooked nose.
ni-i′-wa, to blow the nose.
nothing, i-ka-ku′-a.
now, i-wan′-ha.
numb, ben′-i-sa-nu′-kut-i, numb, stiff with cold.

O.

obey, i-tha-wat′-a-ni, to be obedient, to obey.
oftentimes, ni-hou′.
old, ba-a-ye′.
one, na-na-ye′-shi-ni, each one.
ta-na′-ni-si-thet′-éat, neither one.
in-i-éa′-sa, the other one.
only, ben-e′.
ooze, ta-sa-éi′, to ooze out, as sap from trees.
open, ta-tin′-a, to open, as the mouth.
ka-nin′-a, to open, to make an opening in anything.
ka-nit′-a-na, open the door yourself.
ornaments, ée′-ta-na, ear-rings, or ornaments.
orphan, e-nuh-u′-i-sa, an orphan, fatherless and motherless.
overhead, i-éi′-wa-ni′-than, overhead, above.
overtake, wa-ni-ta′-wa, to overtake one in travelling.
owl, bath-i′, an owl.

P.

pace, ba-he′-kut-e, to pace, as a horse.
pack, i-ni′-nuh-it, a pack, a load.
paddle, i-thu-ha′, to paddle a canoe.
paint, ha-ha′, to paint.
parch, ka-ye-na′, to parch, as corn or coffee.
parfleche, o-wa′-na.
pass, ni-the-na′, to pass the pipe.

passionate, ći-ni-no′-wu-it, to be passionate, to get angry quickly.
peace, i-ni′-tai-wa′-na, a peace.
na-ti-ni′-tai-wa′-na, to make a peace.
peel, ka-ku′-i-na, to peel, as bark.
ćin-ahi′-a, to pare, to peel off, as the rind.
perhaps, nahi-u′-i-he, perhaps, maybe.
pheasant, na-na′-be-ćen′-a, drumming pheasant.
bas-ćen-an′, wild turkey, spotted-wing.
pick, ka′-i-ye, to pick, as berries.
ku-i-tan-a′, to pick off, as a scab.
ba-ha-ku′-na, to pick off, as ears of corn from a stalk.
pinch, a-ho′-as-i-na, to pinch.
pine, sath, a pine. *Pinus.*
tha-ki′-sath, spruce pine.
ba-thi′-na, and to-sath′, *Juniperus.*
pipe, e-ća, a pipe.
e-ća′-ha-na (pl.), pipes.
na-ti-ca′, my pipe.
a-ti-ća′, thy pipe.
i-ti-ća′, his pipe.
a-ti-ća′-a′-nin, your pipe.
i-ti-ća′-en′-a, their pipe.
pity, a-we′-nun-i, to take pity on one.
plain, i-tha-be′, a level plain.
plan, tas-ći′-ni-na, to plan anything.
plenty, wa-na′-the, a plenty.
wa-na-the′-thi (intensive form of the above), a great number or quantity.
plough, bi-ta-wu-ni′-tha-ku, a plough, a ground-breaker
plums, ba-si′-win-a.
point, ni-thi-so′-hai-a, to point with the finger or hand.
poor, a-ći′-ni-na-ni′-ni, poor in flesh.
pounce, ith-ku′-te, to seize or pounce on anything.
pound, is-tha′-ba, to pound fine.
ha-ya′-he, to pound or crush, as bones.
pour, e-ta-na′, to pour out, as water.
powder, će′-tha.
praise, bi-with-tun′-a, praise, compliments.
prairie, i-tha-wu′.
to prick, kut-a-ha′, to prick with a pin.
tha-wut′-a-ta-ka′-it, to prick up the ears, as a horse.

pride, i-sit′, pride, to be proud.
prisoner, wa-wa-e-na′, a prisoner, captive.
pull, ka-nan′-a, to pull out the hair from the skin.
ka-ku′-na, to pull in pieces.
push, un-ku′-i-ti, to push down.
ka-ha-e′-na, to push aside, to separate, as high grass.
put, ći′-tha-wi, to put on, as clothes.
ka′-wo, to put anything in the mouth.
na-će′, to put up the lodge.

Q.

quick, na-hu′-hu, to be quick, in a hurry.
quiver, ći-tuth′-a, a quiver for arrows.
bah-a′-ka-ći-tuth′-a, a panther-skin quiver.
bah-a′-ka, a panther.

R.

rabbit, ai-wa-ta′-ka, a large rabbit.
na-wa-ta′-ka, small rabbit, left, or not pure breed.
rain, a-na′-sa.
a-sa′-ti-nit, it rains.
na-yat′, a rainbow, the Great Spirit's fishing-line.
ramrod, ći-ta-hai′.
rattle, kōh′-un-a-ku′-i-te, to ring or rattle anything.
ravine, ka-ha′-wo-e, a ravine or hollow among the hills.
reach, će-ti′, to reach out the hand, to take anything.
red, ba-a′.
ba-iht′, it is red.
relationship, i-ni′-ta-in.
rest, tai-yu-nu′-shi, to rest, to take rest.
revenge, wa-wa-ni′-shi-ni′-tai-wa, to get revenge.
rib, i-ća′-na, ribs of any animal.
rich, ni-thai′-ye-ti, to be rich.
ride, ta-hu′-ki, to ride, as a horse.
ring, ni-ha-nath′-a-tha, finger-ring.
rip, ta-tin′-a, to rip.
river, ni-ći′-a, a river.
ni-ći′-a-he, a little river.
road, na-na′-ća-ba′, milky way, white road.
roast, a-ku′-ha, to roast.
robe, na′-ća, a buffalo robe.

rock, a-bet'-a-na'-ka, a large rock.
ni-ha'-na-na'-ka, yellow rock, rock with thick moss on it.
roll, ta-tué-ku'-i-te, to roll, as a ball or stone.
root, the'-ći, roots of a tree or a bush.
rough, tha'-thi-a, rough, uneven.
e-tus-shi'-ne-et, pimpled, rough.
round, ća-a', round, as a ball.
rub, i-tha-ha', to rub anything.
run, ćeth'-ko-ha, to run.
ći-wa'-a, to rush on, to make an attack.

S.

sacrifice, bi-ta'-tha, to make a sacrifice to the Great Spirit.
saddle, a-ka-aḥ'.
saliva, ku-i-thai'-yat, spittle, saliva.
ku-i-thai'-ye, to spit.
salt, ni-éa'-o.
same, na-a-thu', the same.
ni-sti-ath-i'-a, of the same size.
sand, na'-ba.
satisfied, ni-ith-i-éa'-na, to be satisfied, to have enough.
scalp, bi-thes'.
scattered, ni-e-i-ni'-hi, scattered about.
scorch, a-ku'-he, to scorch, as meat held over a fire.
scrape, a-na-hŭ'-ha-ha, to scrape.
bi-tai'-hi, an instrument for scraping robes.
wuth-ta'-the-a, to scrape off with the foot.
scratch, ées-éa'-a, a scratch on any part.
kōt'-éin, to scratch.
na-hu'-a, to scratch with the foot.
secretly, nes-ta-ni'-hi, secretly, slyly, covertly.
sell, at-ni-a-tan'-a-na, to sell anything.
sensible, a-eht', to be sensible, to have good sense.
sew, ko-i-ya-ta', to sew on a patch.
shake, ka-kun'-ku-i-ti, to shake, to clean by shaking.
shell, a-hi', a mussel-shell. *Unio.*
a-hi'-ha, small shells.
shelter, tu-ka-ha', a shelter, covering, booth.
shield, a-éi'-hi, a shield.
a-éi'-hi-na (pl.), shields.
ni-ta'-éi-hi, my shield.
a-ta'-éi-hi, thy shield.
i-ta'-éi-hi, his shield.
shine, na'-ha-e, to glisten, to shine.
shirt, bi-hu'-it.
shoe, na-a'-na, a shoe.
ne-ni-na-a'-na, a man's shoe.
is-i-na-a'-na, a woman's shoe.
biḥ-a'-na, snow-shoe.
shoot, ée-ba', to shoot.
shore, sus-hith', on or along the shore.
shoulder, te'-ya.
shut, a-wet-in'-a, to shut, as the mouth.
sick, na'-ko-wi, to be sick.
side, na-sit'-ath-an'-i-ni, on one side.
aḥ'-a-na, on the other side.
éa'-thi, on the outside.
éi-taḥ'-a-na, on this side.
i-tun-i'-hi, on both sides.
signs, bath-sa'-win, to make signs to any one.
bath-sa'-hai-e, to make signs.
ben-ath-sa'-hai-e, to make signs at a distance.
sing, ni-be', to sing.
ni-ba'-ti-na, a song.
sink, e-nu'-wo-a, to sink, as in water.
sister, na-tus'-i, my sister.
na-tus-i'-wa (pl.), my sisters.
na-tus'-i-wa, younger sister.
ka-hŭ'-e-na-tus-i, half sister.
ni-thub'-i, sister-in-law.
sit, ée-nuk'-a, to sit down.
skilful, ni-tha'-wa-te, skilful, smart.
skim, éi-na'-ka-ha, to skim off, as grease on a pot.
skin, ya-ées'-éi-hu'-in, irritation of the skin when heated by the fire.
sleep, na-ka'-it, to sleep.
na-wun'-in, sleepy, drowsy.
slip, i-ha-hu'-éi-hi-shi, to slip.
small, na-ath'-i-u, so small.
a-ka-éi'-u-hu-hu, very small.
smell, a-ben-a'-to-wa, to smell.
smoke, ée'-i-ta.
ka-na'-ta, smoky.
i-shi-a'-ha-ha, to smoke a skin.
smooth, a-shi'-thi-ya, to make smooth.
i-ha'-ha-nan-a, to smooth down, as the hair.

snake, si-si'-ye.
snarled, ći-ni'-na-ći'-ya, tangled up, snarled as thread.
sneeze, i-thi'-vi, to sneeze.
snow, i, snow.
ben-a'-ći, it snows.
soak, ni-o-i-thi'-ti, to soak a skin, preparatory to dressing it.
ni-a-ka'-nat-i, to soak, or make soft.
soft, sa-si-na', soft, tender, as meat.
something, a-i-thu'.
somewhere, a-e-to-hin'-i.
son, ne'-ha, my son.
e'-ha, thy son.
i'-ha, his son.
ne-shi'-a, my grandson.
e-shi'-a, thy grandson.
in-i-shi'-a, his grandson.
na-thah', my son-in-law.
a-tun'-i-he-wa, an adopted son.
soon, na-ha-ni'-hi, soon, after a while.
sore, wa-ha'-ha-nat, sores on the body, small-pox.
soup, a-kuk', broth, soup.
sour, ya-sis'-i-nak-ćat.
source, ath-ai'-sin, at the head or source of a stream.
speak, ka-an-a'-i-net'-i, to speak slow.
spear, ha-wa'.
spill, a-kūsh'-ku-te, to spill, as water.
spirit, ihi-ći'-wa-ni-a'-tha, the Great Spirit, half white man.
splinters, an-an'-as-iht-a-sin'-en-a, stuck full of splinters or briers.
split, ta-ti'-ha, to split.
spoon, a-wi'-ya, a spoon.
sport, ak-se-si'-hin-a, to play, or sport.
spotted, ka-kut-an'-i, spotted, speckled.
spring, ban-i-o-nū'-in.
sprinkle, e-ći'-i-ku'-te, to sprinkle, as water.
squat, thi-yuk'-a, to squat down on the ground.
squeeze, ni-ći'-na, to squeeze.
tat-a-e'-na, to press or squeeze the hand.
squirrel, bahi-un-i', large squirrel, ground hog.
stab, kōhi-o-hum', to stab one with a knife.
stamp, ta-ha', to stamp in pieces with the foot.
star, a'-tha.
starve, as-na'-tin, to be starving, to starve.
steal, a-wi'-ta, to steal.
step, a-ku'-hu, to put the foot on, to step on anything.
stick, thi-a'-ku-te, to stick or thrust, as in the ground.
still, na-ni-tha'-ni, still, quiet, to be silent.
stingy, ći-ni-ka'-a-tihi, stingy, covetous.
stink, wōh'-a-ba, to stink, to become putrid.
stirrups, ći-thi-uk'-in.
stomach, be-ćat', stomach.
ne-ćat', my stomach.
e-ćat', thy stomach.
i-ćat', his stomach.
stone, a-na'-ka.
straight, ba'-ya.
hu-ben-a', to straighten, make straight, as a stick.
strangle, ni-ća'-na-wa-tha'-wa, to strangle, to suffocate.
streaked, ha-ha'-ye, striped, streaked.
stretch, thihi-o-ha', to stretch, as a skin.
strike, ta-win'-a, to strike.
kai-ye'-thi-ha, to strike and knock loose, as a stake or pin.
strong, ti-ni-ihit'.
a-tha'-na-tin'-i-in-a, I am strong.
stumble, ta-ush'-i, to stumble.
suck, ni'-na, to suck, as a child.
sugar, ni-sis'-ća.
summer, bić.
sun, is-is'.
bi-ku-sis', night sun, the moon.
i-shish'-bi-set, sunrise.
na-is-et', sunset.
surround, ahi-o-in'-a, to make a surround, as of buffalo.
suspend, o'-i-ti, to hang up, suspend anything.
swallow, a-ta-wa-ku'-i-te, to swallow anything.
bi-te-bi'-ho-hu'-hu, mud swallows, birds that build their nests of mud, like the muskrat.
sweat, ći-ba', to take a sweat.
ći-bat', a sweat-house.
ko-no'-wa-na, to perspire freely on a hot day.
sweet, ya-ni-sis-ćat.
swell, ka-na'-a-na, to puff out, swell like inflammation.

swift, ni-nan'-a, swift, swiftly.
swim, tu-i-si'-vi, to swim.
swing, ća-ća-i'-hi, swinging backwards and forwards.

T.

take, na'-tha-wi, to take off, as clothes.
a-thi'-wi-hut'-un-e, to take it over.
talk, a-na'-ti, to talk with any one.
tear, tut-e-ku'-i-ti, to tear or rend.
tho-wu'-thi-a, to tear anything with the foot.
tent, na-tun'-i, flaps of a tent.
thi-ha-an'-a, tent pins.
thankful, a-hōu', to be glad, thankful.
that, in'-i.
thaw, a-na'-ku-a, to thaw, as ice.
they, in-it'-a-na, they or them.
thick, na'-kai-ya, thick, thickly.
thigh, it-sa'-wi.
think, i-wi-na'-ais-tha-ća'-na, to think, consider.
thirsty, na-ka'-ye-na, thirsty, to be thirsty.
this, in'-a, this one, this.
those, in-i-na'-ne.
thou, na-ne'-nit.
thunder, be-ha'-ni-tŭ-it, to thunder.
threaten, a-tun-a'-ha, to threaten one.
throw, to'-o, to throw.
tickle, a-na-ha-hai'-in-a, to tickle.
tie, to'-kte, to tie.
tight, ne'-a-na, to hold tight.
toad, ka-na-na'-ka-we, a large toad.
tobacco, si-sa'-wa, tobacco.
si-sa'-wan, pl.
na-si'-sa-wa, my tobacco.
na-si'-sa-wan, our tobacco.
i-si'-sa-wan, their tobacco.
to-day, i-wan'-hat-i-shi'-na.
together, i-uh'-a-ti'-ni-hi, close together.
to-morrow, na-kak'.
tongue, wi-thun', the tongue.
ni-sa-ta', to lick, as with the tongue.
tooth, bi'-ćit-a, a tooth.
ne'-ćit-a, my tooth.
e'-ćit-a, thy tooth.
in-i'-ćit-a, his tooth.
te-ći'-na-na'-ta, to make a grating noise with the teeth.
kak-si-nan'-at-a-heć'-ta, to rattle with the teeth, to chatter.
top, ta-shi'-he, on the top.
touch, bes-in-a', to touch with anything.
ti-en'-a, to touch one, to call his attention to anything.
track, nah-u-hit', the track of any animal.
trade, a-ta'-ne, to trade anything.
a-ta'-ni-hi, a trader, a merchant.
trail, ba, path, road, trail.
ba'-na, pl.
trample, a-na-hin'-i, to trample down, as grass.
transparent, wa-hu'-i-na-a, clear, transparent.
travelling, nōh'-a-na, to meet any one travelling.
a-ta-bi'-hi, to pass by any one travelling.
tree, a-hat', a tree.
a-ha'-tin-a, pl.
tremble, a-hi'-na-e, to tremble.
trot, sas-es'-kut-e, to trot, as a horse.
trouble, na-tun'-a-he'-yat, to trouble, vex, annoy.
turn, thet-ći-na', to turn over anything.
ith-et-ći-na', turn him over.
na-a-ku'-i-ti, to turn around, as a wheel, or spin a top.
turtle, ba-en'-a.
twins, ka-ka-u'.
twist, ći-thi'-wi-na, to twist.

U.

uncle, na-tha'-i-tha, my mother's brother, uncle.
understand, ka-in'-a, to understand, to know what is meant.
unload, a-wa-ća'-in-a, to take off, unload.
untie, a-kun'-a, to untie anything.

V.

village, i-tha-i'-tan-u, at the village.
vomit, bath-an'-a, to vomit.
bath-an'-o-wa-te'-nu, to nauseate, so as to wish to vomit.

W.

wadding, a-ko-ha′, wadding for a gun.
wade, si′-a-he, to wade out after anything.
wag, nan-ak′-a-ni, to wag the tail, as a dog.
walk, ći-wi′-sa, to walk.
warm, ash-ta′, to be warm.
un-a-hu′-a-toi, warm yourself, you are cold.
wander, an′-a-ha, to wander, to lose one's way.
war-party, nut-i-kun′-it.
ta-wa′-he, a war-club.
wash, a-he′-si-ta, to wash, as the hands.
watch, a-na′-yi-ha′-ta, to watch, to look out.
a-na-ye′, watching, waking.
water, nić, water.
ni′-ći, (pl.)
kah-a′-ya-wi-kut′-e, shallow water.
ben-a-ha′-wi-te, wide water.
way, i-tha-ba′-ya, in that direction, in that way.
we, na-ne-ni′-na, we or ours.
weak, na-tiht′, weak, feeble.
wear, a-hu′-be, to wear on the shoulders, as a blanket.
weasel, si′-a.
weather, wa-hu-sa′-ti-hi-ni, to be bad, stormy weather.
weave, ni-tha-tan′-a, to weave or braid.
well, i-nin-tan′, to be well.
wet, sa-ya-ka′-na.
what, to′-is-a, what is it? what?
to-shi′-hi, what is the matter?
to-u′-hu, how long? at what time?
a-ha′, what? is it possible? is it so?
to-huć′-ha-ta, how far? to what place?
when, to-u′-hu.
where, ta-ti′-na, where is it?
whetstone, i-ta′-ha-ha.
which, an-a′-a-huk.
while, ku-thi′-hi, a long while.
whip, is-ko-ha′, a whip.
is-ko-ha′-na, (pl.)
nis-ko-hin′-a, to whip or flog any one.
whirlpool, ka-ka-ai′-na-wa, an eddy, whirlpool.
whisper, i-wi-na-ye′-ti, to whisper.
whistle, ni′-si-hi, to whistle.
white, nun-a′-ća.
why, tat.
who, an-a-a′, who is it?
widow, i-ni-wi′-si.
wife, i-naiu′, a wife, or married woman.
na-tus′-i-ha, my wife.
a-tus′-i-ha, thy wife.
it-us′-i-ha, his wife.
willow, ba-će-wi′-shi, red willow. *Cornus sericea.*
nōh-than′, bark of red willow.
ba-ći-ya′-ka, a large willow, growing near the foot of the mountains.
wind, a-se′-si.
na-kai′-si-si, with the wind.
window, na-e-ha′.
wink, na-o-si′-ći, to wink with the eyes.
winter, ćeć.
wish, at-i-na-e′-na, wish, disposition.
with, na-ku′-in, with, together with.
ći-ta′-wo, inside, within.
ća′-i-thi, out of doors, without.
wolf, ka-a′, prairie wolf.
ka-a-wo′-u, same as last.
ah′-i, large wolf.
a-wa′-ta-tas, same as last.
woman, is′-i.
is-i′-na, (pl.)
a-na′-e-ha-wu′-is, an unmarried woman.
wood, heh′-a.
ah-u′-in-i, green wood.
wa-thi′-ni, dry wood.
it-ush′, pith of wood.
wrinkles, wa-tha-na′-hain.
write, ća-thun-a-he′, picture-writing on a robe.
wa-thun-a-he′, to write with a pen.

Y.

yawn, na-ka′-ni, to gape, to yawn.
yellow, ni-ha′-ya.
ath′-i-na-ni-ha′-ya, very yellow.
yes, a.
yesterday, un-hu′-bat-i-i′-shi-in-a.
yonder, in′-a, yonder, there.
you, ne-na′-nin.
young, wa-na-niht′.
yours, ai-nis-tat′.

CHAPTER XI.

V. Atsinas.

ETHNOGRAPHICAL HISTORY.

The Atsinas are undoubtedly a branch of the Arapoho nation, as the great similarity in the two languages would indicate. The cause of their separation from the Arapohos probably originated in some feud, so common among savage tribes. They then crossed the Rocky Mountains (the nearest route to the Blackfoot country from the Platte is to cross the mountains near the sources of Snake River, and recross at the sources of the Missouri), and associated themselves with the Blackfeet. When this division took place is not now correctly known, though we think it must have occurred some time within the last century. Their former hunting grounds, as indeed were those of the whole of the Blackfoot nation, were on the tributaries of the Saskatchewan, in which region buffalo and other game was abundant. Previously to the opening of the trade with these Indians on the Upper Missouri, they sold all their skins to the Hudson's Bay Company, seldom visiting the country about the sources of the Missouri except for hostile purposes.

It is said that the Atsinas captured one of the English forts, murdered the people, and were, on that account, obliged to change their location for the one they now occupy. This is very probable, as they are a subtle, revengeful people, social and united in their undertakings, and easily influenced and guided by their chiefs. At the present time, and for many years past, their range has been along Milk River, on the east side of the Missouri, extending nearly as far as Cypress Mountains. From this line to the Marias River stretches a beautiful, level country, well covered with grass, and adapted to the pasturage of buffalo. Here the Indians under consideration may be found at all seasons,—in the winter, along the banks of Milk River, where wood can be obtained, and on the plains in summer, where fuel is not so necessary.

As we have before stated, the Atsinas were originally a portion of the Arapoho tribe, now occupying the country about the sources of the Platte River. We may here say, in giving an account of their past wanderings, that the precise time of their separation from the Arapohos is not known. For the last hundred years or more they have lived on the Saskatchewan and near the sources of the Missouri. With the Blackfeet they have always been on terms of peace and amity, having intermarried with them and learned to speak their language. It is worthy of remark, that while nearly all of them speak the Blackfoot language fluently, very few, if any, of the Blackfeet have ever acquired that of the Atsinas. They usually converse in a low, quiet tone, and there is apparently such a similarity and monotony in the words, as well as sounds, that their language is regarded by the traders and Indians as the most difficult to learn of any on the Upper Missouri.

No trader has ever acquired it sufficiently to carry on even an ordinary conversation, much less to make a speech, though some of the old residents can pronounce the names of different articles of trade with tolerable accuracy. All dealings or intercourse with them by whites or Blackfeet are conducted through the language of the latter nation, which abounds with interpreters.

In the year 1818, the Atsinas, having surprised and robbed one of the forts of the Hudson's Bay Company, on a tributary of the Saskatchewan, fled to the sources of the Missouri, where they passed the winter; but, finding no traders there to furnish them with supplies or purchase their peltries, they continued their route across the mountains, and joined once more their old relations the Arapohos. Here they resided and hunted in common with the latter tribe for the space of five years, during which time the small-pox passed among them, having been communicated through other tribes with whom they were at peace or carried on a traffic. This disease, at that time, destroyed about half their number, but secured the remainder from the next attack, which occurred in 1838. At this latter period the small-pox only acted upon the young, and destroyed numbers of them, but the chiefs and elderly men escaped, so that the tribe was not reduced to the disorderly and helpless condition of the Blackfeet and other surrounding nations.

In the summer of 1823, the Atsinas became dissatisfied with the country of the Arapohos, and longed for their old district, or at least, for some place where the buffalo were to be found in greater abundance than among the valleys of the mountains. The Crow nation had been on terms of peace with the Arapohos for several years, but not being acquainted with the Atsinas, regarded them as enemies, from their previous union with the Blackfeet. This fact the Atsinas well knew, and to avoid meeting with the Crows on their journey to the Missouri, they made a circuit of many miles west of the Crow district, passing near the Columbia. During this trip across the mountains, they came in contact with a few white men trapping for beaver, some of whom they killed and robbed of their property, while others escaped, and carried the intelligence of the murder of their comrades to the main body of trappers. This was a company of sixty to eighty men, all well armed, and versed in the different modes of Indian warfare. They were brave men, headed by renowned leaders, Sublette and Fontinelle. Most of these trappers were assembled at their rendezvous, on a tributary of Big Snake River, not far from the place where the murders were committed.

Always ready to avenge the death of any of their party, and to drive hostile Indians from the mountains, they at once started to attack the advancing camp of the Atsinas. The latter discovered their approach in time to erect several small forts and other breastworks, with such materials, hastily thrown together, as the country afforded. The trappers arrived, and one of the most severe engagements took place ever known in the Rocky

Mountains. The Indians had the advantage of position and defensive barricades, the trappers that of arms, ammunition, and skill. For two days a sharp firing was kept up on both sides, the whites from behind trees and rocks, aiming at the openings in the forts, and the Indians shooting any trapper that exposed his person to view. A number of exhibitions of individual daring occurred on the part of the trappers; some of them leaped into the middle of one of the defences, which contained about twenty Indians, whom they killed and scalped, losing a few of their own party at the same time. Mr. Sublette, the leader, received a severe, though not mortal wound, from a ball passing through his body, after breaking his arm. At the end of forty-eight hours, the trappers left the place, being unable to dislodge the Indians from their barricades. In this conflict, fifty-six of the Atsinas were killed, and about double that number wounded. The trappers had nine men killed, and several wounded, some of whom subsequently died from their wounds.

As soon as possible after this battle, the Atsinas decamped, and pursued their journey by long and rapid marches. Considering themselves out of the reach of their white enemies, and beyond the limits of the range of the Crows, they travelled more leisurely, and inclined more northward, with a view of reaching a portion of the Blackfeet, near St. Mary's Valley. Even when they considered themselves most secure, still greater misfortunes were impending over them. It so happened that the whole Crow nation had been on a visit to the Flatheads to obtain horses by barter, as was their usual custom. Having concluded their traffic, the Crows returned home in two camps, about the same time that the Atsinas were travelling through that region. Neither tribe was aware of the proximity of the other, this portion of the mountains being unoccupied by Indians, and seldom visited by war-parties. The Crows, also, were travelling from west to east, whilst the others marched from the southwest in a northern direction. One of the Crow camps was about two days' journey in advance of the other, when four young men started from the hindmost camp to join the one in front. In the meantime, the Atsinas had advanced nearly to the trail when the Crows had passed, and these young men, seeing the lodges, supposed them to be their own people, and went directly to their village. They soon discovered their mistake, for the Atsinas at once killed three of them. The fourth, escaping among the rocks and bushes, fled back to his people, and informed them of the fate of his friends. To secure a signal revenge without farther loss, the Crows waylaid the Atsinas in a certain pass which they knew their enemy would be obliged to travel through. This spot they surrounded, and lay in ambuscade until their enemies entered and filled it without suspicion. The Crows then fired upon them from behind rocks and trees with safety. The Atsinas were panic-stricken, and fled, leaving behind them their wounded, and some of their women and children. They scarcely attempted a defence: only a few shots were fired at the Crows, but without effect. Sixty-seven Atsinas were killed, and double that

number of women and children taken prisoners, many of whom can be seen among the Crows at this time. The remainder of the Atsinas reached their people, the Blackfeet, without farther loss, with whom they have continued to reside to this day, and are classed as Blackfeet when that nation are spoken of as a body.

We have now given as correct an account of this nation as can be obtained from the most intelligent Indians and traders of the country at the present time. We have searched in vain among all the old books of travel for any definite account of the Atsinas or Arapohos, and consequently, any accurate information in regard to them must be important.

Umfreville, as far back as 1790, seems to have known of the Atsinas, and to have obtained a vocabulary of forty-four words of their language. According to his account, the Hudson's Bay Company and the Nehethewas or Crees, called them Fall Indians, from the fact of their inhabiting a district on the southern branch of the Saskatchewan, where the rapids are frequent. He says: "As they are not very numerous, and have a harsh, guttural language peculiar to themselves, I am induced to think they are a tribe that has detached itself from some distant nation, with which we are not yet acquainted." He also alludes to the impropriety of calling them Big-bellies, inasmuch as they are as comely and as well made as any of the surrounding tribes. "They seem not to be acquainted with the hunting of beaver, dressing skins, and killing small peltries, for they bring us nothing but wolves, which they take by a variety of contrivances. Though we have interpreters for all other Indian languages, none as yet have been able to attain a fluency sufficient to be understood, and the general method of conversing is by speaking the Blackfoot tongue, which is agreeable and soon acquired."

Mackenzie, in 1801, merely alludes to the Fall or Big-bellied Indians living on the Saskatchewan.

Brackenridge* says: "The Gros Ventres of the Prairie speak the Crow language, and wander on the South Fork of the Saskatchewan."

Morse† speaks of them as Rapid Indians, and remarks that they call themselves Paw-is-tuck'-i-e-ne-wuck. From what source he obtained his information, he does not say.

Gallatin‡ also seems to have procured very little accurate information in regard to these Indians, and in his comparisons, he used the small vocabulary of Umfreville.

The brief list of Atsina words given in these pages seems to be the only one, so far as I can learn, that has ever been secured, except that of Umfreville, in 1790. It is a matter of great surprise, that so little is known of this tribe, though it may be due to the fact, that the Atsinas have always been classed with the Blackfeet.

These Indians have received a great variety of names, as Paunch, Fall, Rapid Indians,

* 1819. † 1822. ‡ 1836.

Gros Ventres of the Prairie, Minnetarees of the Prairie, &c. They have also been confounded with the Minnetarees of the Missouri, and one author says they speak the Crow language. I will now endeavor to correct some of the errors which authors have fallen into, in regard to these Indians.

The tribe under consideration call themselves Atsina, the meaning of which I could not ascertain. They now live in and about the valley of Milk River, in latitude 48°, longitude 108°, while the Minnetarees, or Gros Ventres de Missouri, as they are called by the Canadians, reside in a permanent village on the left bank of the Missouri River, near latitude 47°, longitude 102°. The latter speak a dialect of the Crow language, and know very little, if anything, in regard to the former, for they have never met, either in war or peace.

Their numbers have been variously estimated by different authors. The Prince Neuwied, in 1832 and '3, made their number about 200 lodges, and 400 to 500 warriors. Gov. Stevens, in 1853, estimated them at 360 lodges, 900 warriors, and a total population of 2520. The last estimate is probably correct for the present time. In 1855, I took a careful census of 60 lodges of Atsinas, and found that there was an average of a fraction over five persons to a lodge.

VOCABULARY OF THE ATSI'NA DIALECT OF THE ARA'POHO LANGUAGE.

alive, life, na-tha'-ni-ta.
all, ba'-hi.
arm, nin'-is.
arrow, uts.
axe, a-nas'.

bad, wun'-a-tha.
bark, na'-si.
beard, bi-a-thut'-i.
bear, wa'-si.
beaver, a'-bit.
belly, wa-nut'-a.
bird, ni-i'-ha.
blood, ba-uts'.
boat, tse'-e-wa.
body, ni-tun'-i-ya.
bone, mun-i'-ya.
bow, ma-ta'.
boy, a-na'-he.
bread, kat'-san.
brother (elder), ni-ti'-wa.
younger, na-tha'-wa.

buffalo, it-a'-nun.
bull, a-ni'-ke-a.

chief, ni-ke'-a.
child, te'-a-na.
corn, mis-ka'-ta.
cow, bi.

day, ba-a'-a.
darkness, bi'-hi-ka.
daughter, ni-ta'-na (my).
dead, death, na-kik'.
deer, ut-i-vi'-a-nin'-a.
dog, a'-te.
duck, ni-hi'-a.

ear, ke'-ta, mo-ne-tun'-i.
earth, pi'-tōn.
egg, nau'-na.
evening, i-to'-a.
eye, ba-si'-the.

face, it-a'-thi-wi'-a.

father, ne'-ha.
feet, i-thet'-tōn.
finger, ba-kit'.
fire, sit'-a.
fish, na-qua'-a.
fox (red), ba'-thew.
(gray), no.
forehead, wa-thaut'.
friend, ba'-ni.

girl, i-the'-e.
go, ke-tats'.
good, i'-ta.
goose, ne'-i.
grass, wa-se'-na.
great, be-na-thi'-a.

hair, mi'-ta.
hand, ma-kit'-in.
handsome, sin-i-sa'-ti.
hare, nat'-sa.
head, bi'-ta.

heart, nut'-a.
hen (prairie), kin'-a.
hill, ka-te'-ni.
house, hut, ni'-nun.
husband, na'-si.

I, ni-na'-ni.
ice, wa'-ku.
Indian, ni-thit'.
iron, bet'-ste.
island, ka-a'-pu.

kettle, bet'-ste-na.
kill, nan-a'-a.
knife, wa-tha'.

leaf, bi-ćish'-e.
leg, na-ats'.
light, ni-sin'.
lightning, e-sa'-an.
love, pi-tha'-ta.

man, ni-thun'-a.
many, much, wun-a-tauts'.
meat, a'-than.
moccasins, wa'-a.
moon, bi-ko'-is-is.
morning, na-na'-ka.
mother, e-naun'.
mountain, a-ha'-ni.
mouth, it'-i.

nails, wa'-us.
near, ek-i'-ba.
neck, wa'-thun.
night, tu'-ki.
no, tse.
nose, ba'-is.

old, bi-e-a'-wa.

pail, pi'-nats.
pipe, e'-tsa.

rain, na'-tha.

sea, ti-yo-ni'-ća.
see, na-na'-ha-qua-ki.
sing, ma'-ki-ha'-ke.
sister, te'-ya.
sleep, na-kasć'.
sky, un'-u.
small, a-ksi'-o.
snake, si'-sa-a.
snow, hi.
son (my), ni'-kun.
speak, na-ne'-kik.
spring, bi-ni'-ka.
squirrel, ba-thaut'-si.
star, ou-to-ha'.
stone, a-na'-ken.
strong, tin-a'-ik.
sun, is'-is.

this, i'-na.
thou, na'-na.
thunder, pa'-a.
tobacco, se-tha'-wa.
to-day, wa-ni'-i-hu-sin.
toe, wa-tha'-a.
to-morrow, na-kast'.
tongue, ni'-tun.
tooth, bi-it'-a.
town, ni'-i-nun.
tree (pine), tha'-a-ta.

ugly (bad heart), na-ta-wun'-a-tha.

walk, be-ni-ta'-pe-ki.
warm, a-sit'-e.
warrior, ne-ta'-tit.
water, nets.
white, nun'-au-ćo.
who, hai'-yo.
wife, na'-ti-tha.
wind, a-tha'-tha.
winter (cold), na-ka'-ta.
wolf, kai-i-ki'-tha.
woman, ith'-a.
wood, bes'-a.

yes, a'-e.
yesterday, a-ta'-ni.
young, wun-a-he'-ku.

one, nin-i-thi'-ki.
two, nin'-i-sits.
three, ni'-nić.
four, kin'-a-nits.
five, kin-a-ta'-nits.
six, ni-ka-ta'-sits.
seven, nin'-i-ta-ta'-sits.
eight, nin'-a-tha-ta'-sits.
nine, e-na'-na-pe-ta'-sits.
ten, ma-ta-ta'-sits.

PAWNEE GROUP, C.

CHAPTER XII.

VI. Pawnees.

ETHNOGRAPHICAL HISTORY.

It is somewhat remarkable that so little information of a definite character should have been placed on record in regard to a nation which has been so long known as the Pawnees.

I have searched with much care all the works within my reach, and can find no detailed account of their history, only incidental allusions to them in the writings of various travellers. Gallatin remarks that they were visited by Bourgmont as early as 1724, and observes that they occupied very nearly the same district of country over which they range at the present time. I can find no reliable account of their migration from any distant point to their present location. It is the opinion of Mr. Shea that Cavilier alludes to them under the name of Panismahans, in his account of "La Salle's Voyage to the Mouth of the Mississippi, in 1688," where he notes the information given him by three Shawnee Indians, "that there were other nations to the northwest, who had kings and chiefs, and observed some forms of government, honoring and respecting their kings as Europeans do theirs." Again, in the narrative of Father Doway, who, it seems, was a member of La Salle's party, in his attempt to ascend the Mississippi, in 1687, we find the following paragraph, which throws much light upon the location of numerous other tribes now inhabiting the Missouri Valley: "We crossed the Ouabache (Wabash) there on the 26th of August (1687), and found it full sixty leagues to the mouth of the River Illinois, still ascending the Colbert. About six leagues above this mouth there is on the northwest the famous river of the Massourites, or Osages, at least as large as the river into which it empties; it is formed by a number of other known rivers, everywhere navigable, and inhabited by many populous tribes, as the Panimaha, who had but one chief and twenty-two villages, the least of which has two hundred cabins; the Pancassa, the Pana, the Paneloza, the Matotantes, each of which, separately, is not inferior to the Panimaha. They include also the Osages, who have seventeen villages on a river of their name, which empties into that of the Massourites, to which the maps have also extended the name of Osages. The Arkansas were formerly stationed on the upper part of one of these rivers, but the Iroquois drove them out by cruel wars some years ago, so that they, with some Osage villages, were obliged to drop down and settle on the river which now bears their name, and of which I have spoken." The above account seems to me to be somewhat confused, according to our present ideas of the geography of the Mississippi Valley; but I am inclined to think that the various tribes of Indians alluded to were located in the Missouri Valley. In the narrative of the "Travels of Lewis and Clarke," may be found the most reliable account of the location and condition of the Pawnees at the time when these enterprising explorers ascended the Missouri. At that time, 1803, their principal village was situated on the south side of the Platte, about forty-five miles above its mouth, and contained about five hundred warriors. Not many years previously were added the Republican Pawnees, so called from their having lived on a branch of the Kansas of that name. This band numbered two hundred and fifty warriors. The third band was called the Pawnee Loups, or Wolf Pawnees, who resided on the Wolf or Loup Fork of the

Platte, and numbered about two hundred and eighty men. There was also a fourth band, who originally ranged over the country bordering on the Kansas and Arkansas, but were so often defeated in their wars with the Osages that they removed to Red River, forming a tribe of four hundred men. "All these tribes live in villages and raise corn; but during the intervals of culture rove in the plains in quest of buffalo." The band last mentioned undoubtedly includes the Huecos and Witchitas, whose villages are now located near each other, between the Washita and Red Rivers. According to Gregg, these two tribes have been called Pawnee Picts, from their habit of profuse tattooing.

At the time of Major Long's Expedition to the Rocky Mountains, in 1820, three bands, Grand Pawnees, Pawnee Republics, and Pawnee Loups, all resided on the Platte and its branches, and numbered about ten thousand souls. They seem to have been at that time in a prosperous condition, and much devoted to agricultural pursuits.

The Pawnees at this time reside on the Loup Fork, a tributary of the Platte, having been assigned a reservation on that river by the United States Government.

Very little attention has been given to the language of the Pawnees, as well as to their history. So far as I can learn, the first vocabulary of their language was taken by Mr. Say in 1820, and published in the report of Long's Expedition to the Rocky Mountains. The Prince Neuwied also obtained a few words, and Gallatin, in his "Synopsis" (Archæologia Americana, Vol. II, pp. 305–367), simply repeats Say's list of words. Rev. Mr. Dunbar, for a long time a missionary among the Pawnees, prepared a small elementary work in their language for the use of the mission, but as yet I have been unable to secure a copy. No attempt has ever been made to work out the grammatical structure of the language. The following vocabulary was obtained for me by the Rev. William Hamilton, of Bellevue, Nebraska, and, from his great experience in such matters, it is entitled to much confidence. I have simply made some changes in the letters employed, to render the orthography uniform throughout the entire memoir, and arranged the words in alphabetical order.

VOCABULARY OF THE PAWNEE LANGUAGE.

A.

alive, ki′-si-kit.
all, kit′-o.
ant, pit′-a-ru.
antelope, a-pi′-ka-tōs, flat horns.
arm, pe′-ru.
arrow, li′-ksu.
autumn, lits′-ko-ki.
axe, ka-ta′-ra-ki.
ka-ta′-ra-ta′-īt, a battle-axe.

B.

back, līk-sta′-ku, lēk-sta′-ku.
bad, kau-ku′-ra-hi.
bag, ka-dōs′.
ćat-ka-tōs′, a woman's bag or satchel.
bark, laks-kūs′.
beak, ćōs, beak, or nose.
bean, at-it′.
at-it′-di-wi′-ru, round bean, or pea.
bear, ko-rōks′.

beast, i'-ta, and i'-to.
beard, a-ka'-da-rūs, and a-ku'-da-rūs.
beaver, ki-tūk'.
bird, li-kūts'-ki, a bird.
kit-o-ka'-ru, all kinds of birds.
black, ti'-ka-tit.
bladder, ka-sīt'-ki-ra'-ku.
blood, pa'-tu.
blue, ta-ri-ūs'.
boat, la-ku'-hu-ru.
tu-wau'-rūks-ti, a ship, sacred, medicine.
la-ku-ha-wau'-sīks-ti, steamboat, medicine-boat.
body, ki-si-kīt'-ri, a living body.
bone, ki'-su.
bow, ti-ra'-kīsh.
boy, pi'-ras-ki, and pi'-rūs-ki.
bread, i'-će-ta.
breechcloth, kau'-di-o-kau'-i-o.
brother, i-da'-di-ko-ta'-ti, my brother.
buffalo, ta'-ra-ha.
ta'-ra-ha-ta'-ka, domestic cow, white buffalo.
to burn, ti-ta'-ra-ri.

C.

call, ti-wa'-ko-la'-ru, he calls.
cat, pak-sits'-ha-wi'-ru, wild cat.
pak-sits-ka'-ki-ats, panther.
chief, ni-sha'-ru.
chicken, pūks, prairie chicken. *Tetrao cupido.*
coat, na-ha'-si.
cold, ti-pit'-si.
corn, li-kis', lēks, } corn in the ear.
le-ki-sha'-kūts, coarse grass, corn.
copper, pa-pi'-će-spa.
cry, ti-ki'-kat, he cries.
me-ti'-ki-kat, crying.
crow, ka'-ka. *Corvus.*

D.

darkness, ta-ti'-sta-ha.
death, we-si'-kit.
we'-ti-kōt, dead.
ti-ko'-kōt, he is dead.
he-tē'k, he dies.
daughter, će-ra-ki'-ko-ta-ti, my daughter.
deer, a-ri'-ki-ra'-ru, a male deer.
tōh, a female deer, a doe.
dog, as-ak'-i.
door, le-ka'-wi-u.
drink, ti-ki'-ha, he drinks.
we-ti'-ki-ka, drinking.
duck, ki'-waks, and ki'-sat.

E.

eagle, līh'-ta-kats.
earth, a-ra'-nu.
eat, ti-wa'-wa, he eats.
we-le-wa'-wa, he is eating.
ear, ūt-ka-ha'-ru.
a-do-ru'-sa-ka'-ha, long ears, a horse.
egg, li-pi'-ku.
elbow, pa-ro-ćūć'-kīs.
elk, nah.
enemy, ća-hīks-o'-pi'-in.
evening, wa-ti-sak'-u, dark, evening.

F.

face, ska'-u.
far off, kīts-ti-kūts'.
fat, a-hit'-ki.
father, a-ti'-as-ko-ta'-ti, my father.
a-ti'-as-ko-ta'-se, your father.
a-ti'-as-ko'-ta, his father.
feather, hi'-tu.
finger nail, īks-pi'-to, and iks-pi'-to.
fire, lak-tit'.
fish, kat-se'-ik.
flesh, ki-sats'-ki.
flint, ta-hi-u'-ru.
flour, a'-rīh-i-tu.
flower, ki-dēk'-ta-rah'-a-ta.
fly, pi-ra-ras'-a-līt, horse-fly.
foot, as'-u.
forest, o-kat'-u-ha'-ri.
forever, lo-ho'-ri-rēt.
forenoon, ki-ka'-rūs.
friend, i-ra'-ri, i-da'-ri, } friend or brother.

G.

girl, o-da′-o, sha-lo′, a boy, any of the Loup Pawnees.
ćo-wat′, a little girl.
ti′-ki, a little boy.
ćo′-ras-ki-ta-lūs′-ki, a little girl.
pi′-ras-ki-ta-lūs′-ki, a little boy.
god, ti-ra′-wa-kau-ku′-rau-hi, bad gods.
good, tu-ra′-hi.
gone, ne-tēt′, he has gone.
goose, kat-o′-rūt. Loup Pawnees say ko-hat′.
kat-o-rūt′-a-ka, white goose.
grass, ka′-ta-ru.
ha-rut′-ki-i-di, cut grass, hay.
great, ti′-ri-hu.
green, tit-a-ri-ūs′.
gun, ti-ra′-ku.

H.

hail, nih′-ōts.
hair, o′-sa.
a-kau-da′-rūs, hair of the mouth.
half, hūks.
hand, ek-su.
handsome, tah′-ni.
hare, pa′-rūs.
hawk, pi′-a-ki.
he, ti-ra′-ku.
head, paks, pūks.
hear, tat-kōk′, he hears.
heart, pi′-tsu.
heel, as′-kau-ki′-tu.
hill, pa-o-ti′-di-ho, a large hill.
hog, koh′-o, ko-shan′, a word derived from the French traders.
hot, ta′-wi-rits-to.
house, wc′-ti-kau, in the house.
ak-a′-ra, a house.
husband, ta-wa′-ri-ko′-ta-ti, my husband, my married one.

I.

I, lat.
ice, ta-si′-tu, hu-ra′-o.
in, ti-hak′.
Indian, ća′-hiks-i-ća′-hiks, literally, men of men, or the last of men.
island, a′-wa-u.

K.

killed, wc-tih′-o-tit′, he killed it.
knife, lēt′-sik.

L.

laugh, ti-was′-ko, he laughs.
wc′-ti-was′-ku, laughing.
lead, ti-ra-ka′-wi-u, lead balls.
leaf, sh'ki′-ka-la.
leg, kau-su′.
leggin, a-ka′-o-ku.
life, ki′-si-kīt.
light, ūks-e-kut′.
lightning, te-wau-wau′-pits.
liver, ka-di′-ku.
lodge, ak-a′-ska-rīt′-ki, a skin lodge.
looked, to-ti-ri-ku′, he looked on.
long, kau-ki-ra′-ki, not long.
love, ti-ra-pi′-ri-hu, ti-ki′-si-kīt′, } he loves.

M.

man, pet′-a.
ti-pa′-hat, red man.
ća-hiks-ta-ka′, white man.
ta-wa′-re-pīt, pi-to-ko′-ta-ti, } my man.
meat, ki-sūts′-ki, fresh meat.
midday, sak-u-i-ka-ri′-kat.
midnight, i′-das-i-ka′-u-kat.
moon, ko′-ru.
ki′-waks, Duck moon, November.
lūt, Snake moon, October.
kat-i-ha′-ru, six months, six moons.
morning, wet-a-he′-sha.
mother, a-ti-ra′-ko-ta-ti, my mother.
mouth, a′-ka-u.
muskrat, kit′-a-ka.

N.

navel, kau-su′, and la-wats′.

near, tēks′-ku-rat.
neck, pa-hiks′-kīs.
no, kau′-hi.
nose, ćōs.
nothing, kau-hōt′.

O.

oar, kits-ka′-wi-tsa′-ku.
oats, li-ki′-sha-kūts, a-ru′-sa-ko′-ta, } food for horses.
old, ku′-ra-hūsh.
on, ti-hū′-ki-ta-sa.
otter, kīt-a′-pat.
outside, o-ki-ta-ha′-hi-ri.
owl, pa-ho′-ru.

P.

part, kau′-ki.
partridge, ōt-kis′-is.
perhaps, ki′-ri-ku.
ki′-ri-ku-i′-rit, perhaps so.
pepper, kats-kau-pit′, black pepper.
pipe, nōt′-a-wi-ska′-ru.
ka′-ta-ra-pīk′-skīt, tomahawk pipe.
plover, ūt.
potato, īts, ēts.
powderhorn, a-di′-i-ki.
pumpkin, pa-haks′.
pa-hak′-sa-las, ripe pumpkins.

R.

rain, ta-tsōn′.
red, ti′-pa-hat′.
river, kits-wa′-rūk-sti, Medicine River.
kits-ka-tūs′, Shallow River, Platte.
road, hat-o′-ru, a trail or road.
rose, pa′-hat.

S.

salt, kau′-it.
scalp, pūks-sīt′-skūs.
sea, ki-ra-rīk′-shis.
seat, ki-di′-ru, seat or rump.
see, si-sit′, he sees.
September, ki-shōt′.
sheep, a′-ri-ka-rits′.
shoe, as-o′-ru, shoe or moccasin.
shoulder, kīt-ska′-su.
silver, wa-pi′-ći-sta-pi′-ri-hu, best metal.
sinew, as-kats′-ki.
sing, ti′-ra-rūh.
sister, i-la-he′, used by the men, my sister.
i-da-di′, women use this form.
skin, ska-rīt′-ki.
sky, ska′-u, sky, heaven.
slough, ki′-wa-ha′-ru, lake, slough.
ki-wa′-ha-kūts, big slough.
small, ki-ta-lūs′-ki.
smooth, ki-ri-bats′-ki.
snake, lūt′-ki.
snipe, paks-ki-ra′-rūts.
snow, we-tōh′-sha, it snows.
tōh′-sa, snow.
son, pi-ras′-ko-ta′-ti, my son, or my boy.
speak, ti-wa′-ku, he speaks.
spear, u-rūk′-sis.
spirit, te-ra′-wa, Great Spirit.
le-kat-sa′-ro, a ghost, wandering spirit.
spring, a-ra′-ri-ka.
kits-taks′, spring or fountain.
squirrel, ski′-pis.
stomach, la-ća′-kīts.
stone, ka-rit′-ki.
ka-rit′-ki-ti-di-hu′, large stone, rock.
strike, ti-ta′-hi, he strikes.
strong, tit-a′-rah-īsh′.
sugar, la-ki′-tsu.
summer, li′-at.
sun, sak′-o-ru.

T.

thigh, pa′-ki-su.
thistle, pi-ra-ha′-tūs.
thou, las.
thumb, skits′-kūts, big finger.
ske′-tsi, finger.
thunder, tōh-i′-ri-ru.
tie, sta-dīt′, he ties.

toad, sko-rōh′-iks.
tobacco, na-wis′-ka-ru.
toe nail, as-pi′-tu.
to-morrow, la-hi′-sa.
tooth, a-do′, a-du′.
tree, la-kīsh′.
la-hi′-di-buts′-ki, a shrub, or small tree.
ti-hu′-ki-ta-hu, on the tree.
turtle, i-ćaus′, i-ćūs′.

U.

ugly, kau-hōh′-ni.

V.

valley, kat-ōs′, kat-ūs′.
vein, pa-tu-hu′-ru.
village, a′-hi-ta-ra, a town or village.

W.

walk, ti-wa′-ri, he walks.
wampum, ki-dīks-ūt′-ka-u-da′-wis.
war-club, a-da-ke′-du-ću′-ku.
warrior, a-ri-pu′-kūs.
water, ki-tsu′.
wasp, pats′-bu, wasp, bee.
we, a′-hats.
weak, kau-ki-ta′-rah-ish.
weed, i′-du.
what? ka? (asking a question.)
ta-ki′-ru-ća′-hiks, what person?
white, ti-ta′-ka, ta′-ka.
who, ta-ki′-ru.
wife, ća′-nat-ko-ta′-te.
wind, o-to′-ru.
winter, pi′-ći-kat.
wish, ti-wits′-ke, he wishes.
within, kau′-wi-hi-ri.
without, o-ki′-ta-ha′-hi-ri.
woman, ća′-pat.
ćo′-ras, ćo′-ra-ke, } a young, unmarried woman.
worm, pi′-ras.
woodcock, kau′-pat.

Y.

year, ti-ra′-ku-i-kat′-i-ha′-ru.
yellow, ti-rah′-at-a.
yes, i′-rit.
yesterday, ti-rūks′-a-ha′-ta-ki.
young, pi′-ras-ki.

CHAPTER XIII.

VII. Ari′karas.

ETHNOGRAPHICAL HISTORY.

The Arikaras, or Rees, as they are called by the French traders, were originally the same people as the Pawnees of the Platte River, their language being nearly the same. That they migrated upward, along the Missouri, from their friends below, is established by the remains of their dirt villages, which are yet seen along that river, though at this time mostly overgrown with grass. At what time they separated from the parent stock is not now correctly known, though some of their locations appear to have been of very ancient date, at least previous to the commencement of the fur trade on the Upper Missouri. At the time when the old French and Spanish traders began their dealings with the Indians of the Upper Missouri, the Arikara village was situated a little above the mouth of Grand

River, since which time they have made several removals, and are now located at Fort Clark, the former village of the Mandans.

The Arikaras have never manifested a very friendly disposition toward white men; indeed, it is said, that feelings of bitter animosity and hatred toward them are taught to their children, as soon as they are able to understand. This appears to have been a traditionary custom handed down from their ancestors, originating, no doubt, in some difficulties with the first settlers of the Western borders, which also were the probable cause of their emigration. Whatever the cause may have been, this system of education has been persisted in with the young even to the present time, and the consequences have been severely felt through successive generations. It was with great difficulty that a trade could be opened with them, when they inhabited their old village near Grand River, and individual enterprise had established trading-posts for the Dakotas and other tribes lower down. Their thieving and murderous propensities were so great, that but few men would run the risk of living among them, and repeated attempts resulted in the deaths of those who tried the experiment. Still others ventured, and in the course of time a trade in their village was begun, though not established on a very secure basis. At the time the trade commenced on the Upper Missouri, the Arikaras numbered from one hundred and eighty to two hundred cabins, and eight hundred warriors.

The cabins or huts of the Arikaras and other stationary tribes are built by planting four posts in the ground in the form of a square, the posts being forked at the top to receive transverse beams. To the beams other timbers are attached, the lower extremities of which describe a circle, or nearly so, the interstices being filled with small twigs, the whole thickly overlaid with willows, rushes, and grass, and plastered over with mud, laid on very thick. A hole is left in the top for the smoke to pass out, and another in the side for the door. This is the position of the building above ground, but within the circle an excavation is made two to four feet deep, and thus persons can stand upright or walk about with ease in the interior, except at the portion of the circle where the beds of the inmates are made. The door opens a few steps distant from the main building, on the surface of the ground, from which by a gradual descent through a covered passage of about ten feet, the interior of the hut is reached. The door is of wood, and the aperture large enough to admit a favorite horse to the family circle, which is often done. Around the house on the outside a small trench is dug, to carry away the rain.

These buildings are located within fifteen or twenty feet of each other, without any regard to regularity; nothing like streets are formed, and the houses are so much alike that a stranger is liable to lose his way in the village.

These Indians cultivate small patches of land on the Missouri bottom, each family tilling from a half to one and a half acres, which are separated from each other by rude brush

and pole fences. The land is wrought entirely with hoes by the women, and the vegetables raised are Indian corn, pumpkins, and squashes of several kinds. The corn is said to be the original kind discovered with the continent, and is quite different in appearance from that raised in the States. The stalk is from three to six feet in height, seldom more than four or four and a half feet, and the ears grow in clusters near the surface of the ground. One or two ears sometimes grow higher upon the stalk, which appears too slender to support any more. The grain is small, hard, and covered with a thicker shell than that raised in warmer climates. It does not possess the same nutritive qualities as food for animals as the larger kind, but is more agreeable to the taste of the Indians. It is raised with so little labor that it seems well calculated for them. An acre usually produces about twenty bushels. When green, a portion is gathered and partially boiled, after which it is dried, shelled, and laid aside. This is called sweet corn, and is preserved any length of time, and when well boiled it differs little from green corn fresh from the stalk. The Indians plant about the middle of April or the beginning of May, according to the mildness or severity of the spring, and the ears are gathered about the beginning of August. The crops are not uniformly good, being subject to inundations from the Missouri, or to long periods of drouth. A moderately wet season is always favorable, and from two thousand to four thousand bushels of corn are raised by this nation. Cellars are dug within the houses, in which the various kinds of produce are stored.

Many superstitious rites and ceremonies are performed at the time of planting corn, and also at different periods during the growth of the crops; some or perhaps all of which take their rise in ancient tradition, and are very singular, and exhibit the original modes of thought and worship practised by their forefathers. Some of them are very indelicate in their character, and indicate the lowest state of animal degradation.

After corn, squashes next claim their attention in agriculture. They grow on large and very strong vines, and are of various sizes and shapes. They are either boiled and eaten when green, or cut up and dried for winter use. In the latter case they become very hard, and are scarcely edible when cooked, except by the natives, who seem to devour them with a gusto and a preference not shown for any other vegetable except sweet corn.

The crops being gathered in, are stored away in the cellars before alluded to, or buried on the field in different places, in what are called by the Canadian traders *cachés*, so constructed as to be impervious to rain, and so well covered that no one could discover them without a knowledge of their locality. Whatever is concealed in this way is intended to remain in the ground until the succeeding spring, at which time buffalo usually being far distant, it is their only resource for food. Besides the great advantages accruing to themselves over other wandering tribes, by tilling the soil, they have two markets for their surplus produce. The first is the fort of the American Fur Company, located near their

village, at which they trade from five hundred to eight hundred bushels in a season. This trade on the part of the Indians is carried on by the women, who bring the corn by panfuls or the squashes in strings, and receive in exchange knives, hoes, combs, beads, paints, &c., also ammunition, tobacco, and other useful articles for their husbands. In this way each family is supplied with all the smaller articles needed for a comfortable existence; and though the women perform all the labor, they are compensated by having their full share of the profits.

The second market for their grain is with several bands of the Dakotas, who are at peace with them. These Indians make their annual visits to the Arikaras, bringing buffalo-robes, skins, meat, &c., which they exchange for corn; and the robes and skins thus obtained enable the Arikaras to buy at the trading-post the various cloths and cooking utensils needed by the women, and the guns, horses, &c., required by the men.

At the commencement of the winter the Arikaras leave their village in quest of buffalo, which seldom approach near enough to be killed in the vicinity of their cabins. They then encamp in skin tents, in various directions from the Missouri or along its banks, wherever the buffalo may chance to range. They pass the winter in hunting, and return to their permanent village early in the spring, bringing with them their skins in an unprepared state, with a great supply of meat. The buffalo skins are then dressed into robes before the season for planting arrives, and the meat with their reserves of corn enables them to live well. The Arikaras are also good fishermen, and take the fish by placing pens made of willows in the eddies of the Missouri. The fish entering the door of the pen or basket, it is closed, and often large numbers are thus secured. The Arikaras are also good swimmers, venturing out on floating cakes of ice when the Missouri breaks in the spring, and bringing ashore the bodies of drowned buffalo that are drifting by. Multitudes of these animals, in attempting to cross the river in the fall before the ice is strong enough to support them, break through, and often whole herds are thus drowned, their bodies remaining in the mud until the ice moves in the spring, when they are carried down by the current. They are often piled up along the shore, impregnating the air with their decomposing flesh. Even in this condition the Arikaras seem to prefer the meat, which is eaten raw, and though one would suppose that disease in its worst forms would be engendered, no injurious results follow.

The gathering of drift-wood in the spring is also a very hazardous employment, and is performed almost entirely by the women. There being but little timber for fuel in the vicinity of their village, it becomes necessary for them to secure the drift-wood in the time of high water in the spring, and then the women sail out on the masses of ice, attach cords to the floating trees, and haul them to land. Whenever there is an unusual quantity of wood floating down the current, all the village, men, women, and children, turn out, and

the river is alive with them from shore to shore, leaping from one cake of ice to another, sometimes falling in and whirling by in the rapid current. It is very dangerous employment, yet they are so nimble, so expert swimmers, and such good judges of the solidity of the ice-cakes, that comparatively few accidents occur. Such are some of their resources for living, and poor as they are they are better than those of the Dakotas and other wandering tribes.

The Arikaras, though stupid in many respects, show considerable ingenuity in making tolerably good and well-shaped vessels for cooking purposes. They are wrought by hand out of clay, and baked in the fire, though not glazed. They consist of pots, pans, porringers, and mortars for pounding corn. They are of a gray color, stand well the action of fire, and are nearly as strong as ordinary potter's ware. For pounding corn and other hard substances, they make also mortars of stone, working the material into shape with great labor and perseverance. These utensils, though clumsy, seem to be preferred by them to metallic ones, for though the latter can now be had at a trifling cost, they continue their manufacture, and will scarcely exchange them for others, to us, more convenient and durable. They also possess the art of melting beads of different colors, and casting them in moulds of clay for ornaments, some of which are very handsome. In common with the Mandans and Minnetarees, they make skin canoes, which are of great service to them. The body of the boat is made of willows, bent round like a basket, and tied to a hoop at the top, which forms a circle about three or four feet in diameter. The hide of a buffalo, either fresh from the animal, or if dry, well soaked in water, is stretched over the frame, the hair side within. It is then turned upside down, dried, and sometimes smeared with tallow. The whole is made of a single skin, can be carried easily by a woman from place to place, and will convey three men across the Missouri with tolerable safety.

The domestic character and habits of the Arikaras are decidedly more filthy than those of any other tribe on the Upper Missouri. In their dress, they are greasy and slovenly, both men and women, and their hair is seldom untangled by a comb, though frequently amongst the men stuck together in tufts with gum, and then plastered over with clay, grease, and paint, affording excellent pasture-ground for vermin, which grow to a great size, multiply and spread over the cranium and clothes, and even into every nook and corner of their cabins. There are neither handsome men nor women among them; the former have sharp, sneaking, thieving looks, shabby in their dress, and ungraceful in their general deportment, and the latter coarse features, thick lips, short and thick-set persons, and both young and old are often more or less tainted with syphilitic diseases.

Many of the Arikara families are said to sleep indiscriminately together, the father beside the daughter, the brother with the sister, and this is the only nation in which incest is not regarded as disgraceful and criminal.

The literature of the Arikara language is quite brief. They call themselves Sa-nish′ or Ta-nish′, which means "the people," a common form of expression among the Indian tribes, indicating their supposed superiority in their own estimation. Rees, Ricaras, Aricaras, Arickaras, &c., are names which have been given them by the early traders, but their origin is obscure. The first vocabulary of their language, which is quite an extensive and excellent one, was obtained by the Prince Neuwied, in the winter of 1833 and '4. At that time, the Arikaras did not occupy their village on the Missouri, but had removed the year before, far into the prairie country toward the southwest, and were said to live somewhere near the sources of the Platte River. The exact time of their return is not known to me, but it must have been soon after, or rather their absence could not have been more than three or four years. At the time when Catlin visited the Upper Missouri, the Arikaras lived in their dirt village near the mouth of Grand River. In the appendix to his important work on the North American Indians, he has given an excellent though brief vocabulary. No others of importance have been published, so far as I can learn. The following vocabulary, which is more extensive than any ever before obtained, was taken by me from the lips of an Arikara chief, aided by Mr. Andrew Dawson, an intelligent Scotchman, who was superintendent of Fort Clark for many years, and spoke the Arikara language with a good degree of fluency. From the Indian chief I obtained the correct pronunciation, and from Mr. Dawson the true meaning of the words. I therefore publish it in this memoir, with a good degree of confidence in its accuracy.

PHRASES, NUMERALS, ETC.

ti-he-pe′-nu-he, on the tree yonder.
a-ka′-nu-tik-a′-ku, inside the house.
wet-heu′-kut-a, go across the water.
shish-hau′-kut-a, come across the water.
ka-weu′-tre-ha-na′-ni-ku, are you married?
će-kūn-hau-whit′, where are you going?
sku′-hu-ne-sić-aĥ-u, give me a knife.
koh-ti-kut′-ćish, I will be glad.
tut-i-tik′-ūsh, I am strong.
tre-tik′-ūsh, you are strong.
aps-ko′-tik-ōt, he will die.
kōh-he′-kōt, you will die.
kōh-tik-ōt′, I will die.
we-te-ko′-te-hem′, I am dying.
we-tūh-nu′-ba-īk, he speaks bad of me.
na-tu-tēsh′-ha, I am wise.
tash-ha′, you are wise.
ka-kēsh′-ka, you are not wise.
kōh-tēsh′-ka, I will be wise.
koh-ēsh′-ka, you will be wise.
će-kūn′-hau-kre, where have you been?
we-tut-swīn′-heu, it rains hard.
wi-ta′-su, it is raining.
wi-ta′-ha, it is snowing.
shūh-kre′-nit, put some wood on the fire.
tir-aub′-sha, it is smoking.
ta-we′-ris-ta, it is a warm day.
tir-i-wi′-it, it is hot.
tip′-si, it is cold.
wet-ik′-ōt, it is dead.
wet-ster′-it, it is tied.
kak-ster′-it, it is not tied.
shūh-he-re′-pi, } tie it, (imp.)
shūh-ster′-it, }

shūh-o′-tit, kill him.
shūh-tait′, strike him.
ta′-ku-to-tit, I killed him.
we-ta-tūh′-o-tit, I have killed him.
kōh-tik-o′-tit, I will kill him.
wet-a-tuh′-ster-it, I have tied it.
kōh-ster′-it, I will tie it.
ta-tu-te′-rit-ku-nūh, I saw a bear.
ta-tu-te′-ri-ku, I see it.
we′-ta-tu-ter′-it, I have just observed it.
ka-ka-ku′-ter-it, I do not see it.
ćе-ku-na′-rit, where does it stand?
ti-it′-ne-sić, this is a knife.
sa-nish′-ta-ka-a-ka′-nu-tish-ku′-nit, the white man's house is near.
we-ta′-ti-kut′-ćish, I am glad.
we-tre-kut′-ćish, you are glad.
kōh-e-kut′-ćish, you will be glad.
ni-ku′-ta-wi-ku′-su-na′-ka-wa, where the sparrowhawk builds its nest, Square Butte Creek.
wi-sa′-sa-nin′-i, Heart River.
wi-tets-han-sa-nin′-i, Gros Ventres Creek.
wa-hu-tu′-nu, Wind Butte.
sa-ka-nin′-i, our village, the Ree Village.
ka-nu-na-e′-wat, the stone that reveals the news. This rock is seen about two days' journey from the Ree Village, and is considered sacred by the Indians.
ka-nit′, Mandans.
wi-tets′-han, Minnetarees, well-dressed people.
sun-nun′-at, the Dakotas, meaning of the word unknown.
sa-nish′, "the people."

NAMES OF BANDS.

1. sūh-ut′-it, Black Mouths.
2. ho-sūk′-hau-nu, Foolish Dogs.
3. ha-ćе′-pi-ri-i-nu′, Young Dogs.
4. hi′-a, Band of Crees.
5. o-kōs′, Band of Bulls.
6. ka-ka′, Band of Crows.
7. ho-sūk′-hau-nu-ka-ke′-ri-hu, Little Foolish Dogs.
8. pau-shūk′, Band of Cut-throats.

NAMES OF PRINCIPAL MEN OF EACH BAND.

1. su-ta′-ka, The White Shield.
2. sit-hau′-ćе, The one who first rushes on the enemy.
3. ći-na′-ni-tu, The Brother.
4. ćе-re-na′-kut-a, Yellow Wolf.
5. ku-nu-te′-shan, Chief Bear.
6. tūh′-ni-na-ka-ta′-au-u-kut, He who strikes the foe between two fires.
7. ti-ga-ra-nīsh′, He who strikes many.

NUMERALS.

one, ah′-o.
two, pit′-i-ku.
three, ta-whit′.
four, ćе′-tish.
five, she′-hu.
six, sha′-pis.
seven, tup-sha′-pis-wan.
eight, tup-sha′-pis.
nine, nuh-i-ni′-wan.
ten, nuh-i-ni′.
eleven, pit′-i-ku-nūh-i-ni′-wan.
twelve, pit′-ik-ōh′-in-i.
thirteen, na′-ku-git′-a-wan.
fourteen, na-ku′-git.
fifteen, ah′-ko-git′-u.
sixteen, wi-tūć′.
seventeen, wi-tūć′-is-ku′-git.
eighteen, wi-tau′-an.
nineteen, wi-tau′-ah-ko-ka′-ki.
twenty, wi-tau′.
twenty-one, wi-tau′-ah-o.
twenty-two, wi-tau-pit′-i-ku.
twenty-three, wi-tau′-ta-whit′.
twenty-four, wi-tau′-na-ćе′-tish.
twenty-five, wi-tau′-na-she′-hu.
twenty-six, wi-tau′-na-sha′-pis.

twenty-seven, wi-tau′-na-tup-sha′-pis-wan.
twenty-eight, wi-tau′-na-tup-sha′-pis.
twenty-nine, wi-tau′-na-nūh-i-ni′-wan.
thirty, sa-wi′-u.
thirty-one, wi-tau-pit′-i-ku-nūh′-i-ni′-wan.
thirty-two, wi-tau-pit′-ik-ōh′-in-i.
thirty-eight, pit′-i-ku-na-nu-wan′.
thirty-nine, pit′-i-ku-na-nu′-ah-o-ka′-ki.
forty, pit′-i-ku-na-nu′.
forty-one, pit′-i-ku-na-nu′-na-ah′-o.
fifty, pit′-i-ku-na-nu′-na-nūh′-i-na.
fifty-one, pit′-i-ku-na-nu-pit′-i-ku-nūh-i-ni′-wan.
fifty-eight, ta-whit′-ku-na-nu′-wan.
fifty-nine, ta-whit′-ku-na-nu′-ah-o-ka′-ki.
sixty, ta-whit′-ku-na-nu′.
sixty-one, ta-whit′-ku-na-nu′-na-ah′-o.
seventy, ta-whit′-ku-na-nu′-na-nūh′-i-ni.
seventy-eight, će′-tish-ta-nu-wan′.
seventy-nine, će′-tish-ta-nu-ah′-o-ka-ki.
eighty, će′-tish-ta-nu′.
eighty-one, će′-tish-ta-nu′-na-ah′-o.
ninety, će′-tish-ta-nu′-na-nūh′-i-ni.
ninety-eight, shć′-hu-ta-nu-wan′.
ninety-nine, shć′-hu-ta-nu-na-ah′-o-ka-ki.
one hundred, shć′-hu-ta-nu.
one hundred and one, she-hu′-ta-nu′-na-ah′-o.
one hundred and eighteen, sha′-pis-ta-nu-wan′.
one hundred and nineteen, sha′-pis-ta-nu-ah′-o-ka-ki.
one hundred and twenty, sha′-pis-ta-nu.
one hundred and thirty, sha′-pis-ta-nu-nūh′-i-ni.
one hundred and thirty-eight, tup-sha′-pis-wan-a-nu′-wan.
one hundred and thirty-nine, tup-sha′-pis-wan-sa-nish′-ah′-o-ka′-ki.
one hundred and forty, tup-sha′-pis-wan-sa-nish′.
one hundred and fifty, tup-sha′-pis-wan-sa-nish′-nūh′-i-ni.
one hundred and fifty-eight, tup-sha′-pis-ta-nu-wan′.
one hundred and fifty-nine, tup-sha′-pis-ta-nu′-ah-o-ka′-ki.
one hundred and sixty, tup-sha′-pis-sa-nish′, or, ta-nu′.
one hundred and seventy, tup-sha′-pis-ta-nu′-na-nūh′-i-ni.
one hundred and seventy-eight, nūh′-i-ni-wan′-na-nu-wan′.
one hundred and seventy-nine, nūh′-i-ni-wan′-sa-nish′-na-ah-o-ka′-ki.
one hundred and eighty, nūh′-i-ni-wan′-sa-nish′.
one hundred and ninety, nūh′-i-ni-wan′-sa-nish′-na-nūh′-i-ni.
one hundred and ninety-eight, nūh′-i-ni-na-nu-wan′.
one hundred and ninety-nine, nūh′-i-ni-na-nu′-ah-o-ka′-ki.
two hundred, nūh′-i-ni-na-nu′, or, sa-nish′.
three hundred, ah-o-git′-u-sa-nish′.
four hundred, wi-tau′-sa-nish′.
five hundred, wi-tau′-na-shć′-hu-sa-nish′.
six hundred, sa-wi′-u-sa-nish′.
seven hundred, wi-tau′-ah-o-git′-u-sa-nish′.
eight hundred, pit′-i-ku-na-nu′-sa-nish′.
nine hundred, pit′-i-ku-na-nu′-na-shć′-hu-sa-nish′.
one thousand, pit′-i-ku-na-nu-na-nūh′-i-ni-sa-nish′.

VOCABULARY OF THE ARI′KARA DIALECT OF THE PAWNEE LANGUAGE.

A.

above, as′-kut.
as-kut′-nu-hc, far above, in the sky.
afar, ći′-stit, afar off, away.
alive, tit-ćit-ćit′.
all, git′-u, all, the whole.
wc-ku-tu′-ut, all the time, always.
ankle, in-c-sa-wi′-o.
antelope, na-nu-nać′.
ant, pit′-a-ru.
arm, wi′-nu.
arrow, ni-shu′.
ash, ćin-i-na′-ku.
autumn, nis-kūh′.
awl, tūh′-ni, an awl.
axe, ka-ta-rūć.

B.

back, sta′-ku.
bad, ka-ku′-na-he′.
bark, na-sku′-hu.
bead, ći′-nish.
ći′-nish-ai-re-push′, small beads.
ći′-nish-ta-ka′-ta, yellow beads.
ći′-nish-ka-tik′, black beads.
bean, at′-it.
at′-it-hu-na′-nūn.
bear, ku-nūh′.
ku-nūh′-ta-ka, white bear.
ku-nūh′-a-tik, black bear.
beard, a-ra′-nu-hu′.
beaver, git-ūh′.
belt, sah-se′-ish, a leathern belt.
bird, niks.
he-rūs′, a snow-bird. *Junco hyemalis.*
black, ti-ka-tik′.
bladder, kah-ći′-ra-nu.
blanket, nau-wi′-nu.
nauh-ta′-ka, gray or white blanket.
nauh-ta′-ka-re-hu′, blue blanket.
nauh-ta′-ka-ka-tik′, black blanket.
nauh-ta′-ka-pa, a red blanket.
blood, pa′-tu.
blue, tit-e-re′-ūh.
boat, na-ko-hōn′.
na-ko-hōn′-ska-ruć, a skin boat.
na-kūh-wa′-na-kūh, steamboat, roaring boat.
ku′-su, a large boat.
nać, a wooden boat.
ćer′-i-pasć, a small boat.
body, tan-ith′-tan.
bone, ći′-shu.
bow, na′-ć.
box, ha′-ku.
boy, mi-nūh′-ć′.
bread, iz-et′-ta-ta-ish′-u, hard bread.
breast, wa′-ku-ka′-u.
bridle, a-ka′-ra-ka′-ra-ku.
brother, a-ti′-tat, a brother.
i-na′-ni, big brother.
shi-na′-ta-ni, my brother.
na-ra-nit′-ish-u, elder brother.
ka-wi′-ta, younger brother.
brush, wa-pe′-i-sūs, a brush for clothes.
buffalo, ta′-na-ha.
ći-wi′-e-ku, a male buffalo.
wa-tash′, a female or cow,
burning, wet-wheu′*-ni-wit.
burn, t′wheu′-it, to burn.

C.

calf, ha-nit′.
ha-ni′-pat, a red calf.
cap, su-na-we′-wa.
chief, ne-sha′-nu.
child, pi′-ra-o.
pi-re-ha′-re, a young child, a year old, or more.
pi-re-ćip′-e-ri, a new-born child.
cloth, na-wi′-nu.
na-wi-na′-wish, strouding, or blue cloth.
ka-ni′-u-ka-bi′-u, a breecheloth.
club, na-kuh′-sin-it-i-wa′-ru, a war-club.
coal, a-ni′-tu-a, a coal of fire.
coat, u-ka′-wić.
u-ka′-wić-ti-pas′ć′, a shirt, thin coat.
coffee, ska-tit′.
cold, tip′-si.
cord, hat-se′-i-shu, a string or cord.
corn, ne-ći′-i-shu.
cow, wa-tash′.
ta-na-ha′-ta-ka, white man's cow.
crow, ka′-ka. *Corvus.*
crying, ti-ći′-kut.

D.

darkness, tik-a-tis′-tit.
daughter, su-nać′-ku-ta′-ti, my daughter, or the girl belonging to me.
su-nać′-kut'h-ra, your daughter, or the girl belonging to you.
su-nać′, a girl.
day, sha-ker′-i-ćish′-kut.
sha-u′-nu-ker′-i-kut, midday.
wait-hi′-i-sha, daydawn.
shak′-u-git′-u, all the day.

* Pronounced like whew.

dead, tik′-aut.
deer, nu-nać′.
ta′-pat, red deer.
a-rik′-a-ra′-nu, a male deer.
ta-ka-tit′, black-tailed deer.
did, ta-tūh′-na, I did it.
dish, tūh-éi′-ka, a cup or dish.
disposition, wi-su-tūh′-ni, a good heart, a good disposition.
dog, hané.
ha-ta′-ka, a white dog.
ha-kūn′-hauf, an old dog.
ha-sūh′-tit, an old, female dog.
door, ne-kub′-i, and ne-ka-wi′-o.
dove, wać. *Zenaïdura Carolinensis.*
dress, ah-ku′-ku, head-dress.
drink, wi-tut′-ska-ni′-is, } to drink.
éi-ka′-hu, }

E.

eagle, pi-ać′, gray eagle.
ne-tuk′-us, war eagle.
ar-ēt′, bald eagle.
ear, at-éi′-ish-u, and a-tik-a′-nu.
earth, hu-na′-nu, ground, earth.
eat, ti-wa′-wa-a, to eat.
egg, ni-pi′-ku.
elk, na.
wa-o-kōs′, a male elk.
wa-wa′-tash, a female elk.
wa-ha′-nić, a calf elk.
enemy, pa′-tu, and hish.
eye, éi-ri′-ku, and her-i-i′-ku.
her-i-nu-nan′, sore eyes.

F.

face, ka′-u.
fat, hić.
father, at-i-uh′, my father.
ha-uh′, your father.
i-uh′-tik, his father.
at-i-uh-wa-ruh-te, my medicine father, the Great Spirit.
feather, he′-tu.
few, sah′sh, a few.
finger, séi′-shu.
shu-wi′-tu, finger-nails.
fire, ti-kai′-it, and ha-ni′-tu.
fish, gi-wać′.
han-we-ru′-kut-ōh, flatfish.
gi-wa-nan′-shish-u, catfish.
hish, a pike.
flint, ne-sit′-a-nu.
flower, pa-kīsh′.
fly, sup-i-na′-nu.
foolish, ti-sa′-ko, foolish, crazy, a lewd woman.
foot, ah′-u.
forest, tu′-hu-na′-će.
forever, ti-ra′-nauć.
fort, na-wi′-u, a fort.
fowl, nuks-éi′-re-kūc′.
fox, gi-wa-ku′, a gray fox.
gi-wa-ku′-ku-sū, a large fox.
friend, si-nun′.

G.

girl, su-nuh′é′.
good, tūh′-ne.
nūn-hi-nan-tūh′-ni, beyond good, better.
tūh-ni-nūn′-hi-nan-git′-u, good beyond all, best.
tūh′-ni-su-shu′-hin-i, good among inferior objects, used only in comparison.
ka-kūh′-ne, not good, bad.
goose, ko′-ut, so named from its cry.
grass, kut-a′-nu.
grease, éiz′-hić, marrow grease.
great, ti′-er-wheu.
green, ti-ta-re-hu′, green or blue.
ground, tūh-na-nin′-e, plain or smooth ground.
hu-na-nin′-e, in the ground.
gun, na′-ku.
na-ku′-ti-pa′-kūt, an old gun.
e-na′-ta-ra′, a double-barrelled gun.
ka-wi′-u, a gun-flint.

H.

hail, kat.
hair, o-hu′, and pah′-tis-kūn.

pah'-ta-ka-ta, yellow hair.

hand, ish'-u, and sha-na'-ku.
ska-tus'-u, inside the hand.

hare, wa-rūh'. *Lepus campestris.*
nis. *Lepus artemisia.*

hawk, ćin'-it, a small hawk.

hay, ha-ta'-nu, dried grass.

head, pa-hu'.
ći-ni'-tu, back of the head.
ti-ku-pah'-tau, headache.

heart, wi'-su.

heel, ah-a-ći'-ne-tu.

hen, ūt, prairie hen. *Pedioecetes phasianellus.*
ūt-ka-wit', sage hen. *Centrocercus urophasianus.*

hill, wa-u', a mountain.
wa-hin'-i, a hill.
wa-kut'-e-buh, a place called Cut Butte.
kut'-e-buh, cut off.

hog, ku-kūh', pork, hog.

horse, ha-wa-rūht'.
ha-ći-za-wet'-a, a white horse.
ha'-wa-rūh-te, medicine dog, horse.

hot, ta-ba-ris'-ta.

house, a-ka'-nu, and a-ka-nūh'-ner.

husband, nah-tuk-u'.
ni-kōh-tuk'-u, my husband.
te-na-ta'-ku, your husband.

I.

I, na'-tu, I, me.

ice, nah'-e-tu.

insect, pi-rūh'.

iron, waps'-ish-u.
waps'-ips-wat, red iron, copper.

island, a-wa'-u.

K.

kettle, ko-shap-shi'-shu.

knee, pa-ći'-shu, and na-hu'-na-ći'-shu.

knife, ne-sić'.

L.

lake, ib-wha'-nu.

land, tūh-na-nin'-i, fine land, fine country.
git-u'-hu-na-nin'-i, the whole land.

lariat, ha-wi'-shi.

laugh, te-bah'-u.

lead, nish-ći-su.

leaf, na'-ga-ru'-ku.

leg, ka-hu'.

leggins, no-ko'-kić.
nauh-ta'-ka-pa-o-ko'-kić, red blanket leggins.

light, tits-er'-i-ćish.

lightning, ti-wa-waps'.

limb, nut-ći'-ta-wi-u, a limb or branch.

little, ka-ki-ra'-ni-hu, not much, little.

liver, ka-ri'-ku.

lizard, st'ćer'-ut.

lodge, te-ka'-ni-hu.
a-ka-pa'-tu, skin lodge, or an enemy's lodge.

love, te-sish'-ta, to love.

M.

man, ter'-i, and wi'-ta.
sa-nish', a man, a people.
sa-nish-ta'-ka, a white man.
ti-ger'-ish, a weak man.
te-tir'-a-ćish, a strong man or animal.
ne-sha'-nu-nau-ćish'-u, a great man.
wi-te-shūć, a young unmarried man.
kūn'-hauf, an old man.

many, ter-heu'.
ta-ra-ni-hu', a great many, a heap.

marsh, tūh'-nu-nan'-ai-i-wun'-u, a bog or marsh.

me, na'-tu.

meat, sus'ć, ćash'ć, } fresh meat.
ta-kah'ć', dried meat.

mine, ku'-ta-te.

mirror, na-nu'-ka-te'-ris-ku.

mist, speu.

mink, e-rūh'.

moccasin, hanć.

moon, pah.

morning, hin-uh'-tit.

mother, at-na', my mother.
hah, your mother.

shūh′-te, his mother.

mouth, ka-ka′-u.

a-ka′-ra-nūh, hairy mouth.

mud, ho-rūh′-tu.

t′wheu′-rūt, muddy.

muskrat, git-uk-a.

N.

nail, shi-ni′-tu, also the claws of an animal.

navel, nis-ka-ku′-hu.

near, tish-ku′-nit, near by, not far off.

nan-shu′-tish-ku′-nit, very near.

tish-ku′-nit-nuh′-in-i, near ten, or about ten.

neck, na-ti′-nu, and sen-a′-nu.

night, hi-nūh′, and nut-ik′-a-nu.

no, ka-ki′.

nose, si-ni′-tu.

O.

oak, ska-nūh′.

off, ćis-tit′, far off.

old, ti-pa′-kūt.

one, o-pi-nu′-te, the other one.

a-re-isht′, either one you like.

ti-će-nu′-tu, which one is it?

otter, get-a′-put.

owl, p′hau′-ru.

P.

paddle, wi-er-ha′-ku.

part, heué.

penknife, ći-rak′.

people, sa′-nish, people.

san-ish-ta-ka, white people.

git-u-san′-sta-ka, the whole people.

pepper, a-kat′-i-tić.

perhaps, ći-ra′-to.

pine, na-hi′-shu, pine, pine wood.

nué-e-ish′-u, a pine tree.

pipe, na-wis′-kōć.

polecat, ni-bit′.

potato, is-ku′-su.

powder, hit-i-ka′-nu.

R.

rain, ta-su′.

we-ta′-tu, it rains.

ramrod, nué.

red, ti-pa′-at, and pa′-at.

river, u-sa′-nu, and hu-ka-ha-nu′.

ka-to-hu′-ni, a small river, a branch.

road, a-ta-nu′, a road or trail.

robe, sa-ūć, a buffalo-robe.

rock, kau′-i-ta-wi′-ut.

rotten, tih′-o-ut.

run, shu-nūh′ (imp.), run.

S.

saddle, na-ni′-ći-tan-i.

salt, ka′-it.

scalp, pah′-sku-hu.

ha-wah′-ka-wi, scalp-lock.

seat, ka-tuks′, and shūh′-wi-ta.

see, ti-re-wat′, to see.

net-i-re′-wat, seeing.

sheep, a-rić′-in-is.

shirt, o-kau-ić′.

shoe, hauh′-e-shu, a leather shoe.

shot-pouch, par-e-tak′-u-hu.

shoulder, ska′-nish.

ha-ha′-re-shu, shoulder-blade, or hoe, so called because the shoulder-blade of a buffalo was formerly used as a hoe.

silver, waps-ips-tap′-er-wheu.

sinew, ah′-a-su.

sister, i-ta′-ni, his sister.

a-ti′-tat, my sister.

skin, ska-ūć′.

wa-rūh′-tu, a dressed skin.

sky, ska-a-kat′-ha-wu.

sleep, to-kris-ći′-pi, to sleep.

small, ka-ker′-wheu.

small-pox, sći-ri-ći′-shi-wa-ta.

smoke, ni-wi′-shu.

snake, nūt.

snow, hu-na′-u.

we-ta′-ha, it snows.

son, na-ti-na′-hu, my son.

na-hi-na′-hu, your son.
ni-ha′-o, his son.

sour, ka-kōh′-ta-ne, not sweet.
spear, hu-nūh′.
spirit, ći-ci′-tu.
spring, ish-cip′-it.
ne-ka′, spring, fountain.
squash, wa-hauh′.
star, sa′-ka.
o-per′-i-ku-su, a collection of stars, constellation.
stirrup, ha-ka-ta-tau′.
stomach, wa-ku′-kre-ni, and ni-ku′-ci-shu.
stone, kas-nic′, a stone, rock.
stream, sa-nin′-i, a stream or creek.
strong, tik-hash′.
ka-ke-hash′, weak, not strong.
sugar, ka-e′-na-ka-ta.
summer, ha-wi-rit′-i-kut.
sun, sha-ku′-nu.
sunset, nit-suk′-o-nish.
swan, sha′-tu.
sweet, tūh′-ta-ne.

T.

thigh, ka-taks′.
thin, ti-pas′ć′.
thou, na-hu′.
thunder, wa-rūh′-te.
toad, sku-na′-ka-ku.
tobacco, na-kush′-ka-nu.
to-day, ti-wen-sa′-ker-ić.
toe, ah-ći′-shu.
tongue, ha-tu′.
tooth, a-nu′.
true, t'ha′-pe.
ti-wać′, it is true, it is so.
turkey, nu.
turtle, sah.

U.

ugly, pir-a-nin′-o-ći.

V.

valley, ta-wat-e-ru′-hu-nu.
vein, pa-te′-hu, a road for the blood.
village, i-tu′-nu.

W.

warrior, nu-ti-wun′-u-hu, one who goes to war.
water, sto′-hu.
t'ćin-wheu, big water, sea.
ka-kūh′-p'si, bad water.
weather, ta-wi′-ris-tu, a fine day, fine weather.
what? ti-će′-nu, what is it?
ti-će′-nu-wi′-ta, what man or person?
ta-će′-nu, who, or which one?
where? ću-hu-ni-he′, where is it?
whip, pin-hu′, a small riding whip.
whiskey, ći-sin′-ah.
white, ta′-ka, and ći-sha′-wa-ta.
whole, ći-tu′, the whole of anything.
wife, na-ti-na′-ta-ku, and ta-wi′-ni.
wind, t'wheut, and hu-tu′-nu.
t'wheut′-a-her′-heu, a strong wind.
windpipe, pah-ni′-shu, and o-ka-kūh′.
winter, p'si-kut′.
within, o-ki′-i-kut.
without, o-wat′-ik-ut.
wolf, sti-ćer′-ić.
ći-wa′-ku, a small wolf.
pa-kać′, medicine wolf.
pa-kać′-ti, it is a prairie wolf.
woman, sa-put′.
ta-će′-nu-sa-put′, what woman?
sūh′-tit, an old woman.
su-nah′, a young, unmarried woman.
wood, nuć.
na′-kūn, logs or drift-wood.

Y.

year, ti′-kut-i′-a-nu, the whole year.
yellow, ti-ra-kut′-a.
yes, an, and ni-ku′-ti.
yesterday, ti-su′-sa-ker-ić.
you, na′-hu.
young, tit-ćip′-er-i.

DAKOTA GROUP, D.

CHAPTER XIV.

VIII. Dakotas.

ETHNOGRAPHICAL HISTORY.

The country claimed by the Great Sioux or Dakota nation, prior to the organization of the Territories of Nebraska, Dakota, and Minnesota, was very extensive. Commencing on the northeastern limit at Lac qui Parle, an imaginary line would run in a northwest direction, taking in Lac du Diable, thence inclining south by west, including Turtle Mountain and the head of Pembina River, would strike the Missouri River at the mouth of Apple River, below the Gros Ventres village. Crossing the Missouri, it would proceed up the Grand River of the Arikaras (or even some distance west of this river), bearing west by south until reaching near the head of Powder River. From this point it would continue along the range of mountains called the Black Hills in a southern direction, until reaching Fort Laramie on the Platte, thence down that river for some distance, afterwards extending east to the junction of the Niobrara with the Missouri River, thence down that stream to the mouth of Big Sioux River, this being the boundary line to which their claims had been extinguished by the United States. Proceeding along the Big Sioux River inclining northeast, taking in the Vermilion and James Rivers, their lands would terminate by a junction with the starting-point at Lac qui Parle. Within a few years, the United States Government has purchased of the Indians much of the territory comprised within the above limits.

That portion of their lands east and north of the Missouri is quite sterile, and with the exception of some coulées and hills, formed by the rivers and creeks, presents a most monotonous prairie, many hundred miles in length and breadth, very level, and devoid of trees, or even shrubs. The soil is loose and sandy, grass rather thin, and in no great variety, that known as the short, curly, buffalo grass being the most abundant. In former times, this was the great range for the buffalo, but of late years, they are found in greater numbers west of the Missouri. The soil is generally too dry for agricultural purposes, except along the borders of streams, where it is for the most part quite fertile. In some parts where the vegetation is luxuriant, the grass is very nutritious, and would, in common with most of the Northwest Territory, afford good grazing for horses, horned cattle, and sheep. Small lakes are to be met with in this region, from which the Indians get their supply of water when travelling across the prairies, which they do not attempt to do except in the summer and autumn, when the "buffalo chips" answer the purpose of fuel. The terrible snow-storms that sweep over these plains in the winter, compel them to place

their camps along the rivers where timber is to be found. Along the Coteau de Prairie, or dividing ridge between the waters of Iowa and Missouri, near the source of James River, is found the celebrated Red Pipestone Quarry, to which the Indians pay yearly visits, to procure materials from which to make their pipes. This material is found in no other portion of their country, and is considered by them of great value.

The surface of the country west and south of the Missouri River, is more rolling and diversified, on account of the large streams that course their way through it. The principal rivers on that side of the Missouri are Niobrara, White, Medicine, Teton, Big Shyenne, Moreau, Cannon-ball, Heart, and Grand Rivers. Most of these streams have been navigated by the traders with skin boats during the spring thaws. They are well timbered along their banks, the trees growing in large groves or points, frequently reaching from one bluff to the other, the whole width of the valley. The largest and most common trees are the cottonwood, elm, and ash, though others of smaller growth are found. Though there are many tributaries to the rivers named, running through the interior, most of them are short, and only convey the water produced by rain or snow to the parent stream. These are termed by the traders and voyageurs coulées, seldom extending more than from one to three miles in length, and usually covered with various bushes, small trees, grass, and weeds. Between rivers, and beyond the heads of the coulées or dry valleys, are large tracts of table land, from ten to fifty miles in breadth, on which no timber is seen, but where the spontaneous grasses are very thick, and of excellent quality. It is in such spots as these that the buffalo delight to remain undisturbed, quietly cropping the choice blades in happy ignorance of the hordes of hunters roving through the country. Springs impregnated with saline substances are often met with, and the water is drank with eagerness by these animals. The most fertile region, however, and the one approaching nearest to a habitable district, is on the head waters of the Shyenne and Moreau Rivers, commencing at the eastern base of the Black Hills, and running northeast for the distance of sixty or eighty miles. The prairies here are undulating, well wooded, well watered, and present much varied, beautiful, and enlivening scenery to the eye of the traveller. Indeed, with but the exception of that portion of the Dakota lands situated west of the "Mauvaises Terres" or "Bad Lands," on the source of White River, the rest cannot be regarded as an entirely barren district, though to what extent grain could be produced has not been determined.

Many fabulous stories in regard to the Black Hills are related by the Indians, and are believed by them even to this day. They say that rumbling noises, like the sound of distant thunder, are not infrequent, and one of the principal peaks is called by them the Hill of Thunder. In 1833 they supposed it to be on fire, and on almost any clear day they say large volumes of smoke could be seen, which they regarded as the breathing of the great

white man buried beneath. Unnatural noises are said to be heard, which, whether originating in their fancy, or caused by wild beasts, are thought to be the moans of the great white giant when pressed upon by rocks, as a punishment for being the first aggressor on their territory. They say that he issues forth occasionally, and his tracks seen in the snow are twenty feet in length. He is condemned to perpetual incarceration under the mountain as an example to all white men to leave the Indians in quiet possession of their hunting grounds. This story, though fabulous, shows their ancient and intense repugnance to the encroachments of other and distinct races.

Southeast of the Black Hills is a large area of country known as the "Mauvaises Terres," or "Bad Lands," which is very remarkable for its unique scenery and the organic remains entombed in its strata. The portion of country to which this name has been especially applied is about one hundred and fifty miles in length, and sixty miles in width. There are many other portions of the Northwest to which this term is applicable, but no other area so large possesses this uniform character. It is hardly possible to describe this singular country. Along White River, for sixty miles in length and fifteen to twenty in breadth, the country presents the appearance in the distance of one vast city, and but little imagination is required to see immense public edifices, towers, churches, &c., with people on their summits. What tends to make the illusion more perfect, is that the mountain sheep (*Ovis montana*), sometimes alone and sometimes in small bands, are seen on the tops of these towers, several hundred feet high, and entirely inaccessible to the approach of man. Here they remain in security, rolling their large horns from side to side, and casting suspicious glances at the traveller below. It is somewhat strange that this animal should prefer the most rugged and inaccessible places where scarcely a spear of grass is seen, and no shrubs but here and there a solitary bunch of stinted sage. A few small grassy spots, like oases, are found in this region low down at the base of these lofty ridges and towers, to which the mountain sheep descend early in the morning to feed. Although the absence of vegetation in their favorite places of resort would induce the belief that they fared badly, yet when killed they are invariably fat, and the meat is superior even to that of our domestic sheep. The Indians prize it next to the meat of the buffalo. The road from Fort Pierre across the country to Fort Laramie runs directly through this region, and is the only road that can be travelled with safety with carts or wagons. In the spring of 1855, the writer passed up the valley of White River with carts, but scarcely a day passed that they were not upset, and their contents more or less injured. Water is very scarce, though a few springs and small streams occur, and these are of great importance to the Indian as he winds his devious way through this region. But the objects of the greatest interest to the scientific man, and curiosity to the Indian and voyageur, are the organic remains which abound here. They consist for the most

part of the remains of vertebrata, which have been described by Prof. Joseph Leidy in the Proceedings of the Academy of Natural Sciences, Philadelphia. They all belong to extinct species, representing with a good degree of completeness the mammalian Fauna of a district. All the remains of Turtles appear to belong to a single species, but the individuals are very numerous and of large size, some of which were estimated to weigh from five hundred to one thousand pounds. The materials of which the rocks are composed are light-colored clay, grits, and marls, more or less indurated, and worn into these fantastic shapes by atmospheric agencies. The presence of land and fresh-water shells, and the absence of all indications of marine origin, show this region to have been a vast inland lake some time during the Miocene Tertiary period. For some distance up the White River Valley from its mouth, the country is very fine, and clothed with an excellent growth of vegetation, but towards its source for two or three days' march the sandy desert prevails, and travelling is very difficult. Passing across the country to the Niobrara, toward the Platte, the prairie assumes its usual character, and travelling is much better; and though much of that region is occupied by patches of bad lands and denuded places, still the greater portion is clothed with good grass, and has a cheerful appearance. Along the Platte, Loup Fork, and portions of the Niobrara, are the Sand Hills, a large area of not less than twenty thousand square miles, composed of loose sand, which has been thrown up into hills and ridges fifty to two hundred feet in height by the wind. The material is derived from the eroded portions of the more recent Tertiary beds in this region, and as the winds are mostly from the west and northwest, this loose sand is slowly moving onward toward the east and southeast. Though totally unfit for agricultural purposes, this tract of country cannot be said to be destitute of vegetation. In the valleys and depressions among the hills are many fine spots of grass, and sometimes the hills are covered with varieties of grass adapted to so meagre a soil. The soap plant, *Yucca angustifolia*, grows here very abundantly, and sending its roots deep into these sandy hills, protects them from being diminished by the winds. The sand plum, *Prunus pumila*, grows very abundantly all through the Sand Hills, and supplies an astringent but not unpalatable fruit. On the head of Loup Fork, and between that stream and the Niobrara at various localities, are numerous saline and fresh-water lakes. The fresh-water lakes contain a great profusion of various species of water-plants and their peculiar animal life, while those that are impregnated with saline matter present the appearance of desolation, no vegetation growing in their vicinity except a few weeds adapted to a saline soil. In former years these Sand Hills were a famous resort for the buffalo, and even at this time a few may be found, but they have been for the most part driven away by the Indians to other and less frequented parts.

Among the many objects which come under the observation of the traveller in the Dakota country, none are of more interest than the numerous villages of the prairie dog,

scattered all over the dry and gravelly plains. Sometimes they are situated upon the high terraces along the rivers, but generally they are upon the high, arid plains, many miles from water. A good deal of a fabulous character has been written in regard to the habits and habitations of this little animal. Some have even observed a council-house in the centre of the village, which is supposed to be laid out in regular streets, reserving a public square for meetings and discussions for the general good of the community. Others have imagined a particular large sleek dog to be the chief, and contend that they have seen him receive visits and apparently give directions to many of the citizens, who, after receiving the same, departed to give others an opportunity to state their requests. With a zeal for knowledge, and a perseverance in labor, truly creditable in many respects, attempts have been made to dig to the bottom of their subterranean abodes, as well as to drown them out, but most of these experiments have resulted in failure. It does not occur to the laborious hunters that the dog can dig as well as they, and that if their holes are so constructed as not to be affected by the heavy rains that fall on the level places, where their villages are always situated, they would not be likely to be disturbed by a few pails of water. The truth is, the animal does not dig deep, seldom more than four or five feet, but penetrates the earth in a horizontal direction. It lays up no stock of provisions for the winter, but lives on the roots of grass, which it reaches by digging up toward the surface when the ground is covered with snow. This explains their extensive burrowing in different directions, seeking support, and crossing each other's routes in many places, leading persons to suppose their different chambers are thus connected for convenience, to associate and talk over their national and domestic affairs during the long winter evenings. The uncertainty of success in digging them out is thus seen, and a man might continue his excavations for miles without securing the inhabitant. The dog must have food, and having but little hair upon his body cannot endure the cold on the surface, therefore he finds his food below it in winter, and in his subterranean travels comes across others of his village friends engaged in the same pursuit. In this manner they destroy in the course of time all the vegetation in their immediate vicinity, and are obliged to remove to some other locality, and abandon their holes to the owls and rattlesnakes.

Crossing the Dakota country through the middle portion south and west of the Missouri, from the Niobrara to Grand River, the prairies, though occasionally twenty to fifty miles in breadth, cannot come under the head of level plains like the district on the opposite side. The distance is not great between the rivers on the west side. Although their junctions with the Missouri are widely separated, yet their sources all occur near each other, as they take their rise in and near the Black Hills. In travelling across this portion of the country in a transverse direction, a man on foot is seldom obliged to camp without wood or water, the heads of the valleys or ravines of one watercourse extending to within a distance from five to forty miles of the tributaries of another.

Springs and small groves of trees frequently occur in the intervening prairie, and good encampments can usually be found by any one familiar with the geography of the country throughout the length and breadth of the interior. In the winter, however, it happens that persons are frozen to death in crossing these prairies; for when storms occur it is often impossible to travel, the sun is invisible, and all objects are hidden at the distance of from fifty to one hundred paces by the particles of snow that are whirled through the air by the wind. This is called by the Canadian voyageurs *pouderie*, and when occurring in extreme cold weather, leaves but two alternatives to the traveller,—to ramble on at hazard, in the hope of keeping himself warm by walking and stumbling on timber, or to lie down and let the snow blow over him, remaining in this temporary grave until the atmosphere becomes clear, and his course can be determined by the sun or stars. Both of these methods are often resorted to by the Indians and traders when caught in snow-storms, where timber is not at hand, and sometimes success and sometimes failure attends their efforts.

The three streams, Shyenne, Moreau, and Grand Rivers, approach so near each other that there is no broad stretch of level prairie between them. As we proceed west, the surface becomes more broken and intersected by valleys, which are clothed with excellent grass. In all the small streams beaver are very abundant. Grand River has the largest valley, is best wooded, and best stocked with game. Buffalo are found along this river when there are none in the country around. Elk rove in large bands through the wooded bottoms, and antelope are abundant upon the grass-covered hills. Many deer, both white- and black-tailed, are found in the valleys of the little tributaries.

The fruits and succulent roots indigenous to this region are few but quite palatable, and form no small item in the bill of fare of the Indian in times of scarcity. The prairie turnip, *Psoralea esculenta*, ti'-psi-na of the Dakotas, *Pomme blanche* of the voyageurs, is found everywhere on the high prairies. It may be eaten raw or boiled, and is collected in large quantities and dried by the Indians for winter use. It is quite farinaceous, and when dried and pulverized makes a very good substitute for flour, and in any form it will sustain life for several months without the assistance of animal food. This root is also the favorite food of the grizzly bear.

The wild artichoke, *Helianthus tuberosus*, pan'-ći, grows in great abundance along the marshy banks of the rivers. It is roasted or boiled, but often eaten uncooked.

Dakota peas, *Apios tuberosa*, ōm-a-ni'-ća, grow very abundantly in the rich valleys of the streams. This plant has a vinelike top, and the tuberous roots form the edible portion. In the fall of the year large quantities of these tubers are collected by a species of field-mouse for its winter store, which is in turn robbed by the Indian squaws, who often secure half a bushel from a single nest. They are boiled with dried buffalo-meat, and the

writer can testify from personal experience that they make a most palatable dish to the hungry traveller.

The plum, *Prunus Americana*, kun'-ta of the Dakotas, grows very abundantly along the Niobrara and White Rivers. The fruit is ripened usually in October, and is much sought after by the Indians.

The choke-cherry, *Prunus Virginiana*, ćaŋ'-pa, and the bullberry, *grain de bœuf* of the voyageurs, mash-tin'-pu-ta of the Dakotas, grow in the greatest quantities all over the country. These fruits, with the plums, form, in their season, the principal food of the bears and wolves. Both of these fruits are dried, the former pounded with the seed and cooked in various ways, sometimes made into soup, but more often mixed with dried buffalo-meat and marrow-grease. This is called pemican among the voyageurs, and is very convenient in travelling, on account of its nutritious and concentrated character. The *grain de bœuf* is a small red berry, with an acid taste, and when dried is often made into soup, or takes the place of cherries in the composition of pemican.

A few service-berries, *Amelanchier Canadensis*, and here and there a patch of wild strawberries, are found, but not in sufficient quantity to be relied upon as a means of support. The Indians are very fond of fruit of any kind, and seem to prefer that grown and preserved in their own country to the dried fruits introduced from the States by the traders. It is impossible, except from actual observation, to form an idea of the immense quantities of cherries and other kinds of fruit eaten by them in their season, and these, with certain edible roots, constitute a most important resource to a people dependent upon the chase for their subsistence. They can be easily preserved, packed, and conveyed from point to point, and they are of special service to their children when meat is not to be obtained. The fruits of the wild rose, which are very plenty and remain on the bush during the winter, are eaten both raw and boiled, but are quite indigestible, as are also the red thorn-apples, called tas'-pan by the Dakotas.

Some of the dishes prepared by the Indians in the yet undeveloped condition of their culinary science are not enticing even to the eye of the hungry traveller, and are by no means adapted to delicate stomachs or fastidious palates. In this class may be placed a favorite dish of theirs, made of blood boiled with brains, rosebuds,* and the scrapings of rawhide, until the whole assumes the consistency of warm glue. Pounded cherries boiled with meat, sugar, and grease, are esteemed a rare dainty, and are eaten with great relish. The prairie turnip boiled with the dried stomach of the buffalo, or the Dakota peas abstracted from a mouse's nest and cooked with dried beaver's tail or a fat dog, are dishes much admired and regarded fit to set before soldiers, chiefs, and distinguished visitors.

A great variety of roots, leaves, barks, and plants are used by these Indians, in common

* The seed-vessels of the Rose, which remain on the bushes during the winter, and often supply a scanty nourishment to the famishing voyageur, are called by the Indians and traders "rose-buds."

with other nations on the Upper Missouri, for medical purposes, the principal of which, together with their manner of application, will be alluded to elsewhere.

The animals inhabiting the Dakota country, and hunted more or less by them for clothing, food, or for the purposes of barter, are buffalo, elk, black- and white-tailed deer, bighorn, antelope, wolves of several kinds, red and gray foxes, a few beaver and otter, grizzly bear, badger, skunk, porcupine, rabbits, muskrats, and a few panthers in the mountainous parts. Of all those just mentioned the buffalo is most numerous and most necessary to their support. Every part of this animal is eaten by the Indians except the horns, hoofs, and hair, even the skin being made to sustain life in times of great scarcity. The skin is used to make their lodges and clothes, the sinews for bowstrings, the horns to contain powder, and the bones are wrought into various domestic implements, or pounded up and boiled to extract the fatty matter. In the proper season, from the beginning of October until the 1st of March, the skins are dressed with the hair remaining on them, and are either worn by themselves or exchanged with the traders.

In the year 1833, that part of the Dakota nation residing on the Missouri and its tributaries, and trading there, was divided as follows:

Titonwan-Dakotas.	Se-ćang'-ćos, Brulees, Burnt-Thighs,	500 lodges.
	O-ga-la'-las,	300 "
	Min-ne-kan'-zu, those who plant by the water,	260 "
	Si-ha-sa'-pas, Blackfeet-Dakotas,	220 "
	Wo-he-nōm'-pa, Two-Kettle-Dakotas,	100 "
	Hunk'-pa-pas,	150 "
	I-ta'-zip-ćo, *Sunsarcs*, Without-Bows,	100 "
Yancton-Dakotas	Lower-Yanctons,	300 "
	Pa-bak'-sa, Tête-Coupées, Cut-Heads,	250 "
	Wa-ge'-ku-te, Gens des Pin, the Pine-Band,	100 "
	Band, name not obtained.	50 "
	I-san'-tis,	30 "

These 2360 lodges, averaging five souls to a lodge, would make a total of 11,800 souls. The above estimate may be relied upon as correct at that time. The nomadic Dakotas have slowly but steadily increased in numbers since that time, and in 1857, Lieut. Warren estimated that the same bands mentioned above numbered 3000 lodges and 24,000 souls. From various causes, as the introduction of contagious diseases, and other calamities, some of the bands have diminished in numbers, while others have greatly increased, and it is believed that at the present time the Missouri Dakotas are in the aggregate more numerous than at any former period.

These bands at that time (1833), occupied separate districts, though they could if they chose, hunt unmolested by each other, in any portion of the common territory. But being generally intermarried, and connected by societies of dances and clans, they usually

preferred locating at a distance from each other, that their hunts might be better carried on, and their domestic arrangements and tribal government conducted by the chiefs and soldiers appointed to these positions by the general consent of each band. When two camps are joined, each having its own head, opinions and interests clash, quarrels follow, and separation, with angry feelings toward each other is the result, often extending to the stealing of each other's horses. But by each band confining its hunting operations as nearly as practicable to a certain tract of country, accustomed to the rule of its own chief, and its own domestic associations, differences that arise when several bands who are comparative strangers are thrown together, are prevented. Partly with this view, and partly to occupy their entire country where game is found, but mainly on account of the hunting advantages, the following sections were agreed upon as the residence of the different bands mentioned, which arrangement has been continued, with little deviation, up to the present time.

The portion of the country inhabited by the Si-ćaŋ'-ćos, or Burnt Thighs, is on the head waters of the White and Niobrara Rivers, extending down these rivers about half their length. The Teton River formed the northern limit. For many years, this band was headed by a chief named Ma-ka'-to-źa'-źa, or the Clear Blue Earth, who governed them wisely and well. He was very friendly to the white man, and few Indians have had the power, dignity, and influence which he held over this band. Though some have been more feared, others more brave, yet by his constant and uniformly good management and just government, he kept his people in order, regulated their hunts, and usually avoided placing them in the starving situations incident to other bands, led by less judicious rulers. They were good hunters, usually well clothed and supplied with meat, had comfortable lodges, and a large number of horses. They varied their occupations by hunting buffalo, catching wild horses, and making war expeditions against the Arikaras, then stationed on the Platte, or the Pawnees, lower down on that river. Every summer, excursions were made by the young men into the Platte and Arkansas country, in quest of wild horses, which abounded there at that time in large numbers. Their mode of catching them was by surrounding them, and running them down on their own horses. Taking their positions at different points, they pursued them from one to the other, until they became so fatigued as to be lassoed, after which they were thrown down, bridled, and packed or rode by these fearless cavaliers. Often forty to sixty of these wild horses were brought home as the results of a single expedition.

In their wars with the Pawnees and Arikaras, the Brulees were usually victorious, and seldom a summer passed that they did not secure many of the scalps of their enemies. Indeed, the periods of time at all seasons were short that the scalp-dance was not going on, and the monotonous war-song heard through the village, accompanied by the lamentations of the friends of those who had fallen in battle. Their foes did not remain idle.

Every now and then some of the Brulees' horses would be stolen, or some lone wanderer outside the camp killed. In 1835, some Pawnees and Arikaras stole forty or fifty of the Brulees' horses from their camp on the Niobrara, when the latter pursued and defeated them within a short distance of the village. Twenty-two of their enemies were killed, their horses recovered, and the successful warriors returned bringing the heads, hands, feet, and other parts of the enemies' bodies into camp. The hands and feet were thrust on sticks and paraded through the village by old women, and the scalpless heads were dragged about with cords, followed by small boys shooting them with arrows and powder, and pelting them with stones, encouraged by the old women, who followed after heaping abuse upon the helpless and mangled remains of their once dreaded enemies.

One of the amusements of this band is the driving of antelope over precipices into pens made for the purpose, thus inclosing and destroying several hundred at a time. The broken country about the source of White River is very favorable for this object. The animals being surrounded by several hundred people are driven through some gap in the hill, beyond which is a perpendicular descent of many feet, inclosed around the base with logs and brush, raised to a sufficient height to prevent them from jumping over. The antelope once through the gap or pass, cannot recede, and the pressure of those from behind forces those in front over the descent, the rear being followed up quickly by the pursuers.

Since the emigrants to California and Oregon have passed through the Dakota country, the Brulees have suffered more from diseases thus introduced than any other division of these Indians, being located nearest to the trail. Small-pox, cholera, measles, &c., have year after year thinned their ranks, so that comparatively few of this once numerous band remain, and these are hostile towards the whites, to whom the cause of their destruction is attributed. Their ties of relationship have been severed by the deaths of their friends, their head men have fallen victims, their former good order and flourishing condition have been deranged; and thus they have acquired a sullen and permanent hatred towards the white man. They now comprise about one hundred and fifty lodges, scattered through this district in small divisions, the inmates poorly clothed, with very little game and but few horses. They have paid some attention to the cultivation of the soil, and with proper encouragement might be made an agricultural people. The game has left their country, and with it the means of obtaining supplies from the traders, and now they are mainly dependent upon the small amount of annuities or presents given them by the United States Government.

The Ogala'las occupy that portion of the Dakota country from Fort Laramie on the Platte, extending northeast, including the Black Hills, the sources of the Teton River, and reaching as low down as the fork of the Shyenne. They sometimes range as far west as the head of Grand River. This region, until a recent period, was well stocked with

buffalo, and even at this time elk, antelope, deer, and mountain sheep are found in sufficient numbers to afford the Indians a moderate support. A portion of this band have obtained rifles, and are expert in their use, and the consequence is that they are better clothed and less subject to extremes of want than some of their neighbors. They are remarkable for having the most handsome women in the nation, who are neat and tidy in their dress and modest in their deportment.

The Mi-ne-kaŋ'-źūs are usually found from Cherry Creek on the Shyenne to Slender Butte on Grand River, in which section the buffalo, until within a few years, were very abundant. This band, though peaceable when ruled by good chiefs, has always been very wild and independent, seldom visiting the trading-posts either on the Platte or on the Missouri, and having no intercourse with white men, except with a few traders during the winter season.

The Hūnk'-pa-pas, Si'-ha-sa'-pas, I-ta'-zip-ćos, occupy nearly the same district, and are so often encamped near each other, and otherwise so connected in their operations, as scarcely to admit of being treated of separately. That part of the country under their control lies along the Moreau, Cannon-ball, Heart, and Grand Rivers, seldom extending very high up on Grand River, but of later years reaching to the Little Missouri. Although the bands just mentioned are often stationed near each other, they are sometimes found several days' journey apart, and each is headed by its own chief. Of the leading men, the Little Bear Chief is the most prominent. He wields great influence over all the bands, and from his youth up he has manifested an intense hatred toward the white man.

The Two-Kettle band, Wo-he-nōm'-pa, confine themselves to the Shyenne and Moreau Rivers, seldom going higher on the former river than the mouth of Cherry Creek, but passing up and down the Shyenne, Moreau, and Grand Rivers, but not uniting with the bands just described. The principal chief of this small band is Ma'-to-to'-pa, or Four Bears, a man of moderate capacity, but exercising a good influence on his people. They live entirely in the plain country, seldom go to war in any direction, are good hunters and shrewd in their dealings with the traders. Very few complaints have ever been made against them. They have observed faithfully the stipulations of their treaty with the United States, and have always treated white men who came among them, either as traders or visitors, with respect, but they are too few in numbers to give direction to the actions of large and more powerful bands. Neither contagious disease nor war seems to have reduced their numbers, and it is believed that they have remained nearly stationary in that respect for the last twenty-five years. Many portions of their country could be cultivated with success, and with their tractable disposition they could be made an agricultural people.

The Cut-Heads and Pine Indians, all come under the head of Yanctonais. In 1833

the whole of this division of the Dakota nation was governed by the great chief Wa'nata, but after his death in 1840 it became separated into three distinct bands, each having its own rulers. All of them, however, range and hunt on the east side of the Missouri, and very rarely are found beyond its western shores. They range in their hunting excursions from Apple River down to the mouth of the Little Shyenne, north to the neighborhood of the Lac du Diable, and east along the Coteau de Prairie, but never going as low down as the source of James River. Most of this district, though formerly the favorite range of the buffalo, is now nearly abandoned by them, and at the present time these animals are found only near the northern and western boundaries. In 1830, the Yanctonais, and a few Indians from other bands, being encamped opposite Fort Pierre, on the east side of the Missouri, killed fifteen hundred buffalo at a single surround. This is the largest number that was ever known by the traders to be destroyed at any one time. The fact was ascertained by the trader securing the tongues as the Indians returned from the hunt. Since this period the buffalo have gradually retired from the eastern districts, moving westward and northwest, and thus compelling the Indians to follow. From 1833 to 1844 they were found in considerable numbers on the head branches of the Little Shyenne, and east in the direction of the Coteau de Prairie, but since that time few are seen so low down, which accounts for these Indians occupying their western limits, and hunting north as far as Pembina River. In their travels during the fall they not unfrequently come into collision with the half-breeds from the Red River of the North, who sometimes hunt buffalo in this country in parties of from three to six hundred men, bringing with them a thousand carts or more to transport the meat and skins to their settlement. Several skirmishes have occurred, in most of which the half-breeds have been the victors, and they are known to be better warriors than the Indians. The latter, not gaining much in actual contests, retaliate by stealing the horses of the former at their village near Pembina in the absence of the men on their hunts. Of late years their visits in that direction have been more frequent and bold, several residents have been killed in the village, and many horses stolen. This predatory warfare becoming very serious and annoying, the half-breeds applied a few years ago to the United States Government for permission to make war on the Indians on a large scale. They claimed that they would be compelled to make war or remove to their original homes in the English possessions.

NAMES OF DAKOTA BANDS, WITH THEIR PRINCIPAL CHIEFS.

DAKOTA BANDS.	PRINCIPAL CHIEFS.
min-i-sha',* Red water band,	ćäŋ-te-ni'-tku, Foolish Heart.
ta-shunk-'e-o-ta,† Plenty of horses,	käŋ-ge-ni-a'-ke, Crow Feather.
wak-po'-ki-an, Flying river band,	he-wa-zin'-ća, One Horn.

* This band numbers eighty lodges.

† Seventy-five lodges.

DAKOTA BANDS.

i-na-ha′-o-wīn, Stone ear-ring band,
wa-ĥa-le′-zo-wen, Striped snake ear-ring band,
shunk′-a-yu-tēsh′-ni, Band that eat no dogs,
min-i-kaŋ′-źu, Band that plants near the river,
wak-to-ni′-la, The band that kill no people,
o-he-nōm′-pa, Two kettle band,
pa-ha-hi′-a, Those who camp at the end,
min-i-sha′, Red water (an Oglala band),
pe-hi′-pte-ći-la, Short hair band,
ōg-la′-la (meaning not known),
si-ćaŋ′-gu, Brulees, Burnt thighs,
wam-bi-li′-ne-ća, Orphan band,
wa-ći′-ōm-pa, The band that roasts meat,
si-ća′-wi-pi, Band with poor guns or bows,
a-a′-ko-za, Big ankle band,
wa-źa′-za, Band rubbed out,
hunk′-pa-pa (meaning unknown),
ta-lo′-na-pi, Fresh meat necklace band,
će′-ĥa-na-ka′,* Half-centre cloth band,
ći-o-ho′-pa, Sleeping kettle band,
ćaŋ-ho-ham′-pa, Band with bad backs,
si-ha′-sa-pa, Blackfeet,
ći-hu′-pa, Jawbone band,
pa-a′-bi-a, Those who camp at the end,

PRINCIPAL CHIEFS.

wi-a-ka′-o-wīn, Feather Ear-ring.
ma-ka-ći′-ka, Little Ground.
caŋ-te′-wa-ni′-će, No Heart.
o-pa′-no-to-no′-ma-ni′, The Elk that whistles running.
ta-taŋ′-ka-ći-ka′-la, Little Bull.
mi-wa-ta′-ne-haŋ′-ska, Long Mandan.
wa-min′-i-mi-du′-za, Whirlwind.
wam′-bi-li-shi′-a-na, The Eagle that sails.
ho-po′-ma-za, Iron Arm.
ta-shunk′-a-wīt′-ku, Foolish Horse.
wa-ki′-a-ći-la, Little Thunder.
ću′-wi-wam′-bi-li-shi, Eagle's Body.
wi-sa′-pa, Black Moon.
ki-u-kam′-pi, He who gives praise.
a-ĥa′-ka-haŋ-ska, Long Elk.
wak-pe′-sha, Red Leaf.
ma-to′-ći-ūk-sa, Bear Rib.
shi′-o-taŋ′-ka, Large Pheasant.
shi′-o-ći-ka′-la, Little Pheasant.
ma-to′-ći-ka′-la, Little Bear.
ma-to′-wa-na′-he, Bear's Spirit.
wa-wa-ćaŋ′-ka-to, The Blue Shield.
si-ćo′-la, Bear's Foot.
ma-to-wa-ku′-a, The man who runs the bear.

NAMES OF MONTHS OR MOONS, RIVERS, ANIMALS, ETC.

1st moon, ma-ga-ga′-li-wi, when the geese come up from the south, March.
2d moon, pe-źi′-to-i-wam′-pi-wik, when the grass springs up, April.
3d moon, shunk-a-ma-ni-tu-ćin′-ća-tōn-wik, when the wolves have their young, May.
4th moon, pte-ki-u′-ĥa-wik, the rutting time of the buffalo, June.
5th moon, ćam′-pa-sha-wik, when the cherries are red, July.
6th moon, ćam′-pa-sa′-pa-wik, black cherry moon, when the cherries are ripe, August.
7th moon, ćāŋ-wak′-pe-hi′-wik, when the leaves become yellow, September.
8th moon, ćāŋ-wak-pe-inĥ′-pa, when the leaves fall, October.
9th moon, wik-to-ka-i-ća′-mi-na, when the first snow falls, November.
10th moon, pte-yu′-kta-ha-shi′-na-wash′-te, when the robes are good, December.
11th moon, pte-i-ću-la-wash-te-yu-ta-wik, the time when the young buffalo (in utero) are good to eat, January.
12th moon, shunk-a-ma′-ni-tu-ga-nash′-ki-wik, when the wolves go mad, February.
we′-tu, spring, three moons, coming in of spring.
bel-o-ke′-tu, fair weather, coming of summer.
ptaŋ′-e-tu, coming in of autumn, three fall months.
wa-ni′-i-tu, coming in of winter, three winter months.

* Cloth cut from corner to corner,—tri-cornered clothing.

ma-ka-si'-ća, Mauvaises Terres, or Bad Lands of White River.

wi-wi'-la-wak'-pa-la, Spring Creek or Bear Creek, in the Bad Lands.

pe-zi-ho'-ta, Sage Creek, or Gray Grass Creek.

ćaŋ'-wi-ta, Wood Island Creek.

wak-pa-si-ća-o-inh-pa', Pinaus Spring, source of Teton River.

ho-ki-ha'-lo-ka, hole through the hill, or Opening Creek, a branch of the Shyenne.

i-rūh'-a-pa-ha', Whetstone Hills, where the Indians procure sandstone for whetstones.

pa-ha'-sa-pa, Black Hills.

wag-a-ćaŋ'-haŋ-ska, Long Cottonwood Creek.

pi-spi-za-o-ti-taŋ'-ka, Big Prairie Dog Village Creek.

wi-ća-ag-e-wa-ka'-pi, where they place the dead on scaffolds, Shepoi Creek.

shunk'-a-kaŋ-pa'-o-ta, where the Indians lost many horses, the Great Hole.

ćoh-waŋ'-zi-ća, Willow Creek.

wak-pa-wash'-te, Good River, Great Shyenne.

kaŋ-ta-o'-ta, a plenty of plums, Plum Creek.

ćam'-pa, the cherry, Cherry Creek.

o-ki'-ża-te, forks of any river.

hi-haŋ-wak'-pa, Owl River, Moreau River.

wak-pa-shi'-ća, Teton, Little Missouri, Bad River.

ma-ka-i-zi'-ta, Smoking Earth River.

ta-to'-ka-la'-o-ti, where there are plenty of antelopes, Antelope Creek.

ćān-te-sha', Cedar Creek.

pa-ha'-wa-kan, Medicine Hill Creek.

mi-la-haŋ-ska', Long Knife, or American Creek.

pa-la-ni-ta'-wa, where the Rees had their village, Ree River, Grand River.

i-aŋ'-wa-ka-ha'-pi, the river that makes rocks, Cannon-ball River.

sha-he'-e-la-wo'-żu, the river where the Shyennes planted corn, Little Shyenne.

min-e'-taŋ-ka, Big River, L'eau qui Court, running water.

o-pa-wo'-żu, where the Indians make cornfields, Ponka River.

ma'-to-pa'-ha, Bear Butte.

mash-tin'-ska, white rabbit, in winter pilage. *Lepus campestris.*

he-tōŋk'-taŋ-ka, a wood rat. *Neotoma.*

wam-bi-li', the bird that sails, golden or war-eagle.

pa-ća-shi'-wa-ta, short bill. *Junco hyemalis.*

wa-zi-zit'-ka-la, yellowstone bird. *Leucosticte tephrocotis.* A bird that lives among the yellow ferruginous sandstones.

mash-tin'-ća-la, sage rabbit. *Lepus artemisia.*

shi'-o, birds that eat rose-buds.

shi-o'-ći-ka'-la, sharp-tailed grouse.

wa-zi'-shi-o, yellow wood bird, pine pheasant.

ūnk-ći'-ki-ća, a magpie.

i-ha'-mi-ko-ti-la, the owl that lives with the prairie dogs.

żo'-a-to-pi, poor-will, so named from its note.

ćān'-ska-sa-pa, blackbird.

hi-hu', the hooting owl, named from its note.

pa'-pe-sto-la, "sharp-nose," fish-duck.

zit-ka'-to, bluebird, Maximilian's jay.

ho-pa-wa'-to-to, blue wings, blue-winged teal.

ćāŋ-o-hu'-ya, "wood-color," cheewink.

pi-spi'-za, the animal that calls to people "come here," prairie dog.

pa-hiŋ', derives its name from its quills, porcupine.

psi-psi-ćai'-la, jumping mouse. *Hesperomys.*

het-ka'-la. *Spermophilus quadrivittatus.*

sink-pe'-la, flat-foot, muskrat.

zi-ća', "yellow-wood," a pine squirrel.

VOCABULARY OF THE DAKOTA LANGUAGE.

alive, ni.
all, si-to'-mi-ni.
arm, ish'-to.
arrow, wa-hink'-pi.
autumn, pta'-e-tu.
axe, ma-zōn'-spe.
bad, shi'-ća, si'-ća.
bear, ma'-to.
beard, pu-te'-hi.
beaver, ća'-pa.
belly, te'-zi.
bird, zit-ka'-la.
black, sa'-pa.
blue, to.
body, taŋ'-ćaŋ.
bone, hu'-hu.
bow, i-ta'-zi-pa.
bread, a-hu'-e-a-pa, flour.

brother, ći'-e.
buffalo, pte.

canoe, wa'-ta.
chief, i-taŋ'-ća.
cold, us'-ni.
copper, ma-za'-sha, red iron.

dance, wa-ći', to dance.
daughter (my), mi-ćunk'-she.
dead, ta.
deer, taȟ'-ća.
dog, shunk'-a.
drink, at'-ȟa, to drink.
duck, ma-ga-si'-ća.

earth, ma'-ka.
eat, yu'-ta.
eye, is'-te.

face, i'-te.
father, at'-e.
finger, shash'-te.
fire, pe'-ta.
foot, i'-ha.
forehead, na-su'-na.
fox (red), shunk-u'-la.
friend, ko'-la.

good, wash'-te.
grass, pe'-źi.
great, taŋ'-ka.
grouse, shi'-e.

hail, wa'-su.
hair, pe'-hi.
hand, na'-pe.
he, i'-ye.
head, pa.
heart, ćaŋ'-te.
hill, pa-ha'.
husband (my), mi-hing'-a-na.

I, mi'-ye.
ice, ća'-ra.

infant, ōk-shi'-ća-la.
iron, ma'-za.
island, wi'-ta.

kettle, će'ra.
kill, kte'-pi, to kill.
knife, mi'-na.

lake, bi-le'.
leaf, wak'-pe.
leg, hu.
lightning, wa-ki'-an.
lodge, ti'-pi.
love, to-wa'-ka, to love.

maize, wa-ka-me'-za.
man (red), wi-ća'-sha.
many, mi-će'-ta, much.
meat, cēk'-pi.
morning, am'-pa.
mother, in'-a.
mountain, ȟa.
mouth, i.

nail, sha'-ke.
near, ki'-e-la.
neck, ta'-hu.
night, aŋ-hi'-pi.
no, hi'-ya.
nose, pa'-su.

old, e-ha'-na.

pipe, ća-nōm'-pa.

rain, ma-ra'-zu.
red, lu'-ta.
river, waȟ'-pa.

sea, min-i-wa'-ća.
see, wai-a'-ka, to see.
shoe, naŋ'-pa.
sister, tank'-e.
sky, maȟ-pe'-a-to.
sleep, is-ti'-ma, to sleep.
small, ćīs'-ći-la.
snow, wa.
soldier, a-ki'-ći-ta.
son (my), mi-ćink'-shi.
speak, wo-ga-la'-ka, to speak.
strong, wa-źa'-ka.
summer, bi-lo-ki'-tu.

this, le.
thou, ni'-ye.
thunder, wa-ki'-an-o-tōmp.
tobacco, ćaŋ'-li.
to-day, le-am-pe'-tu.
toe, si-hu-ka'-za.
to-morrow, am-pa'-ke.
tongue, će'-shi.
tooth, hi.
turtle, ke'-a.

water, min'-i.
white, ska.
who, tu'-a.
wife (my), mi-ta'-wi.
wind, ta'-te.
winter, wa-wi'-e-tu.
wolf, shunk-to'-ke-ća.
woman, wi'-a.
wood, ćaŋ.

yellow, zi.
yes, tōsh.
yesterday, uk-ta'-le-ha.

one, wunć.
two, nōm'-pa.
three, ya'-mi-ni.
four, to'-pa.
five, za'-pta.
six, sha'-ko-pi.
seven, sha'-ko-wi.
eight, sha'-ge-lo'-ga.
nine, na-pći'-ōn-ka.
ten, wik-ćim'-i-ni.

CHAPTER XV.

V. ASSINIBOINS.

ETHNOGRAPHICAL HISTORY.

IN regard to the origin of the Assiniboin tribe, but little authentic information can be obtained from their traditions, though many singular and fabulous tales are related concerning it. As a portion of a people, however, once inhabiting another district, and being incorporated with another nation, their history presents a connected and credible chain during the last century.

The Assiniboins were once a part of the great Dakota nation, residing on the tributary streams of the Mississippi, as the head of the Des Moines, St. Peter's, and other rivers. This is evident from the similarity and almost identity of the language spoken by the two tribes or nations. Moreover, there lived a few years since, on the Missouri, a very old chief, known to the traders as "Le Gros Français," though his Indian name was Wah-e'-muz-a, or the "Iron arrow-point," who recollected perfectly well the time of their separation from the Dakotas, which, according to his data, must have been about the year 1760. He stated that when Lewis and Clarke came up the Missouri in 1805, his band, about sixty lodges, called *Les Gens des Roches*, had, after a long conflict, made peace with those bands of the Dakotas who resided on the Missouri, and that he saw the expedition referred to near the mouth of White Earth River. This was the first party of white men ever seen by them at their camps, though they had been accustomed to deal with the fur traders of the Mississippi, who visited the interior of their country in the winter. After their first separation from the Dakotas, they moved northward, made a peace with the Crees and Chippeways, and occupied a portion of the country on or near the Saskatchewan and Assiniboin Rivers, in which district some two hundred and fifty or three hundred lodges still reside.

Some time after the expedition of Lewis and Clarke, or at least after the year 1777, the rest of the nation, at that time numbering about twelve hundred lodges, migrated towards the Missouri, where superior advantages for game and trade presenting themselves, they located permanently, and continue to reside there to the present time.

The principal incident, and one which forms an era in their history, which they have every reason to remember, is a visitation of the small-pox in 1776 or 1777, when they occupied the British territory. Even yet there are two or three Indians living (1855) who are marked by the disease of that period, which greatly thinned their numbers, though owing to their being distributed over a large district, some bands escaped entirely. However, the small-pox does not appear to have been as destructive to them at this period as it was on the Upper Missouri in 1838, which will be noticed hereafter.

Before proceeding further with their history as obtained from the old men of the tribe, let us present a summary of the notices of different travellers as far back as we have the means of ascertaining. Inasmuch as an extended history of the Indian tribes of the Missouri Valley is in process of preparation, only the more important and standard works of travel will be referred to in this memoir.

Umfreville calls these Indians Assinnee-Poetuc, and says that they obtained their name from the Crees, which signifies in their language Stone Indians. He also states that they are a "detached tribe from the Naudawissees of the Mississippi, who anciently separated from the general stock on account of some intestine commotion." He gives a vocabulary of forty-four words of the Assiniboin language, and, so far as I can ascertain, the first ever published. Henry speaks of them as Osinipoilles or Assiniboins, who at that time lived in the vicinity of and traded at Fort de Prairie. He says that they are the "Issati of older travellers, and have sometimes been called Weepers." He gives much interesting information in regard to this tribe, and suggests that their language connects them with the Nadouwesis. La Hontan merely alludes to them as "Nadouessis or Scioux." Gallatin, who seems to have had access to works beyond my reach at this time, thus sums up their ancient history: "The Assiniboins (Stone Indians) are a Dakota tribe, separated from the rest of the nation, and on that account called *Ho-ha*, or Rebels, by the other Sioux. They are said originally to have formed a part of the Yanktons, but we are not acquainted with their real name. Their separation must have taken place at an earlier date than has been presumed by late writers. Father Marquette, writing in the year 1669, from the Chagouadmigong Mission, after having mentioned the Nadouessies as a formidable nation, speaking a language altogether different from the Algonkin and the Huron, adds, that the Assiniponiels have almost the same language as the Nadouessies, and live about fifteen days' journey from the Mission on a lake, which, from a map annexed to that volume of the Relations, must have been Lake Winnipek."

Carver (1796) alludes to the "Assinepoils" as having revolted from the "Naudowessie nation," and formed a league with the "Killistinoes," keeping up a continual warfare, however, with other neighboring tribes. Mackenzie (1801) also alludes to the Assiniboins as a detached tribe of the "Nadowasis," and residing upon the river which bears their name.

A number of vocabularies of the Assiniboin language have been published from time to time. So far as I am able to learn, the first one given to the public was published by Umfreville (1790), consisting of forty-four words.

The Prince of Neuwied, in his excellent work, "Travels in North America," 1839–41, gives quite an extended vocabulary, with some interesting remarks in regard to their manners and customs. Prior to this time, however (1817), Major S. H. Long obtained a small but accurate list of words of their language, which was published in the appendix

to his "Account of an Expedition from Pittsburg to the Rocky Mountains, in 1819 and 1820."

The most important vocabulary of the language of this tribe ever published may be found in the fourth volume of Schoolcraft's great work, which consists of over four hundred words, prepared by Mr. E. T. Denig, an intelligent trader, who resided for many years at the junction of the Yellowstone and Missouri Rivers, as superintendent of Fort Union, the trading-post for the Assiniboins. I know of no others that are of sufficient importance to mention here.

We will now continue the history of the Assiniboins as given by the most intelligent men of the tribe. The name of this tribe among themselves is Dakota, the same as that of the numerous tribes along the Missouri and the sources of the Mississippi, and with them it signifies "our people." By the Dakotas they are called "Ho'-he," or Fish-eaters, perhaps from the fact that they lived on fish while residing in the British possessions, as most of the Indians do in the absence of other food. By the Crees and Chippeways they are called A-si-ni-poi'-tuk or Stone Indians,—thence the name of Assiniboins is derived. As has been stated, at the earliest date known they roved about the sources of the St. Peter's and Des Moines Rivers, Lac du Diable, Lac qui Parle, &c., and were then joined with the Dakotas proper, who inhabited and claimed all the land between the Mississippi and Missouri as low down as Big Sioux River, reaching to the source of James River, and stretching thence northward as far as Lac du Diable. There were also other bands of Dakotas (Tetons), occupying the country west of the Missouri. The number of the Assiniboins when they separated could not have been much less than fifteen hundred lodges, averaging six souls to a lodge. Their migration has already been alluded to, and the extent of territory which they traversed in search of game, in the Hudson's Bay country, along the Saskatchewan, was very great, but at the present time their location is entirely different, which we may as well define at this time.

The northern Assiniboins roam over the country from the west banks of the Saskatchewan and Assiniboin Rivers, in a western direction, to the Woody Mountains, north and west amongst some of the small outliers of the Rocky Mountains east of the Missouri, and on the banks of the small lakes frequently met with on the plains in that district. They consist of about two hundred and fifty or three hundred lodges, and they occasionally make peace with some of the most northern bands of Blackfeet, which enables them to extend a little farther west, and deal with those Indians, but these peace arrangements are usually of short duration, and thus they are, for the most part, limited in their hunting operations, and confined to the prairies east and north of the Blackfoot range. The remainder of the tribe, now reduced to two hundred and fifty lodges, occupy the district defined as follows. Commencing at the mouth of White Earth River on the east, extend-

ing up that river to and as far beyond its source as the Grand Coulée and the head of La Riviere aux Souris, thence northwest along the Coteau de Prairie, or divide, as far as the beginning of the Cypress Mountains, on the north fork of Milk River, down that river to its junction with the Missouri, thence down the Missouri to White Earth River, the starting-point. Formerly they inhabited a portion of the country on the south side of the Missouri, along the Yellowstone, but of late years, having met with great losses in that direction, from war-parties of the Blackfeet, Dakotas, and Crows, they have been obliged to abandon it, and now never go there.

Until the year 1838 the tribe still numbered from a thousand to twelve hundred lodges, trading on the Missouri, when the small-pox reduced them to less than four hundred lodges. They were also surrounded by large and hostile tribes, who continually made war upon them, and in this way their number was diminished, though at the present time they are slowly on the increase.

The chief rivers running through the Assiniboin country are, first, the Missouri, which is so well known that it needs no description here. The next is Milk River, on the northwest boundary, a very long and narrow stream, rising in some of the small mountains east of the Missouri, and lakes on the plains, runs a southwest course, and empties into the Missouri about a hundred miles above the mouth of the Yellowstone. Its bed is about two hundred yards wide, though the water seldom occupies more than one-third of that space, except during the spring thaws, when for a week or two it fills the entire bed, and even overflows the valley. It is fordable on horseback the year round, except at the time above mentioned, or when swollen by continued rains, and it might even be navigated with Mackinaw boats, when full, though the undertaking would be attended with some risk, owing to the large quantity of drift-wood, snags, and other obstructions. The water in a high stage has a white and milky appearance, caused by its flowing through beds of white clay, which are found along nearly the entire length of it, but more especially near the sources of most of its tributaries.

The Riviere aux Tremble, or Quaking Asp River, empties into the Missouri about fifty miles below Milk River, is about half the length and breadth of the other, and takes its rise in the range of hills constituting the divide called the Woody Mountains. It is fordable at all times, except during spring freshets, or when filled by heavy rains, at which times it could be navigated with small Mackinaw or flatboats, if floating ice and drift-wood would permit.

Several creeks or small streams, of comparatively little importance, flow into the Missouri lower down on the east side, called Porcupine, Big Muddy, Little Muddy, Knife River, &c., none of which contain much water. These, with several small coulées, serve to drain the plains of the waters caused by snow and rains, and are for the most part miry, and only fordable on horseback in certain places where gravel bottoms are found.

After these comes White Earth River, on the eastern boundary of the district now under consideration, which is about one hundred miles in length, and at the mouth over one hundred yards wide. This like the others becomes very full from the melting of snow in the spring, but falls low enough in course of the summer to be fordable in most places, either on foot or on horseback. This stream could be navigated with small canoes during the months of April and May. It takes its name from a kind of white pipe-clay, which occurs about half way to its source, and is supplied with water from springs in the Coteau de Prairie.

The entire country occupied by the Assiniboins, or hunted in exclusively by them, the outline of which has been given, embraces an area of about 20,000 square miles, and presents the same general features as the rest of the Upper Missouri territory, on the east side of the Missouri River. From James River up, it may be said to be one great plain, hills and timber only occurring where rivers run, and even the small streams are wooded only a short distance above their mouths, so that the traveller may pass for days over large tracts without meeting with a tree or shrub. In the valleys of the rivers, there is some good land for agricultural purposes, but the level plains present a sterile aspect, and can only be adapted to the grazing of cattle. The soil for the most part is not deep, but light and sandy, absorbs rain readily, and the hills, which are usually composed of indurated sands and clays, are often washed by atmospheric agencies into most grotesque and singular forms, called by the Indians ma-ka-si'-ća, or "Bad Lands."

The indigenous grasses are quite numerous in species, and very nutritious, affording most excellent pasturage for horses, horned cattle, and sheep. The dry season of autumn gradually desiccates the vegetation, so that all the nutritious substances remain, and it is not until the melting of the snows of spring that their nutritious character is lost. At this period, all the herbivorous animals of the plains become quite weak and thin in flesh, but quickly recover in the months of May and June. This monotonous and barren surface of the country only terminates after crossing the Coteau de Prairie, which divides the waters of the Missouri from those of the Red River of the North, where both the nature of the soil and the general appearance present an entirely different character, to which allusion has already been made in our description of the Crees.

Though wood cannot be found to any extent in the Assiniboin plains, and dried buffalo-dung, usually called "buffalo chips," is used by the natives for fuel during the summer season, or any portion of the year when the ground is not covered with snow, yet water can be had at all times from small lakes, or rather large ponds. These are met with in many places on the prairie, are formed by rain or melted snow, and have no visible outlet, but diminish by evaporation and saturation. They differ in size from one hundred yards to two or three miles in circumference, usually contain tolerably good water, are

surrounded by a border of tall flags and rushes, and in the autumn covered with myriads of wild fowl. A few small springs are seen occasionally, but most of them have a mineral taste, and possess active cathartic properties.

Notwithstanding the dull and dreary appearance always presented by naked and extensive plains, there are no places that could properly be termed deserts, though there are some marshes, pools, and swamps, which, however, are not very near together, or of a nature to present any formidable obstruction to travel, neither do they seem to affect the health of the natives, any farther than being the breeding-place of hosts of mosquitoes, which are very annoying to man and beast.

The principal hindrance to foot travellers in this district, is the great abundance of a few species of Cacti, or as they are usually called, "prickly pears," some of which are armed with long, sharp, barbed spines, and readily pierce the moccasined feet of the Indian or voyageur. The dogs, also, used by the Indians for carrying burdens on the plains, suffer severely from these spines, though the older and more experienced have the faculty of perceiving and avoiding them even while running. The principal varieties known in this region are *Opuntia Missouriensis* and *O. fragilis*, both species of which cover thousands of acres over the West. The smaller and most annoying form is the *O. fragilis*, the joints of which separate very readily, and adhere by the spines to the legs of horses or the clothes of travellers, and owing to the barbed character of the thorns, produce often quite serious and painful results.

The climate in this latitude is pure and dry, and perhaps the healthiest in the world. In the months of April, May, and to the middle of June, when east winds prevail, much rain falls, but during the rest of the summer and autumn, the weather is dry and moderately warm, there being only a short period in July and August of intense heat. There are not unfrequently severe thunderstorms during the hot season, accompanied by rain or hail, which in a few hours swell the small streams so that they overflow their banks, but with the cessation of the rain, they fall as suddenly as they rise. The Missouri and most of its tributaries inundate the neighboring valleys, when rain falls for ten or fifteen days in succession. This usually happens in the month of June, when they are already nearly full of water from the snow melting near their heads. This is not, however, of very frequent occurrence. Strong gales of wind also come from the west and southwest in form of sudden gusts, prostrating numbers of trees along the banks of the Missouri, but these storms only last for a few moments, and are not common. The summer season, being short, leaves vegetation but little time to decay, and the firing of the prairies, which happens more or less every year in different parts, burns up all the old grass, fallen timber, and underbrush along the river bottoms. Owing partly to these facts, partly to the very equable temperature, and the absence of excessive moisture, the air is pure and invigorating,

and few epidemics rage among the migratory Indians. Fevers are almost unknown, and nervous diseases seldom met with.

The transition from summer to winter is very sudden; no long period of time intervenes equivalent to the Indian summer of the States. A few days are often sufficient to deprive the trees of leaves, freeze up the running streams, and clothe the yet partially green plains with a garment of snow. The winters are variable, mostly very cold, with deep snow. During the period of greatest cold, the mercury freezes. It often remains frozen for several days, and for weeks together the temperature ranges from thirty to forty degrees below zero. The snow-storms at this period are terrible, and almost certain death befalls those who are so unfortunate as to be caught on the plains. During every extremely cold winter Indians are frozen to death, many instances of which might be recorded here. Other winters are mild, but little snow falls, though there is always a short spell of intense cold, mostly in the month of January. When the winter proves mild and open, a disagreeable spring follows, snow falls in May, and March and April produce cold winds, rain, snow, and sleet. Occasionally, however, the spring opens finely, and the change from winter to summer is as sudden as from warm to winter weather. The constant exposure to cold, inseparable from the lives and occupation of the Indians, sleeping on damp ground, wet feet, and insufficient clothing, bring on bronchitis, pulmonary affections, rheumatism, and sometimes quinsy. These diseases do not often prove immediately fatal, but usually enfeeble the constitution. By reference to some tables of temperature kept at Fort Union, we find the longest winter on record to be that of 1844, when the Missouri closed on the 9th of November, and opened on the 21st of April.

The Assiniboins do not raise any cattle or sheep, but judging from the stock reared at Fort Union, near the mouth of the Yellowstone, the country is well adapted to grazing purposes. The grasses of spontaneous growth are very nutritious, and their supply inexhaustible. The only obstruction seems to be the severe cold of winter and the deep snow, though if animals are housed and provided for during a month or two in midwinter, it has been proven that no hardier or better stock can be raised in any country than in this. Sheep especially would thrive well if properly cared for, as far as grazing is concerned, though the great number of wolves with which the country abounds would present a formidable objection. Large quantities of good hay can be cut either on the Missouri bottoms or in the valleys of other streams, and, by experiments made near Fort Union, it has been ascertained that oats, corn, potatoes, and all garden vegetables grow well in favorable seasons. The soil, being light and sandy, requires frequent rains to produce a good crop, which happens about one year in three, the others failing from drouth and destruction by grasshoppers and other insects. The natural productions of the soil which are useful for food to man are not very numerous, but are held in high esteem by the

Indians. Wild turnips (*Psoralea esculenta*), artichokes (*Helianthus tuberosus*), bullberries (*Shepherdia argentea*), choke-cherries (*Prunus Virginiana*), red plums (*P. Americana*), service-berries (*Amelanchier Canadensis*), rose-buds, gooseberries, currants, sour grapes, and a plant resembling the garden rhubarb, are the principal fruits, and are eagerly sought for at their proper season. When dried or cooked in various ways, they are considered great luxuries. Wild hops (*Humulus lupulus* var. *Americanus*), are found in abundance, possessing all the properties of the cultivated plant.

When the Assiniboins migrated to the Missouri and the contiguous territory now occupied by them, they numbered, as has been observed, from ten to twelve hundred lodges. They did not all come at the same time, but by bands, at different periods, from 1800 to 1837, when the whole tribe may be said to have established themselves on their present lands, except that portion which still remains in the British territory. Their first interview with white people was at the time when the traders of the Mississippi pushed their traffic as far as their camps, when joined with the Dakotas proper, at which time they were the poorest of all Indians. They used knives made of the hump-rib of a buffalo, hatchets of flint, cooking utensils of clay or skin, awls and other tools made of bone, and arrow-points and spear-heads of stone, some of which articles can still be found among them, though most of them have been replaced by more durable metallic instruments obtained from the traders. As soon as enough had arrived on the Missouri to afford a trading establishment, the American Fur Company built a fort on White Earth River for their trade, which post was removed in a year or two and a large substantial fort built three miles above the mouth of the Yellowstone, on the east side of the Missouri. It required some years to bring these savages to anything like an appreciation of order or system, and ammunition, guns, knives, &c., had to be furnished them gratis; horses were sold to them very cheaply, and every inducement held out to them to improve their condition by labor. Though wretchedly supplied with arms, clothing, and other necessary articles, and subject to extreme want at all times, yet they were so lazy and improvident, their wants were so few, that many years passed before the proceeds of their hunts more than paid the expenses of their trading establishment. They were also of a thievish and malicious disposition, seldom bloodthirsty, but perpetually annoying the traders by stealing their horses, robbing and insulting the men in their employ when found on the prairie, killing their domestic cattle, and obstructing them in their operations in every way. They were the most impudent beggars, and having been supplied with many things to induce them to work, they at once came to the conclusion that this state of things must continue, and any refusal to supply their demands was resented in some of the ways just mentioned. This condition of affairs continued to grow worse and worse, until the gates of the fort were closed upon them, and they were compelled to trade within range of a loaded cannon.

The first calamity which cast a gloom over this nation occurred when the small-pox visited them in 1838. This disease made its appearance at Fort Union when the steamboat arrived in the month of June with the annual supplies for the post. No Indians were then in the vicinity, except the wives of the employés of the Fur Company in the fort, every one of whom caught the infection, and in a short time thirty persons were attacked. When the first band of Assiniboins came, they were met a mile or more from the fort by good interpreters, who represented to them the danger of going near, and goods were taken out to them with the intention of trading with them at a distance; but all efforts of that kind were disregarded, and they passed on to the fort, and two hundred and fifty lodges, or upwards of one thousand persons, contracted the disease at the same time, and in a short period they were reduced to about thirty lodges, or one hundred and fifty persons, old and young. Other bands coming in from time to time caught the disease, some of which remained at the fort, where the dead bodies were daily thrown into the river by scores. Others attempted to escape by running away, and the different roads leading from the fort were dotted with dead bodies, and occasionally lodges were standing in which whole families lay dead. The Indians in vain tried their own remedies, and the disease continued until midwinter, when it seemed to have spent its power and ceased. Out of one thousand lodges of Assiniboins only four hundred remained, and of these two hundred were saved by having been vaccinated in former years by the Hudson's Bay Company.

At the present time the Assiniboin tribe is separated into the following bands:

1. wah-to'-pah-an-da-to, Gens du Gauché,	100	lodges,	averaging four persons.
2. min'-i-shi-nak'-a-to, Gens du Lac,	60	"	"
3. i'-ap-to'-an, Gens des Roches,	50	"	"
4. wi-ié'-ap-i-nah, Gens des Filles,	60	"	"
5. wah-to'-pap-i-nah, Gens des Canots,	220	"	"
6. wah-zi-ah, or to-kum'-pi, Gens du Nord,	30 to 50	"	"

Several smaller bands are also found near the Montagne du Bois, but these, for the most part, belong to and reside in the English territory. The Gens du Gauché, above named, inhabit that part of the district described, along the Woody Mountains on the west side in summer, often moving westward to the sources of the Quaking Asp River, and toward autumn locate their camp at or above Big Muddy River, or along the first-named stream. In this direction, along the east shore of the Missouri, wintering-houses are built by the Fur Company for the convenience of the Indians, and also for collecting the buffalo-robes and other skins they obtain by hunting.

The Gens des Canots are commonly found along White Earth River, and extend their travels, in the summer season, as far north as the sources of La Riviere aux Souris, Grand

Couleé, and Pembina River. Indeed, the entire extent of country east of Fort Union as far down as the Great Bend is hunted in by them at different times; but owing to the absence of fuel on this broad plain, they are obliged to place their camp on or near the Missouri during the winter season. They are, therefore, usually found at that time either on White Earth River or above that point, where trading-houses are established for their benefit. Some fifteen or twenty lodges of this band trade at the posts of the Hudson's Bay Company, or with the half-breeds of Red River, who visit their camp during the winter with dog-sledges loaded with merchandise. The remaining bands mentioned, are scattered over the intervening region between those of the two bands just mentioned, moving from point to point near the Coteau de Prairie in summer, approaching the Missouri in the autumn, and stationing themselves on its banks or low down on some of its tributaries. These bands commonly make their winter hunt near the Quaking Asp River, and along that stream, but when the weather permits them to travel over the unwooded plains, proceed as far north as the Cypress Mountains. Some of them, especially the Gens du Nord, go still farther, and trade either at some of the Hudson's Bay Company's posts on the Assiniboin River, or with the Red River half-breeds.

The Assiniboins subsist almost entirely on the proceeds of their hunts. The buffalo is the principal animal killed, which is found in greater numbers through this territory than in other districts. The meat of this animal, either fresh or cured by drying, is their principal food. Smaller game, such as elk, deer, and antelope, are not killed to any extent. Some indigenous fruits and roots aid considerably in their support, at times when buffalo are too far from camp. The skins of the animals killed by them serve for their clothing, and lodges, or are exchanged with the Fur Company for articles of use and comfort, assorted to suit their wants. Owing to their nomadic life, they seldom have a supply of meat laid up for the future, and consequently often live on a short allowance for a time; but when buffalo are near at hand, there is continual feasting throughout the camp. It also sometimes happens that from an entire disappearance of these animals, they are distressed by actual want, which was the case in 1846, when they ate their dogs and horses, and, in some instances, even their own children. They have but few horses, and these are required to transport their tents and children when travelling. Dogs are used to a great extent for carrying burdens, but they cannot carry heavy packs, and when killed for food, their means for migrating from point to point is taken away, especially in the winter, when the snow is so deep that horses cannot travel. This inability to transport provisions prevents the desire to lay up for the future, and militates against any economy. They are compelled to follow the buffalo at all times when one day's travel from their camp. In this respect they are not as comfortable as those tribes who live in stationary villages, as the Mandans, Minnetarees, &c., who take care to lay up a good store of provisions

for the future. Their roving habits prevent the accumulation of much baggage. All useless articles must be thrown away to make room for those that are necessary, and thus personal property cannot be acquired to any amount. Even their horses, the main stay of their existence, are very precarious stock, being subject at any moment to be taken away by the hostile tribes in the neighboring territories. These things united produce a carelessness of character and an apathy of disposition which runs through most of their actions.

In their personal appearance, they are not remarkable for either beauty or homeliness. The men average about the middle height, and usually have a determined, dogged look, especially when in a strange place. In their homes, however, they are more sociable. Each master of a lodge preserves a degree of dignity in his family circle, and exhibits a determination to be respected. They do not play or joke much with their women or children, nor do they enter into useless quarrels or recriminations. Trifling differences are settled by decision of the master in a tone of authority, and more serious quarrels are ended by the sudden application of the tomahawk. They are affectionate to their children, kind to strangers, distant in their manners to each other unless to kindred, and very revengeful when roused into passion.

There are but few handsome women amongst them, and virtue is somewhat rare except in very young females. In these matters, however, they are very sly and modest, exhibiting none of the bold and barefaced vulgarity of the Arikaras and Crows. They do not seem to be an amorous people, and marriages are often contracted for the first time at twenty-five or thirty years of age.

VOCABULARY OF THE ASSINIBOIN DIALECT OF THE DAKOTA LANGUAGE.

above, a-kan′.
alive, ni.
all, o-was′.
ankle, si-kun′-paz-o.
arm, ish-to′.
arrow, wa-hink′-a-pa.
autumn, pi-ti′-i-tu.
axe, ōns′-pe.

back, ta-pe′-ta.
bark, ćuŋ-ha′.
bear, ma-to′.
beard, pu-te′-hi.
beaver, ća′-pa.
belt, i-pi′-ya-ka.
bird, tit-ka′-na.
black, sa′-pa.
bladder, ta-ne′-ha.
blood, o-we′.
blue, to.
boat, wa′-ta.
body, ta-ćun′.
bone, hu-hu′.
bow, i-tas′-i-pa.
boy, oh-shi′-na.
breast, maŋ-ka′.
breechcloth, će-gi-min′-ka.
brother, ćin-ću′, elder brother.
sūn-ka′-ku, younger brother.
buffalo, wo′-ta-ća, buffalo in a herd.
ta-tun′-ga, a bull.
burn, spaun, to burn.

call, ki-paun′, to call.
cap, wa-pa′-ha, hat or cap.
certainly, tōk.
chicken, ōm-pau′-ho-to.
chief, hūn-ga′.
coat, ća-i-gi-nunk′-a.
cold, sni.
copper, muz′-a-zi, gold or brass.
cow, pte.
crow, a′-a-na.
cry, će′-a, to cry.

dance, wa-ći'.
darkness, i-oh'-paz-a.
daughter, ći-wint'-ku.
day, aun'-pa.
dead, ta, to die.
deer, tah'-ća, red deer.
sin-te'-sa-pa, black-tailed deer.
dog, shunk'-a.
door, ti-o'-pa.
drink, yat-ka', to drink.

eagle, wa-min-di'.
ear, noh'-a.
earth, man'-ka.
eat, wo'-ta.
wo'-tap-i, eating.
egg, wīt'-ka.
enemy, to'-ka.
evening, h'ti'-i-tu.
eye, ish-ta'.

face, i-te'.
far off, to'-hund.
fat, wa-shi'.
father, at'-e.
feather, wi'-ya-ka.
finger, nap-e'-wash-i.
fire, pe'-ta.
fisher, ske'-ća.
flesh, ćo-ni'-ća.
flint, ćaŋ-ki'-a-pa.
flour, ah-u'-a-pi.
flower, wah-ća'.
foot, si-ya'.
forest, ćaŋ-no'-ha.
fox, to-ka'-na, gray fox.
shunk-a-sha'-na, red fox.
friend, ko-da'.

give, wi-ćin'-ćin-na.
go, i'-a, to go.
good, wash'-te.
wi-wash'-te, a handsome woman.
goose, ma-ha'.
grass, pe-źi'.
gray, ho'-ta.
grease, wa'-su-na.
great, tun'-ga.
green, wi'-to.
grouse, shi-o'.
gun, ćo-tun'-ga.

hail, wa-su'.
hair, pa-ha'.
hand, nap-e'.
hawk, će-tun'.
he, i'-a.
head, pa.
hear, na-ho'.
heart, ćāŋ'-te.
heel, si-e'-te.
hill, pa-ha'.
horse, shūn'-ga-tun'-ga.
hot, ka'-ta.
mash'-ta, hot weather.
house, ti'-pi, house or lodge.
ti-ma'-hēn, in the house.
husband, hi-ku'-nun-ku.

I, mi'-a.
ice, ćah'-a.
Indian, īks-će'-wi-ćas'-ta.
infant, ta-ku-ski'-na.
iron, muz'-a.
island, wi'-ta.

kettle, će'-ha.
kill, kit'-e, to kill.
knee, ta-hun'-ke.
knife, mi'-na.

lake, min-de'.
laugh, i-ha'-ha, to laugh.
lead, muz-a-su'.
leaf, wah-pe'.
leg, hu.
leggin, hōn'-ska.
lightning, o-wa-ni-hink'-an-da-ka.
little, to'-nun-a.
live, ni-wa', I live.
liver, pi.
love, ćān-te'-do-za.

maize, wa-ko-mo'-hi-za.
man, wi-ćas'-ta.
wa-si'-ću, a white man.
meat, ta-do', raw meat.
wa-ćo'-ni-ća, dried meat.
midday, wi-ćo'-kun.
midnight, hi'-i-tu-ćo'-kun.
mink, i'-ku-sa.
mole, wi-ash'-pu-na.
moon, ha-wi'.
moose, tah'.
morning, hi-a'-ki-ni.
mother, i-na'.
mountain, he.
mouth, i.
much, o'-ta.
muskrat, sink'-pe.

nail, shak-e'.
navel, ćēk-pa'.
near, ash-ka'-na.
neck, ta-hu'.
night, hi'-i-tu.
no, hi-ya'.
nose, po-ha'.
nothing, ta-ko-nish'.

oar, wa-ti'-ća-ga-bo'-ga.
old, we-ća'-ća.
otter, pi-tun'.
owl, hi-hun'-a.

part, a-pa'.
perhaps, ća.
pipe, ćān-du'-pa.
plain, o-min-da'.
polecat, ma-ha'.
potato, pa-he'.

rabbit, mus-tin'-ća-na.

red, sha.
rock, i-ya-tun'-ga.
run, du-za'-ha, to run.

scalp, wi-ća'-pa-ha'.
sea, min-i-wa'-zi-ća.
seat, ōn'-za.
see, wa-ya'-ka, to see.
shirt, ma-hēn'-ta-ūm-pi.
shoe, cāŋ-ham'-pa.
shot-pouch, tah-e-ik-un'.
shoulder, a'-min-do.
sinew, ik-un', sinew of a man.
ta-kun', sinew of an animal.
sing, do-wan', to sing.
sister, tunk-shi'.
skin, ha.
sky, moh-pi'-a-to.
small, ći-ka'-na.
snow, wa.
soldier, a-ki'-ći-ta, warrior.
son, ći-hint'-ku.
speak, i-a', to speak.
spear, wa-hu'-ka-za.
spirit, nah-e'.
wa-kaŋ-tun'-ga, Great Spirit.
spring (of water), wi'-wi.
spring, we'-tu, a season.
star, wi-ća'-pi.
stomach, ah-ća'.
stone, i'-yaŋ.
stream, wah-pa'-na.
strike, a-pa', to strike.
strong, su-ta'.
summer, min-do-ke'-tu.
sun, wi.
swan, ma-ha'-ska.
sweet, sku'-ya.

thigh, će-ća'.
think, i-uk'-a-ćūn.
this, de.
thou, ni'-a.
thunder, o-te'.
thy, i-um'-pi.
tobacco, ćūn-di'.
to-day, am-pe'-ha.
toe, si-ya'-ink-pa.
to-morrow, hi-ak'-a-ća.
tongue, će-źe'.
tooth, i.
town, wi-ćo'-te.
turtle, pat-ka'-sha.

ugly, shi'-ća, bad.
wi-ća-si'-ća, an ugly man.
under, o-kūn'-
valley, kōh'-a.
vein, kun.

walk, ma'-ni, to walk.
war-club, ćun'-pi.
water, min'-i.
min-i-o'-han, through the water.
we, ūn-ki'.
weak, wān'-ka-na.
what, ta'-ko.
which, tūk-te'-wash-i, which one?
white, ska.
who, tu'-a.
wife, tau-i'-ću.
wind, ta-te'.
windpipe, lo-te'.
wing, hu-pa'.
winter, wa-ni'-i-tu.
wish, wa-ćink'-a.
within, ma-hēn'.
without, tun-kād'.
wolf, shunk-to'-ka-ća.
woman, we'-ya.
wood, cāŋ.

yellow, zi.
yes, ho.
young, kōsh'-ka.

CHAPTER XVI.

X. Aub-sa'-ro-ke, or Crow Indians.

ETHNOGRAPHICAL HISTORY.

The Crows were once united with the Minnitarees or Gros Ventres, who now occupy a stationary village on the Missouri. They resided with them, they say, at different places along the banks of the Missouri, where the remains of dirt villages are still to be found. About eighty years since, a quarrel arose which divided them. The nation was governed by two factions, each headed by a separate chief, both of whom were desperate men, and nearly equal in the number of their followers. Jealous of each other, and striving

after supreme command, many difficulties and differences arose from time to time, though they had never proceeded to extremes on these occasions, there being always a sufficient number of wise, cool heads to check or quell such disturbances. At one time, when both the chiefs with their followers were on a hunt together, and a large number of buffalo had been killed, the wives of the leaders quarrelled about some portion of one of the animals. From words they came to blows, and from blows to knives, and finally one of the women killed the other. The relatives on both sides then took part, and each faction headed by its chief joined in the affray, and a sharp contest ensued, in which several were killed on both sides. The result was that about one half left the other portion on the Missouri, and migrated to the Rocky Mountains, through which wild extensive region they still continue to rove. Why they are called Crows we cannot tell; the word Aub-sa'-ro-ke, the name they give themselves in their own language, does not mean a crow in particular, but anything that flies. Since leaving the Missouri, their language has changed to some extent, but still they can converse with ease with the Minnitarees.

The country usually inhabited by the Crows, is in and near the Rocky Mountains, along the sources of Powder, Wind, and Big-horn Rivers, on the south side of the Yellowstone, as far as Laramie Fork on the River Platte. They are also often found on the west and north side of that river, as far as the source of the Mussel-shell, and as low down as the mouth of the Yellowstone. That portion of their country lying east of the mountains, is perhaps the best game country in the world. From the base of the mountains to the mouth of the Yellowstone, buffalo are always to be found in immense herds. Along that river, elk may be seen in droves of several hundreds at a time; also large herds of deer of both species, *Cervus leucurus* and *C. macrotis*. Antelope cover the prairies, and in the "Bad Lands" near the mountains, the mountain sheep (*Ovis montana*), and the grizzly bear are found in the greatest abundance. Every creek and river teem with beaver, and almost every stream furnishes a great supply of fish and fowl in the proper season.

The once almost fabulous country of the Rocky Mountains is now so well known as scarcely to need description here. The scenery of the district now under consideration does not differ materially from other portions of the mountain region. The same high stony peaks and eternal snows are seen, interspersed with fertile valleys of rich land. Most of the rivers whose sources are in these mountains are clear, rapid streams, formed from springs, which widen into lakes of different sizes, according to the nature of the obstruction the water meets with in its descent. In their course through the prairie country, these rivers usually assume a muddy character, from the alluvial nature of their banks. The valleys between the different ranges of mountains are clothed with thick grasses, many flowers, shrubs, and trees, presenting numerous beautiful landscapes. The higher

ranges of mountains may be divided into three different zones. The first third, from the base up, is well covered with tall pines, poplars, and other trees of large growth. The second portion is composed of gigantic masses of rock, overhanging in such a manner as to present a frightful appearance to the traveller below. Among these, a few stinted cedars and pines, with some other shrubs struggle for an existence, sometimes taking root where there is apparently no earth. In the last zone, the vegetation has ceased, and the snow commences, which continues to the summit. This snow is perpetual, though a portion of it melts annually, which loss is supplied the ensuing winter, yet it is presumed that no thaw takes place on the summit, but on the sides some distance down. When the snow accumulates on the projections so as to lose its balance, it is precipitated below in the form of avalanches, something like those of the Alps. Taking in their way large rocks, and increasing in size as they descend, trees give way before them, until they find rest in some portion of the lower zone, where they melt away, and aid in forming the sources of rivers. Snow-slides are also common, by which piles of snow miles in extent are detached, and force their way into the valleys, or at least as far as the thickly timbered section. Some of the springs near the sources of the Yellowstone are bituminous, sending forth an inflammable substance like tar; others are sulphurous, and a few are hot, or boiling. The water of the last is hot enough to cook meat readily. Most of the tributaries of the Yellowstone are well fringed with timber, though the river itself is wooded only about half the way from its mouth to the base of the mountains, that is, many portions of it for considerable distances are destitute of trees. The lower portion of the valley contains wide belts of cottonwood, and the soil is moderately good for agricultural purposes. Considering the Crow district as a whole, it can never become thickly settled, and all the land that can ever be rendered useful for cultivation, is found only in the valleys of the streams, and along the base of the mountains.

The Yellowstone, like the Missouri, rises to the top of its banks every spring, owing to the melting of the snow along the sides of the mountains. This rise usually commences about the middle of May and continues until the middle of June, when it begins to fall, unless kept up by heavy rains. During this high stage of water steamers of light draught might navigate it to the first rapids, which are about one hundred and fifty miles from its mouth. The ice commonly yields about the first of April, and when broken up suddenly, by pressure of water from the mountains, it forms dams quite across the valley, raising the water fifty or sixty feet, and inundating the neighboring country. The Crow Indians are greatly in fear of the water on these occasions, and suffer severely when taken unawares. One of these breakings up occurred a few years ago, early in the month of February. About one hundred and thirty lodges of the Crows were encamped in the valley of the Yellowstone, where the distance from bluff to bluff is more than three miles. The water

came down upon them in the night so suddenly, that they had barely time to escape with their lives by running to the hills. But the land near the bluffs is often lower than that near the bank of the stream, and consequently in running that way they encountered water, wading and swimming through it and carrying their children. They lost the products of their whole winter's hunt, besides nearly all their arms, ammunition, and other property. When the water fell it left immense quantities of ice piled up around their lodges, causing great difficulty in securing them again. Their entire loss on this occasion could not have been less than ten or twelve thousand dollars worth of robes and merchandise. At another time the American Fur Company's fort at the mouth of the Big-horn was inundated in the same way, and a large amount of property destroyed. This river is, when high, very rapid and dangerous to navigate, on account of the rocks, snags, and other obstructions. Mackinaw boats descend it every year, but they are often lost and the men are drowned.

The Crow Indians live in skin huts like the other migratory tribes. They formerly numbered about eight hundred lodges or families, but from the usual causes of diminution, disease and war, are now reduced to four hundred and sixty lodges. These are separated into different bands, each governed by a chief, and occupying different parts of their territory. Those belonging to the band headed by the "Big Robber," usually make their hunt on the head of Powder River, and of late years take their robes to the trading-houses along the Platte River in the spring. Here they obtain supplies to continue their operations, and move back to winter quarters early in the fall. The largest band is led by a chief named "Two-face," and numbers about two hundred lodges. These range through the Wind River mountain region, and deal with the traders of the American Fur Company located on the Yellowstone. A third portion, under their chief, "Bear's Head," wander along the valley of the Yellowstone, from mouth to source, sometimes passing the winter with the Assiniboins near Fort Union. The whole nation have a rendezvous every summer, when, after performing several national solemnities, they move across the mountains to exchange the greater part of the merchandise for horses. This traffic is carried on with the Flat-heads in St. Mary's Valley, or with the Snake and Nez Percé Indians on the head waters of the Yellowstone. With the nations just named the Crows have been at peace for many years, and also with the Assiniboins since 1850. But their natural and perpetual enemies are the Blackfeet on the west and the Dakotas on the east, with both of which nations they have kept up a continual warfare from time immemorial.

I have before me the materials for an extended sketch of the manners and customs, together with biographical sketches of the principal chiefs of this tribe, but, as they will doubtless appear in a future work now in course of preparation, I will close with a brief notice of the different vocabularies of the Crow language which have been published from time to time.

The first one ever taken, so far as I can learn, was published in "Long's Expedition to the Rocky Mountains," and consists of about thirty words. In the "Reise in das Junere Nord Amerikas, in 1832–1834," Vol. II, Prince Neuwied gives us twenty words. Mr. Gallatin also obtained brief but excellent vocabularies from Mr. Kenneth Mackenzie, who was for many years superintendent of Fort Union, near the mouth of the Yellowstone. In Vol. III of Schoolcraft, twenty-two words are compared with the Minnitaree. No idea, however, has ever been given in regard to the grammatical structure of the Aub-sa'-ro-ke or Crow language. The following vocabulary and grammatical sketch I obtained from the Crows, with the aid of an intelligent Scotch trader, Mr. Robert Meldrum, who has lived thirty-three years with that tribe and speaks the language with the fluency of a native. I was also very much aided by a MS. vocabulary of over a thousand words, obtained by Rev. Mr. Brauninger, a Lutheran missionary among the Crows during the years 1859 and 1860, who was killed by a wandering war-party of Dakotas in the valley of Powder River during the summer of 1860.

REMARKS ON THE GRAMMATICAL STRUCTURE OF THE AUB-SA'-RO-KE OR CROW LANGUAGE.

I. Nouns.

1. As a general rule, no change occurs in the termination of nouns to indicate number or case. There are a few exceptions to this rule, however, as, it-si'-ri, a horse, it-si'-ru, horses; da-ka'-ka, a bird, da-ka'-ku, birds.

2. No change is made in the termination of nouns to indicate gender, but different words are used for male and female; as, ói'-ro-pe, a bull; bi-shi'-e, a cow; bat'-si, a man; mi'-a, or, mi-a-kat'-e, a woman.

II. Adjectives.

3. Adjectives follow the nouns which they qualify; as, it-si'-ri-ma-ni-tum'-a-kat, a gentle horse; mi'-a-ha-bu'-ro-ka, a virtuous woman.

4. Sometimes the adjective assumes the plural termination; as, it-si'-ri-ship-it'-uk, black horses; mi-ship-it'-uk, black rocks.

5. The idea of comparison is expressed in the following graduated form; as, it'-si, good; it-se'-e-shēk, better; it-se'-bat-saé', very good, or powerful good; ka-wi', bad; ka-wi-ka'-te, a little bad; ka-wi'-e-shēk, quite bad, or worse; ka-wi'-a-bat-saé', worst, or exceedingly bad; bat-saé', strong, or powerful; a-haé'-kat, a little; i-a'-kat, very small; i-san-ié'-kat, a little larger; i-sa'-e-shēk, larger than the last; i-sa'-bat-saé', very large.

6. Wherever adjectives or nouns are used as verbs, they are conjugated like verbs; as, hin-i-et'-dēk, healthy, or well; mi'-hin-i-et-dēk, I am well, &c.

7. The cardinal numerals are as follows:

one, ha-mat.′
two, nōp.
three, nam.
four, shōp.
five, tsiḥ′-ōp.
six, a-ka′-mak.
seven, ha′-pu-a.
eight, no′-pa-pe.
nine, a-ma′-ta-pe.
ten, pi-ra-ka′.
eleven, pi-ra-ka′-ma-ta.
twelve, pi-rak′-nōp.
thirteen, pi-rak′-nam.
fourteen, pi-rak′-shōp.
fifteen, pi-rak′-tsiḥ-ōp.
sixteen, pi-rak-a′-mak.
seventeen, pi-rak′-saḥ-pu′-ak.
eighteen, pi-rak-no′-pa-piḥ′-te.
nineteen, pi-rak′-a-ma′-ta-piḥ′-te.
twenty, no-pa-pi′-ra-ka.
twenty-one, no′-pa-pi′-ra-ka′-aḥ′-pa-mat-kat.
twenty-two, no′-pa-pi-ra-ka′-aḥ-pi-no′-pa.
twenty-three, no′-pa-pi-ra-ka′-aḥ′-pi-na′-mo.
twenty-four, no′-pa-pi-ra-ka′-aḥ′-pi-shōp.
twenty-five, no′-pa-pi-ra-ka-aḥ′-pi-tsiḥ′-ōp.
twenty-six, no′-pa-pi-ra-ka′-aḥ-pa-ka′-mak.
twenty-seven, no′-pa-pi-ra-ka′-aḥ-pi-sa-pu′-a.
twenty-eight, no′-pa-pi-ra-ka′-aḥ-pi-no-pa′-pi.
twenty-nine, no′-pa-pi-ra-ka′-aḥ-pi-ma-ta′-pe.
thirty, na′-ma-pi-ra-ka′.
forty, sho′-pa-pi-ra-ka′.
fifty, tsiḥ′-a-pi-ra-ka′.
sixty, a-ka′-ma-pi-ra-ka′.
seventy, ha′-pu-pi-ra-ka′.
eighty, no′-pa-pe-a-pi-ra-ka′.
ninety, a-ma′-ta-pe-pi-ra-ka′.
one hundred, pi-ra-ka-sa′.
two hundred, no′-pa-pi-ra-ka-sa′.
three hundred, na′-ma-pi-ra-ka-sa′.
four hundred, sho′-pa-pi-ra-ka-sa′.
five hundred, tsiḥ′-o-pi-ra-ka-sa′.
six hundred, a-ka′-ma-pi-ra-ka-sa′.
seven hundred, ha′-pu-pi-ra-ka-sa′.
eight hundred, no′-pa-pe-a-pi-ra-ka-sa′.
nine hundred, a-ma′-ta-pe-pi-ra-ka-sa′.
one thousand, pi-ra-ka-sa′-pi-ra-ka′.

The Aub-sa′-ro-ke, or Crows, like all the Indians with whom I am acquainted, use their fingers in counting, bending them down temporarily against the inside of the hand as they proceed, until they reach ten, when one finger is allowed to remain down. They do not usually count higher than a thousand, as they say honest people have no use for larger numerals; aḥ′-pi, means added to, as 20 + 1 = 21.

8. There are also, though rarely in use, numerals of the adverbial form; as, a-ma-tak′, once; en-e-nōm′-pe, twice, a second time.

III. Adverbs.

9. Adverbs precede the words which they qualify; as, a-ma-ta′-aḥ′-pik, I shot it only once; i-uk-ūs′-na-ra, go there.

IV. Prepositions.

10. Prepositions follow the nouns which they govern; as, mo-na-ke′-da, up a tree; min-mo-in′-a, in the water; shi-ća′-ke-da, up a hill; shié-bu-uk′-i-sa, down a hill; min-a-sa′, by the shore; a-she′-a-ke′-da, on the top of the house; a-she-mo′-na, inside of a lodge.

V. Conjunctions.

11. Conjunctions usually follow the nouns which they connect; as, a-pe′, and; ći′-ro-pe-bi-

shi′-a-pe′, bulls and cows; da-ka′-ka-na-ka-a′-pa, the bird and its young. Sometimes the conjunction is repeated after both nouns; as, ći′-ro-pe-ho-it-si′-ri-ho, a bull or a horse; uh̄-ho′, it is either the one or the other.

VI. Interjections.

12. There are but few interjections; as, ha-hi′-a! halloo there! to call to one at a distance; di-du′-ka-źa! hurrah! to one only; di-du-ka-źa′-ra! hurrah, my boys! a common word used in the act of fighting; ho! come! nēs-ha′-ra! get out! nah̄′-a-ra! go away!

VII. Pronouns.

13. Pronouns are of two kinds, the simple and the fragment pronoun. The simple pronouns are complete in themselves; the fragment-pronoun is found only in connection with other words. The simple personal pronouns are,

bi, I.	bi′-rūd, we.	bi′-ru, us.
di, thou.	di′-rūd, you.	di′-ru, you.
i, he.	i′-rūd, they.	i′-ru, them.

14. The possessive personal pronouns are declined in the following manner:

AFFIRMATIVELY.	bi-ru′-duk, it was ours.
bi-bēk′, it is mine.	di-du′-duk, it was yours.
di-dēk′, it is thine.	i-du′-duk, it was theirs.
i-dēk′, it is his.	
bi-ru′-dak, it is ours.	NEGATIVELY.
di-ru′-dak, it is yours.	bi-be′-sa, it is not mine.
i-ru′-dak, it is theirs.	di-de′-sa, it is not thine.
	i-de′-sak, it is not his.
bi-di′-duk, it was mine.	bi-ru-be′-sa, it is ours.
di-di′-duk, it was thine.	di-ru-de′-sa, it is yours.
i-di′-duk, it was his.	ko-de′-sak, it is theirs.

15. The fragment-pronouns are used in conjugating verbs and declining nouns, and are placed at the beginning, in the middle, and sometimes at the end of the word, as the form of the noun or verb may seem to require. Those pronouns denoting possession are attached to all nouns which represent objects of ownership. The following illustrations will explain themselves without further remark. Changes of vowels occur according to the form of the word or particular vowel with which they stand connected.

mi-nup′-h̄e, my father.	ba-ćin′-a, my husband.
ni-nup′-h̄e, thy father.	da-ćin′-a, thy husband.
i-nup′-h̄e, his father.	is-ćin′-a, her husband.

ma-nak′-mi-a, my daughter.
na-nak′-mi-a, thy daughter.
ko-nak′-mi-a, his daughter.

ba-ku′-pe, my brother.
da-ku′-pe, thy brother.
ko-a-ku′-pe, his brother.

ma-shu′-a, my head.
na-shu′-a, thy head.
i-shu′-a, his head.

bi-sas′-ku, my horses.
di-sas′-ku, thy horses.
i-sas′-ku, his horses.
bi-ru-ba-sas′-kūk, our horses.
di-ru-di-sas′-kūk, your horses.
i-ru-i-sas′-kūk, their horses.

ba-sah′-e, my mother.
da-sah′-e, thy mother.
i-sah′-e, his mother.

mu′-a, my wife.
nu′-a, thy wife.
u′-a, his wife.

ma-nak′-ba-tse, my son.
na-nak′-ba-tse, thy son.
ko-nak′-ba-tse, his son.

ba-smi′-a, my sister.
da-smi′-a, thy sister.
ko-i-smi′-a, his sister.

bas-ba′-źe, my boat.
das-da′-źe, thy boat.
is-ba′-źe, his boat.

mi-ba-rut′-shik, I have got good sense.
a-mu′-kak, I saw or have seen.
i-rūd′-mi-ić′-ish-ēk, they love me.
bet-dis-ić′-a-da, you love each other.

16. The adjective-pronouns are quite numerous:

First, distributive, as, ko′-ta, each, every, or all; bi-rup′-tse-pi′-ra-ka-ko′-ta, each one ten charges of powder; ma-e-ha′, neither, or something else.

Second, demonstrative, as, hin-e′, this or that; hin-e-ma-nu′-a, this object or thing; hi-dēd, these; hi-dēd-bi-ruh′-pa-ke, these persons.

Third, interrogatives, as, sap, or sa′-pa, what? sa-pe′, who, or who is it? sap′-te, why, or why is it? sho or sho′-rak, where, or where is it?

VIII. Verbs.

17. (1.) In Aub-sa′-ro-ke verbs, there are three moods, indicative, imperative, and infinitive.

(2.) Three tenses, past, present, and future.

(3.) Two numbers, singular and plural. No dual form has as yet been observed.

The following list of forms, imperfect as it is, will convey some idea of the character of the conjugation of the verbs in this language.

ba-shik′, I am dead.
sa-hik′, thou art dead.
ka-rish′-e, he is dead.
ba-sūk′, we are dead.
ka-re-sūk′, they are dead.
sa-ha′-kek, to die, or it is dead.
sa-match′-e (imp.), die.

ma-ne′-shik, I am hungry.
na-ne′-shik, thou art hungry.
a-ne′-shik, he is hungry.
ma-ne-shis′-a, I am not hungry.
na-ne-shis′-a, thou art not hungry.
a-ne-shis′-a, he is not hungry.
ma-ne-shi′-ink, I will be hungry.
na-ne-shi′-ink, thou wilt be hungry.
a-ne-shi′-ink, he will be hungry.

bi-ba-kuć′-ik, I am thirsty.
di-da-kuć′-ik, thou art thirsty.
a-kuć′-ik, he is thirsty.
bi-ba-kuć′-is-a, I am not thirsty.
di-da-kuć′-is-a, thou art not thirsty.
a-kuć′-is-a, he is not thirsty.

mi-a-pak′, I am cold.
ni-a-pak′, thou art cold.
i-a-pak′, he is cold.
bud-e-a-pak′, we are cold.
i-ru′-da-pak′, they are cold.
mi-a-pa-sak′, I am not cold.
ni-a-pa-sak′, thou art not cold.
i-a-pa-sak′, he is not cold.
bud-e-a-pa-sak′, we are not cold.
i-ru′-da-pa-sak′, they are not cold.

ba-bu′-she, I eat, or am eating.
ba-du′-she, thou eatest, or art eating.
ba-būsh′-mīk, I will eat.
ba-dūsh′-mīk, thou wilt eat.
ba-de-dūsh′-nīk, wilt thou eat?
ba-būsh-is-a′-nīk, I will not eat.
kun-ba-bu′-she, I am done eating.
kun-ba-du′-she, thou art done eating.
ba-de-dūsh′-kōm-nak, art thou done eating?
kun-ba-būsh′-ko-mak, I am done eating.
nam-ba-būsh′-mōk (imp.), let us eat.
du′-she (imp. sing.), eat.
ba-ru-sa′-ra (imp. pl.), eat.

ba-dić′-ik, I strike.
da-dić′-ik, thou dost strike.
i-dić′-ik, he strikes.
bi-dēd′-ba-dić′-ik, I myself strike.
di-dēd′-da-dić′-ik, thou thyself dost strike.
i-de-dić′-ik, he himself strikes.
bi-rić′-ik, I will strike.
di-rić′-ik, thou wilt strike.
i-rić′-ik, he will strike.
bi-dēd′-ba-rić′-ik, I myself will strike.
di-dēd′-da-rić′-ik, thou thyself wilt strike.
i-dēd′-a-rić′-ik, he himself will strike.
it-a-ba-dit′-nak, I am going to strike.

bi-ōź′-ik, I am burnt.
di-ōź′-ik, thou art burnt.
i-ōź′-ik, he is burnt.
bi-dēd-ash′-tak, I myself burnt them.
di-dēd-ash′-tak, thou thyself didst burn them.

mi-hum-ish′-ik, I am sleepy.
ni-hum-ish′-ik, thou art sleepy.
hin-um-ish′-ik, he is sleepy.

ba-rēk′, I go.
ba-re-mi′-a-mak′, I would like to go.
ba-re-mi′-ink, I shall go, or shall I go.
ba-re-sa′-mīk, I will not go.
ba-re′-mīk, I will go.
da-de′-nīk, thou wilt go.
de-sa′ (imp.), do not go.
na-ma′-ra (imp.), go, all of you.
di-tut′-da (imp.), you go alone.
da (imp.), go.
mi-ne-ki′-a (imp.), let me go.

ba-she′-ćik, I mashed it.
de-she′-ćik, thou didst mash it.
i-she′-ćik, he mashed it.
bi-rūd′-ba-she′-ćik, we mashed it.
i-rūd′-a-she′-ćik, they mashed it.

ma-ma′-nik, I did shoot.
bi-ma′-nik, he shot me.
di-ma′-nik, he shot you.
bi-ru-ma′-nik, he shot us.

bi-pu-a′-mīk, I will shoot.
ma-di-pu-a′-mīk, I will shoot you.
di-pu′-a-ka′-ni, thou mayst shoot.

ba-de-dūsh′-ni-shik, dost thou want to eat?
ba-būsh′-mi-shik, I want to eat.
mi-uh-pūsh′-ik, I am full, *i. e.*, I have eaten enough.

mi-ié′-ish-ēk, I am loved.
ni-ié′-ish-ēk, thou art loved.
ko-ié′-ish-ēk, he is loved.
mi-ée′-mué-ish′-e, I love myself.
nié-e′-nue-ish′-e, thou dost love thyself.
a-mué-ish′-ēk, I did love.
a-mué-ish′-e-sak, I do not love.
it-a-a-mué-ish′-e-nak, I am about to love.
a-mué-is′-a-mēk, I will not love.
bud-e-its′-ish-ēk, thou lovest us.
ni-e-mué-ish′-ēk, I love you.
mi-its-ish′-e-ki-a (imp.), let me love.
ié-is-sa′-ra (imp.), love.
mi-ié-ish′-e (imp.), love me.

bu-ru-pi′-uk, I hate.
du-ru-pi′-uk, thou hatest.
i-ru-pi′-uk, he hates.
bat-bu′-ru-pi′-uk, we hate each other.
bu-ru-pi′-a-mink, I will hate.
du-ru-pi′-a-mink, thou wilt hate.
i-ru-pi′-a-mink, he will hate.
ni-bu′-ru-pi′-uk, I hate you.

mi-hin′-i-et′-dēk, I am well.
di-hin′-i-et′-dēk, thou art well.
hin′-i-et′-dēk, he is well.
bud-e-hin′-i-et′-dēk, we are well.

a-ma′-ka, I see.
a-da′-ka, thou seest.
i′-ka, he sees.
a-ma′-ku, we see.
a-da′-ku, you see.
i′-ku, they see.

a-mak-is′-ak, I do not see.
a-dak-is′-ak, thou dost not see.
i-kis′-ak, he does not see.
a-na′-ka, do you see.

i-ki′-a (imp.), look at.

mi-hu′-shik, I run.
di-hu′-shik, thou dost run.
hu′-shik, he or it runs.
mi-ho′-sūk, we run.
di-ho′-sūk, you run.
ho′-sūk, they run.
ka′-na (imp.), run away.

aub-sa′-ro-ke-mi-ié′-ish-ēk, I am loved by the Crows.
ish′-mīk (participle), drinking.
bi-min-ish′-mi-mīk, I am drinking water
ba-hi-ri′-pa-sa, there is no scarcity.
bi-dup-ish′-e, or bi-dup′-det, there are no beaver.
a-ma-su-a-di-e′-ba-mik, I am going to build a fort.
bat-se′-da-de, have you been out hunting?
sap′-du? what did you kill?
mi′-dak-pe-sak, if you do not kill me.
di-bak′-pe-mik, I will kill you.
bi-ruh-pa′-ke-ba-sié′-e-bak, } I love the people.
bi-ruh-pa′-ke-a-mué-ish′-ēk, }
i-e-ke′-be, to wear.
i-a′-ra (imp.), wear that as a blanket.
da-hin′-e-et-a′-ra (imp.), go and do it.
ba-a-ta′-na, I steal.
a-ta′-na, it steals.
ba-a-tan′-mi-uk, I would like to steal.
do-tué′-ik, you bite it.
bi-ru-tué′-ik, he bites us.
bo-ro-ta′-hēk, I break it in two.
do-ta′-hēk, you break it in two.
hu-a′-maé, to come and sit down.
bi-dēd-ba-da′-maé, we come and sit down.
a-mué-ish-im-ink′-pak, I think I love.
a-ué-ish′-e-tats, you think you love.
min-e-ska′-pik, he fell into the water.
ship-i-a-sié′, he threw it into the mud.
ship-i′-a-ko-sié, it was thrown into the mud.

bi-de′-sić, I threw it in the fire.
a-she-ku′-kak, he is in the village.
bat-saḥ′-puk-na-ra (imp.), go all together.
bat-sa-buḥ′-me-mūk (imp.), let us all go together.
i-ćo-ken′-i-ćēk, he has whitened himself with clay.
ba-ret-in-e′-pać, I think not.
ba-re-ta′-ra (imp.), let it not be.
ba-ra-ta′-rik, it shall not be.
bi-nōp′-ka-ti′-a-ma-ku, we all see two of them.

18. There are certain words used only by the women and children; as, i′-ka, attention, used when a woman calls to her friend; hi′-na, comrade or companion; ba-sa′-ka, mother; a little girl addresses her mother as ba-sa′-ka, and a little boy his father as, aḥ′-e; ba-sa′-na, older brother; ba-sa′-kat, older sister; ba-so′-ka, younger sister.

19. PHRASES AND SENTENCES.

ba′-źe is-a-kat′-a ći′-a-ka-ta miu′-a-ta da-ka′-puk
canoe beautiful white on water floats
bu′-uk i-sa′-dēk.
goes down.
A beautiful canoe floats on the water, or goes down the stream.

ba-hu′-ra bat-sa′-ća e′-kus na-na′-mēk.
blackbird great the other side flies.
A great blackbird flies to the other side.

aḥ-pa-naḥ′-e a-she′ a-ho′ wat-sać′.
in the sky house a great many very large.
In my Father's house are many mansions.

ba-sa-pe′ aḥ-i-ta′ ka-wi′.
moccasins wet bad.
Wet moccasins are bad.

aḥ-pa-naḥ′-e a-she′ ka-wi′ ka-wi-ka-wi-ti′-a-sa.
in the heavens house bad bad bad very.
In the heavens are houses, bad, bad, very bad.

i-sa′-ka-wat′-e aḥ-pa-naḥ′-e he′-re-re.
Great Spirit heavens among.
The Great Spirit is among the heavens.

bi-ruḥ-pa′-ke ta-pi′-ōk pat-pa-tsi′-ūk.
a person has been killed in the war.
A person has been killed in the war.

aḥ-pa-naḥ′-e a-she′ a-maḥ′-e ak-tsi′-se.
in the heavens lodge sky on the other side.
In the heavens, in the lodges on the other side of the sky.

it-si′-re a-hūk′ bi-she′ a-ho′ wat-sać′.
horses plenty buffalo a heap very great.
A plenty of horses, and a very great abundance of buffalo.

A Prayer to the Great Spirit.

Mi wa-tsēsh′-yat ka-wi′ mi mba-tse′-tse-rik it-si′-re a-ho′ be′-mi ba-sap′-ka-te it-siḥ-at′-te-be i-mi-a′-wa. It-si′-re it-si-ka′-ta ma-ka′-ku shi′-a-kat a-she′-i-sa′ be-i-mi′-a-wa it-si′-re a-ho′ be-i-mi′-a-mo it-si′-re it-siḥ-a′ a-ta′-nu-a be-i-mi′-ma. O-mat-ma-naḥ′-e gu-ru-tats be-miḥ′ mi-a it-si-ka′-ta a-paḥ′-pa-miḥ bi-shi′-a-te-kat. Pi′-a na-mo′ ba′-ret pi′-a hep′-kat it-si′-ka ish-te-pit′-e a-te-kat′-ham ba-ba′-miḥ ha-hu′-a. Pa-pe-miḥ′ bi-ruḥ′-pa-ke su′-a ka-ra-ko′-me-o it-siḥ′; ma-naḥ′-u-a sap′-ka-te-e-i-ru′-ke it-si-ka′-ta tu′-shi bi-ruḥ′-pa-ke ba′-ka ba-kak-shi′-at bi-she′ it-si-ka′-ta a-hūk′ tu′-shi a-hūk′.
horses plenty buffalo a heap very great.
I am poor; that is bad; make me a chief; give me a plenty of horses, give me fine clothing. I ask for good spotted horses; give me a large tent, give me a great many horses; let me steal fine horses; grant it to me. Give me guns by cheating; give me a beautiful woman; bring the buffalo close by. No deep snow; a little snow is good. Give me Blackfeet to kill or to die, close by, all together. Stop the people from dying, it is good; instruments for amusement, blankets too; fine meat to eat; give the people altogether a plenty of fine buffalo, and plenty to eat.

Mi-nup′-he ak-ma-ku′-ko a-ma′-ća; do-ha′-ra da-źa-
My Father above resides; let thy name be

ćik′; is-a-me-hu-ka′-ra; a-na-mis′-će ko-mik′-a-ra ma-
good; let thy country come; thy will let be done above

ku′-ko a-hin′-e a-me-ko-mik′; hin′-e ma′-pe e-bud′-e
on high as here on earth is done; this day food

ku′-a ku-re-shīt′ bud-e-ku′-a-ra e-rup-a′-re bi′-rūd aup-
give

a′-she a-mis′-će ba-ka′-wi a-ku′-sa-ni ku-ru′-tu a-me′ it-

ći′-uk a-sīk′ ba-ko-ći′-ta ba-ko-ći′-ta ka-ra-ko-mi′-sa.
forever, forever, let it be done.

Ka-ra-ko′-mik. May it be so.

NAMES OF TRIBES, CHIEFS, ETC.

aub-sa′-ro-ke, the Crows, the original people.

da-ko′-ta or ma-ko′-ta, the Sioux, or Dakotas of the Missouri.

i-sōnsh′-pu-she, the Shyennes: meaning undetermined.

ba-ra-shūp′-gi-o, Dakotas or Sioux: meaning undetermined.

bik-ta′-sa-te-tu′-se, a-shi-ap′-ka-wi, } very bad lodges.

bik-ta′-she, and sho′-sho-ni, Grass lodges or Snakes.

a-ra′-po-ho or -hose, the Arapohos.

tse′-twa-tse, tuft of hair.

u-ka′-she (ūk, earth, a′-she, a house), earth houses.

a-shu′-e-ka-pe, the Flat-heads.

a-pū-pe′, to paddle, paddles.

ak-min′-e-shu′-me, the tribe that use canoes.

a-pi′-mi-she, people having beards.

ish-te-pit′-e, the Blackfeet.

kam′-ne, Blood Indians.

i-e-wat-se′ (i′-e, mouth, wat-se′, men), mouth men.

a-ma′-te-wat-se′, iron men.

a-me-she′ (a′-me, earth, a-she′, a house), people who live in earth houses, Gros Ventres of Missouri, Minnitarees.

a-pan-to′-pse, Arickaras.

as-a-ka-shi, the Mandans.

bat-se′-e-a-kać, Gray chief.

bi-rūh′-us, the Ice.

a-ra-ću′-ra-sash, the Big Robber.

au-ma-ha′-be-ći′-se, Mountain Tail.

CHAPTER XVII.

VOCABULARY OF THE AUB-SA′-RO-KE, OR CROW LANGUAGE.

A.

abdomen, be′-re-a-rēh′, sickness in the abdomen.

abominable, ban-di-shi′-i-nit, horrible, abominable.

above, ma-ku′-ku-re.
ma-ko′-ko, above, upward, in the sky.
a′-ga-tsi-sa′-re, ma′-gu-gu-re, } above, over, uppermost.

absent, a-tsi′-sak, away.
i-ha′, i-ha′-kūk, } away, not here.

abuse, ban′-dać, to abuse, to misuse.

accompany, bat-sah′-pak, to accompany, to go together.

ache, a-rēk′, mi-ah′-u, } to feel pain.

active, in-i-she′-tuk.

added to, ah-pe′-ta, and ah-pe′, or ah-pi′.

advanced, i′-se-ko, a long time, advanced in age.

afar off, a-ma-te′.
a-ma-te′-me′-mōk, to go afar off together.

affable, ba-e-de′-te, affable, courteous.

afraid, ta′-sash, ta′-sa-si-o, } to be afraid.
tsi′-tik, to be afraid, as of enemies.

after, in-sa-ku′-sa, after a while.

ago, ba-ku′-ske, long ago.
i-sko′-ka-e-shi′-e-ka-she, a long ago.
agriculture, a-ra′-ćik, tilling the ground.
aid, at-bak′, to aid, to assist.
aim, mish-ćūsh′-mih, to take aim at anything, to take sight with a gun.
ma-is-ću′-se, to aim at anything.
alder, ma-nis′-će, white alder.
alike, ba-tsi-ćēk′, two things alike, it is alike.
all, ko′-ta, the whole.
a-a-tsi′-e-ćēk, all around, about.
alone, tats′-yat.
ha-ma′-ta-tats-kat, to be alone, or anything standing alone.
altogether, ha-hu′-e-ka-se, and ba-kak′-she.
amorous, to′-ka-sak.
and, a-pe′.
ankle, at-sa′-ra-bi-she.
annoy, is-is-dis-će-shi′-e, to annoy one.
annually, a-me-shi′-i-she, yearly.
a-me-tsu′-se, semi-annually.
arm, ba-ro-pa′-ko-ba-re, the right arm.
ba-rah-tsi′-sko-ba-re, the left arm.
da-ća-mu′-a, hollow of the armpit.
arrow, a-nu′-e-te.
ba-sa′-e, ma-sa′-e, } an arrow-point.
ba-sa′-e-wa-pah′-mih, to cut off an arrow-point.
ba-rak′-she, arrow-stick, wood part of an arrow.
a-no-mut′-a-i′-sha, ma-re-wa-is′-ko, } a quiver for arrows.
ash, min-e′-pit-e, the white ash.
ask, ma-ku′, ha-ma-ku′-e, } to ask, to beg.
mi′-e-bać-u′-e-ma-ku′, to ask a woman for an awl.
assist, a-rah-di′-a-hu, to assist.
autumn, ba-se′.
avoid, ti′-a-su, to avoid, to cease from doing.
awl, ba-tsu′-e, a sewing awl.
ba-tsu′-e-ta-re, an awl blade.
axe, ma-ći′-pe.

B.

back, shu′-a.
shu′-a-pu′-a, a sore on the back of a horse.
backbone, a-rūh′-a-ro.
bad, ka-wi′.
ap-ka-wi′, ti′-a-sa, } very bad.
a-ni-ka′-wi, Bad Pass in the Rocky Mountains.
badger, tsi-pa′-mu-ne.
band, tsih-ba-wa′-ik-tse, a band of Crows.
bank, ma-pe′, a bluff, bank.
bark, wa′-ak-she, the inner juicy bark of the sweet cottonwood, of which the Indians are very fond.
bead, ba-ro.
ba-ro-pu′-she, a bunch of beads.
teh′-at, ban-teh′-at, } ash-colored beads.
ba-sah′-ba-ro, beads on moccasins.
ba-sa′-tse-ba-ro, beads on leggins.
a′-shi-she, yellow beads.
bear, dah-pit-se′, a grizzly bear.
dah-pit-sōh′-e, a hog, swine.
dah-pit-seh′-ne-she, a kind of berry, of which bears are fond.
beard, mi′-e-tsi-e.
mi′-e-tsi-e-wa-tse′-re-shu′-i-tse, to shave the beard.
mi′-e-tsi-e-wa-ku-rūsh′-tse, to pluck out the beard.
beat, wat-wu-ru′-ōk, to beat another.
ba-rit′-mih, to beat or strike any one.
bed, o-ma′-će, a coverlet for a bed.
before, ishb-tsi′-sa-re.
beggarly, ba-ka′-ni-tuk.
beginning, hu-ku′-se, at the beginning, formerly.
behind, bish-tsi′-sa-re, behind, in the rear.
hau′-ga-she, to be behind.
bell, ba-te-bu′-e, and ba-te-wi′-e.
ba-te-wi′-e-a-mu′-e, a bell-tongue.
bellowing, sah′-ik, the bellowing of bulls.
belt, mi-he′-ru-pde, mi-pe-tah′-e, } my belt.
bend, a′-ra-bat′-sak, to bend.
ta-ka′-ke-we, to bend the bow.
bird, da-ka′-ka, birds in general.
da-ka′-ki-sko-ći, wild turkey, or the birds' enemy.

da-kak-shu'-ak, bluebird.
da-ka-kīm'-po-ka-te, the bird whose tail rattles.
da-kak-ći'-a, red-headed woodpecker.
da-kak'-ba-de'-de-pe, a bat, winged mouse, lips of the vagina.
da-kak-is-ći'-tse, a bird's nest.
tsi'-naḥ-da-ka'-ke, a feather.
a-ma-sha'-is-da-ka'-ko-sha, hay-bird. *Icterus.*
is-ka'-će, a yellow singing bird.
ba-hi'-ri, blackbird.

bitter, ba-e-saḥ'-a-ba, a bitter root.

blanket, bi-ka-sa'-pi, and ba-sa'-she.
ba-sa'-she-hu'-a-ka-we, give me the blanket.
bi-she-pit'-e, a dark blue blanket.
bi-sho'-shi, a red blanket.
bi-shu'-e-ka-te, a light blue blanket.

blister, ba-tsiḥ', blisters from friction.

blood, i'-de.
i-dīn'-de, vein.
i'-de-e-taḥ'-e, i'-riḥ, } to bleed.
a-hu'-a-nōm'-pe, mixed blood, a half-breed.

blue, sho'-shu-kat.

boat, ba'-źe.
ba'-źe-bi'-de, a fireboat, steamboat.
ba-źe'-aks-mōk, the boats are crossing the river.

boil, a-tak'-e, boils on any part of the body.

bone, tu'-shi-to-ćo'-se, the white bones lying on the prairie.
hu-a-rēk', pains in the bones.
min-ōk'-se, large mammoth bones in the West.
du'-pe, marrow-bones.

book, ba'-re-ma-ma-na-tse-i'-she, a writing or painting.

boot, rūsh'-te.
rūsh'-te-a-wu'-e-mīḥ, to pull off the boots.

borrow, ba-ka'-nik, I borrow.

bowel, i-smu'-a, the internal parts of an animal.
i-smu'-a-re, any bowel disease.

bowstring, ma-naḥ'-e-ka-she-aḥ-e'.

box-elder, mish-pe'.

boy, ba-ko'-te, and shi-ki'-a.
ba-i-e-ka'-te, a small boy.

brave, bi-ruḥ-pa'-ka-ri'-će, a warrior, a brave.

bread, baḥ'-a-wa, and baḥ'-a-ba, bread or flour.
baḥ-a-bu'-e-ri'-e-wa-miḥ, kneading dough.
baḥ'-a-wa-ta-reḥ', to bake bread.

break, dēḥ-shi'-she, ta-huk', } to break.
bu-ru-ta'-i, to break off.

breast, buḥ-u'-e, and du-shu'-a.

breath, ku-ći-ri'-ak, to breathe.

breech-cloth, ba-da-in'-ća-sa-će, and ba-sa-shi'-aḥ-tsi.

bridle, ba-sa-shi'-aḥ-tsu'-me-te, i-aḥ-tse'-o-ma'-te, } a bridle for a horse.

bring, o-ka'-be, to bring.
o (imp.), bring.
a-na'-ku, to bring, as a message.

broad, shūḥ'-ak, large, broad.

broken, bu-rūḥ'-shiśh', broken, it is broken.
hu-daḥ'-shi-she, a bone broken in any other way than by a bullet.

brother, mi-ke', an elder brother.
ma-na-sha', my brother-in-law.

brush, bik-ta-sa-pi-a-ku-ru-ka'-tu-a, a clothes-brush.

bud, a-si'-rik, a bud of a tree or flower.

buffalo, bi-she'.
bi-she'-a, a cow or female buffalo.
bi-sheḥ'-tse, a white buffalo.
bi-she'-i'-će, buffalo tracks.

bug, pa-re-a-pu'-she, a coleopterous insect about the excrement of animals.

bullet, a-ro-pa-pa'-she'-a-hūk, a great quantity of bullets.

burn, a-ra'-pēḥ, it burns.
hu'-pa-miḥ, to burn a hole in wood with a hot iron.

burr, ba'-ke, a sticking burr, of the *Glycyrrhiza lepidota*, very annoying to travellers, by clinging to the clothes.

bush, bish-yaḥ-tsi'-e.
ak-bud-e-tsi'-she, a hawthorn bush.

button, be-ro-sho'-ma-te, and o-muć'-e-ćuḥ'-e.

buy, ma-e'-śće-be, to buy anything.

C.

cactus, i-ći-ri'-e-hi-e, *Opuntia.*
ba-sać', the pricking of the spines of the cactus.

calf, naḥ-up-ka'-te.

call, ta′-sash, to call.

care, ba-bu-sih′-i-se, I care nothing about them.

carry, tsi′-ōk, to carry.

ba-ći′-ak, I carry anything.

carve, i-dank′.

wa′-tats, to carve or cut.

wa-tats′-e-mih, I carve or cut.

cat, i-spi′-o-ha-she, a wild cat.

i-spi-i′-sa, a panther.

cattle, bi-she′-i-tsi′-re, domestic cattle.

cedar, īp-tse-tsi′-ha-he, *Juniperus*, running cedar.

min-ah′-pe, the upright cedar.

min-ah′-pe-bat-su′-e, the fruit of the cedar.

o-ma-ko′-ći-ru-e, the ground cedar.

o-ma-ko-ma′-na-ke, kinnic-kinnic.

min-ah′-pe-aź-ka′-te, Little Cedar River.

chain, i-tsi-ti′-e, a chain.

challenge, bat-si-eksh′-mi, to challenge to conflict.

charge, to-ka-ki′-shi-ke, to charge a gun.

chase, ko-mak′, to give up the chase.

cheat, tsu-se-a-tu′-se, to cheat.

cheek, i-se-rūh′-e.

child, na′-ke, a child, any young animal.

ma-na′-ke, my child.

ma-na′-ke-ha-hu′-a, all my children.

i-san′-det, a step-child.

chilliness, a-pah′-te.

chop, de-puh′-e, to chop.

clap, ti′-shi, to clap the hands.

claw, i-tah′-pu-a, the claws of a bear.

clay, o′-ke.

o-ke-ći′-e, white clay.

clean, o-kin′-i-tuk, to clean.

bah-u-ru-shi′-tsh, to clean a gun.

clear, sa′-shik, and ta′-shik.

min-e-ta′-shik, clear water.

min-e-pih′-tak, clearly.

clench, bash-tih-nu-he′, to clench the hand.

close, ah′-ta-kat, near at hand, close.

cloth, ba-sap′-ka-te, any kind of clothing.

cloud, a-pah′-e.

coat, mi′-ta-shi-ne.

mi′-ta-shi-ne-a-mu′-ke, a vest or undercoat.

ba-da-sho′-i-shi′-ste, chief's coat.

ba-da-i-tash′-ne-hap-ka′-te, an Indian shirt.

cold, ho-te-shi′-re, and tsi-ni′-ak.

comb, ma-ne-shu′-ge-ru-ga′-tse, a coarse comb.

mbe-ta-ni′-o, a fine comb.

ba-de-a-shu′-e-ku-ro-ha′-tse, a comb made of porcupine's tail.

come, ho, (imp.)

hu′-be, come here, in speaking to a child.

hu-ka′-be, come here, in speaking to a grown person.

hu′-e (imp.), bring it.

hu-a-ma′-ka-mih, come, let me see.

hu-a-mać′, to come and sit down.

bo′-mek, come back.

comrade, min-e-pah′-e, a male comrade.

cook, ti-o′-ka-wi, ti-e′-ka-wi, } to cook.

bu-rūk′, to cook or roast meat.

cord, bi-shih′-pe, a rope or cord.

corn, ho-pa′-ste, corn, or maize.

nikt-ya′-pa-pa-she′, the ear of corn or wheat.

a-mu′-e, a grain or kernel of wheat or corn.

count, ma-ne-mik′, to count.

courageous, ba-e′-tse-ret, spirited, brave.

crack, i-nu′-a, a crack or split.

crippled, man-dēk′.

crooked, shi-shu′-pih, not straight.

cross, man-tu′-pah-e, used in the Catholic worship.

cruel, ba-tah′-te.

cup, be-dah′-de-a.

cure, di-a-ma-kūh′-e, to cure the sick, to make medicine for the sick.

curlew, o-haé′-ke, long-bill.

cut, wa-pash′-tsu-mih, to cut off.

bash′-ki-o, to cut off the neck.

a-sa′-tu, a-sa′-tsi, } cutting through with a knife.

a-sat-mih′, I cut through with a knife.

a-me-ko′-wah-e, to cut with a knife.

a-pa-hu′-a, de-ći′-pe, } to cut with an axe.

cry, i′-bēk, to cry.

D.

dance, bas-wat-si′-pe, a stick with numerous figures on it, used in dancing.

daughter, ma-nak-mi′-a, my daughter.

day, ma′-pe.

dead, she-ēk′.
she-i-ūk′, dying.
ba-daḣ′-te, to be in the agonies of death.
a-mu-sa-ma′-miḣ, to bury or inter, as the dead.

deafness, a-kūḣ′-de-tuk.

deep, na′-mo, deep, as water or snow.

deer, ōḣ′-bish-ke.
oḣ′-bish-kat, a young deer.
oḣ′-a-te, an antelope.

dependent, mi-um′-i.

die, sa-ha′-kēk, ka-ra′-she, } to die.
bash-mēk′, I will die.

difficult, ma-ma-ni′-stēk, it is difficult, with difficulty.

dig, a-ma-eć′-ka, to dig.

dip, ab-e-stēk′, to dip, as water with a cup.

wa-shik′, o-źēk′, } to dip up.

direct, min-e-shi′-o, to direct.

disease, ba-di-sa′-de, any kind of contagious disease.
ba-du-pu′-pe, cholera, spasms.
na-se-ta-a′-re, disease of the chest.
a-sha′-re, any disease of the heart.
be′-re-a-rēḣ′, sickness in the abdomen.
a-raḣ′-a-he-ra-be-pu′-a, disease in the neck of a horse, poll evil.

dish, ba-te′.

dismount, ba-tsi-naḣ′-pi-miḣ, tsi-naḣ-pe′, } to get off from a horse.

disposition, ma-na-sić′-ik, a good disposition.

distribute, ba-wu-mat′-miḣ, to spend.

do, di-e-ba′-mīk, I will do it, or I am willing to do it.

dog, bis′-ka.
bis-ka-bu′-ra, a male dog.
bis′-ke-mi′-e, a female dog.
bis′-ke-na′-ke, young dog, puppy.
bis′-ka-me-na′-paḣ-u-e, dogs biting each other.
bis-ke-a′-ma-ma, a dog song.
tsiḣ-pe′, a prairie dog. *Arctomys.*

door, bi-di′-a, a door of a lodge.

double-tongued, mi′-shik, a hypocrite.

doubtful, ba-re-na′-se-nop, two hearts, deceitful.

dove, ma-i′-pać-ka′-she, a turtle dove.

down, bak′-se, bu-a-ka-re′, } below, as down the river.

draw, tūḣ′-pūk, to draw down anything.

drink, is-mi′-mik, to drink.
ish-i′ (imp.), drink.
ma′-ku-si-a, to drink out.
ku-ta-ki-shi′ (imp.), take and drink.
ka′-ku-tse, to be drunk.

drop, he, to drop anything.

drum, bi-raḣ′-e.

duck, mi-haḣ′-e.

dung, na-tse′-re, the fresh excrement of a buffalo.

dusty, u′-ke-shik, to be dusty.

dry, ka-ru′-tsiḣ.
ta-shi′-tsiḣ, to dry anything.

E.

each, shi′-she, each one, every.

eagle, da-a-ka′-ḣa, war-eagle.

ear-ring, maḣ-pa-ma′-na, miḣ-pu′-e-te, } ornaments.

early, tsi-na′-ki-sa, early in the morning.

earth, a-me-ko′-ta, the whole earth, the world.
a-ma-pi′-ni-e, rich earth, a fertile soil.
a-me′-ḣa-tsi-e, earthquakes, explosions in the mountains.
a′-ma-she, earth houses, like those of the Minnitarees.

easily, ba-i-tu′-ka.

eat, tu′-shik, ti-ru′-shik, } to eat.
ba-bu′-she, I eat.

egg, i-ke-ka′-te.

elbow, mish-baḣ-e′, and is-pa′-ba.

eloquent, ba-i-di′-tuk.

embroider, bam-pash′-tsik, to garnish or embroider.

empty, ham-nets′.

enemy, bas-ko-ći′, an enemy at home, in camp.

enjoy, ba-si′-tse-wak, to be glad, to enjoy, to take pleasure.

enough, ka-ra-ha′-mik, ka-ra-ko′-mik, ka-ra-ko′-mi-o, } enough; I am done,—usually said when a speech is finished.

exchange, bat-ba′-ke-re, in exchange.

exist, ma-ka′-ku, to live, to exist.

eye, is′-te.

is-te-i′-e, mish-ti′-e, } eyebrows.

is-taḣ′-pe, eyelids.

is-te′-a-re, sore eyes.

is′-te-wa′-tsi-baḣ-u′-e-miḣ, to rub the eyes.

is-te′-pi-ōk, to have the smoke come into the eyes.

is′-te-o′-ma-te, iron for the eyes, spectacles.

is-te-re′-de, to be blind.

is-ta′-re-tuk, blindness.

F.

face, i′-se, ni′-se, ni-shi′-se.

ni′-se-bi′-shi-kat, a red face.

ni′-se-ḣi-ri-shi′-tse, to wash the face.

fall, ta-ni′-o, to fall down.

farther, na′-ne.

fat, shi-me′.

ta-ra′, the fatty portions of an animal.

father, aḣ-e′.

mi-nup′-ḣe, my father.

feather, ma-ēp′-ḣa-ḣa, a quill or feather.

ma-ēp′-ḣa-ḣa-īpsh, the tail feather.

feel, bu-ru-shi′-ćik, to feel, feeling.

find, a-mo-nup′-ik, to find anything.

fire, bi′-de.

bi′-de-ka′-te, a small fire, a candle.

a-raḣ′-i-a, to light, as a candle or a fire.

bi′-de-go′-hi-a, the fire blazes up.

bi′-de-a-ra′-peḣ, the fire burns.

bi-ra′-de, the fireplace.

bi′-di-tu′-a, fire-wood.

bi′-di-tak, matches, friction.

a′-će-bi-de, a fire-horse, locomotive, furnace.

fish, bu′-a.

bu-a-na′-ka, all kinds of small fishes.

bu-a-haḣ′-a, spotted fish, trout.

bu-e-du′-sha, the blue heron, fish-eater. *Ardea herodias.*

bu-e-ku-ku′-e, fish-hook.

i-min-deḣ′-o-me, the fins of a fish.

float, da-ka-pe′, to float.

flower, ba-ha-bu′-e, and ōm′-pe.

fly, ma-na-me′, to fly.

i-nu′-shu-shik, to fly in pieces.

ma-pu′-e-te, a fly, insect.

ma-pu′-e-će′-se, the common house-fly.

min′-e-te-i′-she, a butterfly.

foam, po′-he.

foe, is-ma-hi′-he, all foes.

foolish, ma-ma-naḣ′-e, a foolish man, one with no sense.

foot, ba-tse′, and ić-e-ta′-re.

ba-tsi-ni′-će, foot-racing.

it-mu′-a, sole of the foot.

forehead, mi-e-ḣi′-e.

forever, ko-će-te′.

fork, a-ra-saḣ′-ta, and ba-ću′-e.

ba-ću′-e-sa-te-ka′-te, a small fork.

forwards, i-se′-ko.

freeze, a-ka-pe′, it is freezing.

a-ka-pak′, it is frozen.

mi-a-pak′, to be cold, to freeze.

friend, a-mats′-ćik, and min-e-ba′-a-tse.

ma-na′-ke, my friend.

hin-a-ke′, my friend,—used in addressing a person.

ma-na-se′, my heart, my friend,—a term of endearment in social life.

frighten, aḣ-pa-ret′, to terrify.

frog, sa′-ke.

sa-ka′-re-ću-ka′-re, a large toad.

fruit, ma′-na-pa-pa, berries.

ma-nit-nauk′, to bring berries or fruit.

ma-nit-na′-kūk, to gather fruit.

o-źik′, ripe fruit.

o-źi′-se, green fruit.

ma-ne-shi′-she, bullberries.

ma-ne-shi′-she-ba′-ra-da-ru′-a, to beat the bullberries off the bush.

ma-na-ka′-she, service-berry bush.

bi-tse′-tiḣ-te, a black edible berry growing on the high mountains.

bish-kat-mu′-e, a red berry, species not known.
bi-tash-tse′, white berries.
ba-e-saḣ′-pit-e, black fruit, a kind of service-berry.
ba-e-saḣ′-ēs-tse, a small, edible fruit, growing in clusters.
ba-dup′-i, a palatable dish formed of cherries and meat mixed.
ba′-tsu-a, small cherries. *Cerasus Virginianus.*
ba′-tsu-a-ra-tsi-tu′-e, to beat the cherries off of the bushes.
ba′-tsu-a-mu′-ni-te, black haws.
i-sko′-shi-ke, a kind of red berry.
iḣt-ye-pi′-ti-eḣt, red berries growing on the Rocky Mountains.
hūm′-ba-ta-te, a species of blackberry.
ka-pud′-i-i-ste, the whortle-berry.
i′-aḣ-she-di-a-wa′-me-nak′-miḣ, to make a soup or stew of meat and berries.

G.

gall, a-pi-tsu′-a.

gallop, a-pash′-kuḣ-gi-a-hu′-i-tse, galloping, as a horse.
ba-ge-rūsh′-i-mēḣ, galloping on horseback.

gamble, ba-de′-aḣ′-pe-dik, to gamble.

game, ma-no′-pe-de, a favorite game with the women, in which plum-pits are used.
aḣ-o′-a-da, to hide the dish,—a favorite game with all.
a-ba-tsink′-i-sha, a game somewhat like billiards.

gather, bać-ki-o′-kik, to gather, to collect.

get, hin-e-ći′-nēk, to get up, as from a bed.
nēs-ha′-ra (imp.), get out.
ba-tsi-nēk′, I got up.

girl, ma-nać-ka′-te, a little girl.

give, be′-miḣ, to give, as a present.
ba-ru′-sa-ūk, a present, a gift.
ha-ho′-ka-shi′-na, to give thanks to the sun for any favor.
tu′-sauk, to give up anything.

glass, ba-de′-e-tsi-ći′-ke, a looking-glass, mirror.

glue, ba-i-ćo′-sa.

go, a-sa′-nup, na′-ma-niḣ, } to go.
dēk (imp.), go.
mi′-ma-miḣ, to go in.
bin′-a-be-wa′-miḣ, to go across the river.
ka-me′-mōk, to go together.
kan-tu′-i-tse-nōk-tsi-na′-ne, to pack up and go on a journey.
na′-ne-kan-tēk′, to go farther.
tu′-hi-nan, to go to the war.
bu-re-shīk′, I let it go.
hi-ris-pa′-riḣ, I am going outside, or out of doors, in answer to the question: "Where are you going?"
naḣ′-a-ra (imp.), go away.
ko-tu-ćēḣ′-pa-da (imp.), go with one only.
aḣ′-pa-da (imp.), go with them.
a-ma′-su, to descend, to go down.

goitre, ap-hi′-she.

good, it′-sik, it′-siḣ.
ko-tuć′-it-sik, he alone is good.

goose, mi′-ne, and mi′-na.

grass, bik-te′, grass of any kind, generic term.
bik-ta′-kat, short, low grass.
bik-ti-a′-shu-a, the grass growing.
bik-ti-a′-sa-ti, edible roots of plant like a carrot.
bat-su′-a-te, sweet-smelling grass.
aḣ-pa-naḣ′-e-sīp-siḣ-she′, horsetail grass. *Equisetum.*
pu-pa′-e, dry grass, hay.
naḣ-pit′-e, black grasshopper, a cricket.
mi-shu′-ke, common grasshopper.

great, bat-sać′, strong, powerful.
i-se′, i-sa′, } great, large.

green, shu′-e-kat.

ground, a-mi′-a-mo-na, in the ground.

grow, ba-a-pi′-ni, anything that is growing.
a-pa′-na, to grow.

gum, i-u′-she, gums of the teeth.

gun, be-rup′-tse-ma-naḣ′-e.
ma-naḣ′-i-she, a gun-cover.
ma-i′-a, a gun-flint.
bash-taḣ′-e-ma′-e, percussion caps.

H.

habit, is-e-ta′-be, custom, habit.
is-e-ta′-be-it′-sik, good habits.

is-e-ta′-be-ka-wi′, bad habits.

hail, ma-ka-pe′.

hair, mi′-shi-e, my hair.

mit-su′-a-nu′-mi-ne, a tuft of hair, scalp-lock on the back of the head.

nu′-mi-ne, a tuft or lock.

mih-e′-a-nu-mi′-ne, tuft or lock of hair on the forehead.

hallo, u-ka-he′! an exclamation.

ha-hi′-a! hallo there! to call to one at a distance.

hand, ba-sku′-re, and bash′-tse.

bash′-tse-a′-ke, the upper part of the hand.

bash′-tse-mu′-e, the hollow or inside of the hand.

mash′-tse, my hand.

tēsh′-tse, thy hand.

tēsh′-tse-pah-u-ru-shi′-mih, to wipe the hands on anything.

bas-mi-tsu′-a, a wart on the hand.

hang, i′-shi-e-wa′-mih, to hang up.

hard, ba-ra-hip′-sat, indurated.

hat, ba-da-e′-am-pe′, a hat or bonnet.

mit-yūh-pe′, a cap.

hate, mi-du′-pi-uk, they hate me.

mi-du′-shi-ći′-se, they care nothing for me.

hawk, a-pi-te′, seems to be a generic term of that class of birds.

be′-rets, a kind of hawk.

be-rets-ge-na-hi′-o, a branch of Wind River.

is-a-ći′-sa, a small hawk.

is-e-ke-ki′-she, a mosquito-hawk.

head, a′-shu.

a-shu′-a-ćo-se, white skull, as of a buffalo, long exposed on the ground.

a-skep′-ka-wi, a bad head, a Dutchman.

hear, mi′-ka-kūk, to hear.

heart, na′-se.

na′-se-it′-si-ka, a good heart.

nas-ka-wi′, a bad heart.

na′-se-kōsh′-te-kat, little heart, despondent, faint-hearted.

na-se-hi-ni′-a, undoubted, firm, to be depended upon.

na′-se-nōp, uncertain, deceitful, two hearts.

heavy, tash-ta-tsip′.

herd, man-ći-ćūh′-e, a herd or drove.

hexagon, a-ka′-mak-a-tak, six-cornered.

hill, shi-ća′.

shi-ća′-kē-da, up a hill.

shīć-bu-uk′-is-a, down a hill.

i-she′, the height of a hill.

hin′-e-sha-ke′-ma-kūk, at the foot of a hill.

hold, ta′-hash, to hold anything, as a book.

bu-ru-ba′-shik (imp.), hold on.

hole, ha-hi′-e-pak, to make a hole in the ground.

a-wat′-sit-mi, to look through a hole.

horn, aź-ka-ru′-će.

aź-i′-si-a-de, a horn spoon.

horse, it-si′-re.

it-si′-re-tsi-ri′-tu-a, to drive the horses.

it-si′-re-i-ne-ka′-su-a, picket stakes for horses.

it-si′-re-tsi′-she, horsehair.

tse′-shi-shi-a, a horse-blanket, or other cover.

i-shu′-e, the mane of a horse.

it-si′-ri-ka-she, elk, or real horse.

it-si′-ri-ka-she-ru′-pa, male elk.

it-si′-ri-kash-bi-shi′-a, female elk.

it-si′-ri-ka-nak′, to become frightened and run away, as a horse.

it-si′-ri-na′-ka, a colt.

it-si′-ri-ak-se′-re-te, a free or wild horse.

it-si′-ri-ma-ni-tum′-a-kat, a gentle horse.

it-si′-ri-i-ni′-she-tuk, an active horse.

it-si′-ri-i-tah-pu′-e, the hoof of a horse.

it-si′-ri-mi-ne-shi′-te, to water the horse.

it-si′-ri-man-dēk′, a crippled horse.

it-si′-ri-ba-tsi-ni′-će, horse-racing.

hospitable, ba-ke-tuk′.

ba-tse-ba-ke′-tuk, a hospitable man.

hot, ta-meh′.

house, a-she′.

a-she′-a-ke′-da, on the top of the house.

how do you do, ba-tsa′-bah-a′-pe, "how do you do?" literally, "we find each other."

hungry, na-ni′-she, to be hungry.

hunt, ba-će-tsi′-mik, I hunt for anything.

hurt, i-ah′-ōk, to hurt or injure.

I.

ice, bi-rūh′-e.

ignorance, ma-nah′-e, ignorance, simplicity.
ma-nah′-at, ignorant, simple.
ma-nah′-tuk, I do not know.

ill-natured, in-i-shi′-pīk, badly disposed.

imitate, ka-re-kōt′, to imitate.

increasing, ah-pa-tak′.

independent, ba-du′-she-tsi′-a.

Indian, bi-ruh-pa′-ka-ra.

indigo, mi-shu-ah′-shu-pit′-e.
mi-shu-ah′, bluestone, sulphate of copper.

industrious, i-sam′-bat-sa, an industrious man.

influential, i-sa′-ke-ka-te, large, influential, a great man.

innocent, ma-ni-tum′-e-ka-te, good-natured.

inside, ko′-rak-ma, the inside of anything.

intelligent, bat-si′-tah.

iron, o′-ma-te, any kind of iron or metal, &c.
o′-ma-te-a-pi′-a, a medal, literally, iron on the neck.
o′-mat-shi-re, yellow iron, brass.
o′-ma-ći-di′-e, the iron that rattles.
i-mah′-o-pi′-a, a kind of iron wire.

island, min-e-pi′-źe.

J.

jawbone, du-de-pe′.

jump, a-na-push′-a-ma-ta, where the buffalo jump a great distance.

K.

kettle, bi-rah′-e, a kettle, or kettle drum.
bi-rah′-a-te, a small kettle.
bi-rah′-te-tu′-e, to beat the drum or kettle.
bi-rah′-tsi-e, a white kettle.
bi-rah′-i-tsi-ti′-e, the chain on the kettle.
bi-rah′-e-ci′-nu, a tripod, from which a kettle is suspended.
bi-rah′-e-i-ću′-sa-tse, a kettle cover.
bi-rah′-e-i′-de, the bail or handle of a kettle or pail.
bi-rah′-e-ra′-tsi-ka-tse, the seam on the side of a kettle.
bi-rah′-e-a-pe′, the ears to which the handle of a kettle is attached.
bi-rah′-e-i-tsi′-she, the bottom of a pail.

kill, ha′-mi-o, to kill.

kiss, mis-bash′-tse, a kiss.
mis-bash-tse′-mih, to kiss any one.

knee, i-shu′-de, and i-shu′-she.
ba-shu′-she, my knee.
di-shu′-she, thy knee.

knife, mit-si′-e.
mit-si′-e-nōp′-kat, a pair of scissors, two knives.
mit-si′-e-bat-si-shik′, to sharpen a knife.
mit-si′-e-it-she′, to sharpen any edged tool.
mit-si′-e-tsi-re-tsi′-she, a pocket-knife, one that opens and shuts.
mit-si′-she, knife-scabbard.
mit-si-hin′-ēk, here is a knife.
mits-ka-hat′-ska, long knife, an American.

knock, mi-ta-me′-a-mit-nak, to knock, or strike.
wa-pah′-mih, to knock anything loose.

L.

lame, a-nah′-uk.

land, a-me′, a-re′, } both words used.

large, i-sa′.
i-sa-nić′-kat, rather large.
i-sa-e-shēk′, still larger.
i-sa-bat-sać′, very large.

lariat, i-ah-će′, and i-nah-tu′-e.

last, a-ha′-ka, at last, last.

laughing, ba-rūk′, we are laughing.

lay, ha-pik′, to lay down anything.

lazy, i′-shi-tuk, indolent, lazy, careless.
i′-shi-tēk, a lazy fellow.
ba-am-be′-ret, to do nothing, to be lazy.

lead, is-ba-se′, to lead or conduct.

lead, i-e′-re-pe-pu′-she, a mineral.

leaf, a′-pe.
a-pe′-ta-ni′-o, leaves falling from the trees, autumn.

lean, mi-wah-pūk′-mih, to lean on another.

mi-sak′-spaĥ-e, to lean on any one, used in social intercourse.

leg, mi-hu′-re.

mi-hu′-re-a-ka′-ta-wa-miĥ′, to put the legs into another's lap.

leggins, i′-shi-she, ho-ée′, } leggins or pants.

ho-ée′-e-a-she′, garnishing for leggins.

lengthwise, baé′-ku-ko-ni′-a.

lie, bash-tsit′-miĥ, to lie on anything, as a bed.

ho-pik′, to lie down.

hu-pa′-re (imp.), lie down.

da-ka′-pik, lying down on any place.

ba-hōp′-nik, I will lie down.

lift, du-e′, to raise or lift up.

ba-ru-e′, I lift up.

light, taĥ-piĥ′-at, light, not heavy.

lightning, shi-re-sho′-re.

ka-ni′-tsi-e, to lighten, as just before a storm.

lignite, ōm-bi-daĥ′-i-taĥ-pu′-a, "stone coal."

lips, i-e-aĥ′-pe.

listen, hin-e′, look here! say! listen!—used to call attention.

little, i-e-ka′-shi-at, little, applied to any child.

live, in-ēk′, to live.

in-e′, alive.

in-e-shi′-uk, long life.

hi-ri-tsi′-sa-re, to be or to live close by or near.

lizard, ma-ka′-pe (species unknown).

mi-shu-ka′-re, a ground lizard.

lodge, a-she′, a tent or lodge.

a-she′-mo-na, inside of a lodge.

ash-kum′-u-a, inside of a house.

a-she′-iĥ-i-mo′-a, the tent is full of persons.

a-she′-kan-tuk′-puk, to break down the lodge.

ash-it-sik′, a good house.

bi′-ro-pe-ash′-u-a, a beaver lodge.

a-she′-e-kat′-kat, a red tent or lodge.

ash-aĥ′-tsik, a white tent or lodge.

a-she′-ap′-ka-wi, a very bad lodge.

bik-ta′-she, grass lodge, a house built of grass.

is-ki-she′-pu-a, rotten medicine lodge (Clarke's Fork).

bish-kish′-e, to place buffalo-meat in a lodge.

ba′-tsi-e, i-e′-ni-e, } lodge-poles.

ba′-tsi-e-a-nūk′, to bring the lodge-poles.

ba′-tsi-a′-ze, i-e′-ni-e-a′-ze, } Pine Wood Creek, or Pole Creek.

ma-su′-a, iĥ-a-mo′-a-re, } to live in a tent or lodge.

is-mīź′-pe-re, a lodge-skin that has been used.

look, a! look here!

ba-te-ek′-yak, he is looking at us.

aé-kaĥ′-a-ka-ba, go and look out.

lose, ko′-re-sak, to lose anything.

louse, mbe.

love, a-ma-tsi′-she, in-éi′-sa-kits, } to love.

lungs, da-ho′, lungs or lights.

M.

magpie, īm-pi′-a-kat.

make, waĥ-sa′-ko, ti′-a-wak, } to make anything.

ié-ēk′, to make up.

male, ba-a-sa′-ne, the male of any animal.

mallet, mi-paé′-ke, a stone mallet, used for driving down lodge-pins.

man, bat-se′, and wat-si′.

bat-se′-tse, a chief or warrior.

bat-se′-it-sik, a good man.

is-aĥ′-a-she, a young man.

waĥ-pēk′, medicine-men.

ma-ste-shi′-re, yellow eyes, a white man.

ma-ste-shi′-re-ship-it′-e, a black man, a negro.

ma-ste-shi′-re-is-de-ka′-ke, white man's birds, domestic fowls.

bi-ruĥ′-pa-ke, a human being, person, a man, the people.

ak-ba-di′-o, a doctor or medicine-man.

manœuvre, wa-tsi′-ek-tsūk, to drill.

marrow, tu′-pe.

marsh, ma-ha′-shi-pi-e′.

meat, i-ru′-ke, any kind of meat.

i-rūĥ′-pu-a, stinking meat.

i-ru′-ka-ha-piĥ, the meat falls down.

i-ru′-ke-bu-e-būsh′-mik, to bring meat and eat.
is-du′-she-she, fresh meat.
ma′-ni-she, dried meat.
hūk′-pi-e, *bouillon*, the liquor after boiling meat.

meet, a-ni-eh′-teh, to meet another.

melt, ba′-kats, to melt.
ba-ka′-ćik, to melt, as ice.

memory, a-wats′-kap-ma, to commit to memory.

mend, ić-e-ha-kūk, to mend.

middle, ku′-a-de, in the middle.

milk, at-si-mi′-na.

mine, bas, (possessive pronoun.)
bas-mit-si′-e, my knife.
bas-mit-si′-e-hu′-e, give me my knife.
bi-be′, it is mine.

mint, shu-shu′-e, a kind of mint, *Mentha*.
shu-shu′-e-re-ću′-ku-re, horse-mint, balm.

miss, ba-ru-sak′, to miss the mark in shooting.

mistake, ka-bi′-ūk, to make a mistake.

mix, wa-re-ba′-o, to mix.

moccasin, ba-sa-pe′, and ba-sah-pe′.
ba-sa-pe′-bu-retk, moccasins torn or broken.
ba-sah′-pa-ke, moccasin strings.
hōmp-ta′-re, shoes or moccasins.
hōm-pi-she-dah′-pe, white man's shoes.

moose, o-pis′-pi, seen by the Crows in the North.

mortification, a-no-mut-si′-rus-tse, mortification in disease.

mosquito, a-pa′-ka.

mother, ba-sah′-u-e.
ba-sah-′e, my mother.
bu-sha′, my mother in law.

mountain, a-ma-ha′-be.
a-ma-ha′-ba-i-a-ka′-te, little mountain.

mourn, mi-ma′-tse-shi-a′-te, to mourn, to be in mourning.
ba-ta′-ōk, mourning.

mouse, i-su′-e-ka-te, a kind of field-mouse.

mouth, a-ma-tsi′-e, the mouth of a stream.

move, ah-a′, to move away, from one place to another.
dōs-ha′ (imp.), move up close.

much, a-hūk, a "heap," a great deal.
a-ho′-i-shēk, more, very much.
na′-mih, how much?

mud, shi-pi′-e.
shi-pi′-e-de-sa′-ćik, to stick in the mud.

mule, ah-pi-se′.

mystery, bah-pa, medicine or mystery.

N.

nail, is-mah′-pe, the finger nail.
bas-mah′-pe, my finger nail.
it-ah′-pu-a, toe and finger nails, the claws of any animal.
it-ah′-pu-a-shi′-tik, a claw or nail when broken off.

neck, ma′-a-pe.
ma-a′-pi-e, a necklace of beads.
ba-de′-e-ah-pu′-a-te, a necklace of bears' claws.

needle, mit-se′-wat-su′-a, a sewing needle.

neither, ma-i-he′, neither, something else.

nest, ish-tsi′-se, a nest of any kind.

news, ko-te′-ba-re-ta′-re, ill news, bad news.
a-ni-tsi′-me-bi′-she, I have received the news.

night, o′-tsi-ek.

nipple, a′-at-se, teat or nipple.

no, ba-ret′.
a-ra-di′-a-wa-sa, same as ba-ret′.
ba-re-ta′-re, not at all.
ba-re-ta′-re-ba-re-ta′-re, no, never can be.
a-rīn-det′, for no purpose.

nose, ba-pe′.

nothing, ham-net′, nothing, there is none.

now, hin-e-ka′, hin-ak′-ek, } at this time.
hin-a-ka′-će, not long ago.

O.

object, ka-ni-ni′-a-tek, a thing, anything, an object.

often, a-hōn′-ha, many times.

old, ba-ha-di′-a.
ka-ra-shi′-e, a long time, advanced age.
shi′-a-kat, old, of great age.
is-a′-ka-kat, an old man.

ornament, o′-ma-te-pa-pash′-ka-te, small, round, brass ornaments.
map-ma′-she, a ring hanging from the neck, as an ornament.

otter, ba-huh'-te.
out, a-ma-ne'-na, out of doors.
oval, tsi-tsih'-ih-ats'-hi-kat, oval, like an egg.
over, i-tsu'-sa.
owl, po-pa'-te, owls in general.
own, bīn'-bauk, to own anything.

P.

paint, ma-ma-ma-na'-tūk, to paint.
ma-ma-na'-ćе, to write.
ma-ma-ne'-ćе, painting or picture writing.
mish-tsi-she-wa'-mih, to paint oneself.
pan, i-ma-mi-ni'-su-a, a frying-pan.
paper, ma-na'-ma-na'-tse.
part, ha-ka-kat', any part.
pass, bak'-mih, to pass the pipe.
patella, a-ho'-ha, kneepan.
paw, tsi-ki-ak', tsi-ki-e', } to paw the earth, as horses.
peace, mash-tse'-she.
mash-tse'-she-tsi'-wa-mih, to make peace.
mi-a-ah'-pe, a peace with nations.
pelvis, is-i-shu'-re.
pencil, i'-ma-ma-na-tse.
people, aub-sa'-ro-ke, "the people," the Crow nation.
peppermint, tsu'-shu-a.
perspire, mi-ta'-meh, i'-ōs, } to sweat or perspire.
i-ah-pi'-se, perspiration.
pheasant, sīts'-ke-se, the cock of the plains.
sīts'-ke-ta-re, prairie chicken.
sīts'-ke-īm-po-hah-e, mountain pheasant.
pick, du'-ća, to pick up anything.
bi-wah-tse'-ba-wūsh-yu'-mih, to pick the teeth.
bu-ru'-ćе, I picked it up.
pinch, bu-ru-tsi'-ap-mih, to pinch.
pine, ha-rūh'-a-ne-mik, to pine away.
bat'-si, a pine tree.
bat'-si-ūh-pe, pine cones.
pipe, īmp-tse'-ush, se-īp'-tse, īp'-tse.
īp'-tse-ri-su'-a, the pipe dance.
a-wa'-ko, to take hold of the pipe near the bowl.
a-wa'-ko-pa'-ko, to take the pipe near the stem.
ba-kash'-mih, to place the pipe in another's hands with some force when done smoking.
bat'-si-ba-shi'-tsih, to stir up the contents of the pipe with a stick.
a-mu'-e, the oil which accumulates in a pipe when smoking.
pistol, ma-nah'-e-po'-me-ka-te.
plant, a-mu'-o-bu-ru-shi'-mih, ma'-e-me-mu'-se, } to put anything in the earth, to plant.
ba-ka'-i-sa-tse, thistle plants.
ma-ōm'-pe-hi'-she, a large thistle.
ma-o-pe'-shi-re, a gummy plant, with yellow flowers.
i-ha', pomme blanche, prairie turnip. *Psoralea esculenta.* Abundant throughout the Western country, and most useful to the Indian as an article of food.
i'-re, a sweet-smelling root like parsnip.
īmp-ćе'-ća-ha'-he, a species of *Chenopodium.*
play, ma-nah'-shik, to play.
pleased, me'-ka-matsh, I am pleased.
plum, ma-nūh-pe'. *Prunus Virginiana.*
ma-na-pi'-e, plum bush.
ma-na-pu'-a. *Cerasus.*
pocket, ba-ro'-she, and ba-re'-she.
point, a-wa'-mi-e-mōk, to point out, to direct attention.
a-me'-tsi-re-tsi'-she, a point of land between two streams.
polecat, ho-a-ćе'.
poor, wa-tsēsh'-yat.
porcupine, a-pa'-ni.
a-pa'-ni-ći'-se, the tail of a porcupine.
a-pa'-ni-aź-i'-sa, Great Porcupine Creek.
a-pa'-ni-aź'-i-e-ka'-te, Little Porcupine Creek.
powder, bi-rup'-tse.
bi-rup-tsaź'-e, Powder River.
pretty, it'-se-kat, pretty, handsome.
it-se'-i-shēk, quite pretty, more handsome.
its-kat'-sać, very pretty, or prettiest.
prime, a-kōh-bi-rup'-tse, to prime a gun with powder.
probable, ko-te'-ba-sak, probably it is so; there is no reason to dispute it.
ko-ta-re-tse', it is probable.

sho'-tuk-ko'-tuk, it may or may not be.

pull, bu-ru-tsi'-miḥ, to pull out.
to'-sha, to pull on anything.

push, ba-tsi'-ne-miḥ, to push away.

put, a-waḥ'-ska-miḥ, to put on, as moccasins.
tas'-ke, to put in, as in a vessel.
do'-sha, to put on.

Q.

quantity, a-ho'-ḃat-saé', an enormous quantity.
a-haé'-ka-te, considerable, a moderate supply.
kash'-te, ko'-ste-kat, } a little or small quantity.
tso-na'-ne, a little.

quick, sus-kat', soon, quick.

R.

rain, ha-rak'.
ha-rēk', it rains.

raise, wa-paḥ-shi'-miḥ, to raise up.

ramrod, bash-taḥ-e-wa-ku'-te, the ramrod of a gun.

raven, pa-re-éi'.

read, ma-ma-ma-nat'-miḥ, to read, as a book.

rectum, u-shi'-a, the rectum of any animal.

red, hi'-shi-kat, red, scarlet, as a red blanket.
hi-it'-si-ka-te, light red, rose color.
i-a-pe'-pa-ne-a'-she, the cochineal insect, used for coloring the quills of the porcupine scarlet, an important article of trade among the Western Indians.

remain, a-ma'-tuk, to stay, to remain.
bat-ba-ba-tsi'-mōk, to remain in one place against an enemy, as Crows against Blackfeet.

report, saḥ'-e-wa-tsi', the report of a gun.

reserved, be-te-di'-se, shy.

revengeful, ba-tuḥ'-te.

rib, du'-sa.

rice, bi-she'-tsīḥ.

rich, ba-i'-ée.

ride, a-ki'-na, to ride.
ka-ru'-she-i-ru'-kash, to ride a horse on a gallop.
a-ra'-ki-ni, a-wa'-ki-ni, } to ride on horseback.
i-na-mi'-pet-bi-she'-ri-ūk, three persons riding out together to hunt buffalo.
ba-se', to ride ahead of another on horseback.
ha'-kak, to ride behind another person.
bu-she-pa'-tsiḥ, bu-she-ba'-miḥ, } to be made sore from riding on horseback.
bat-saḥ'-pi-ro, riding side by side together.

ring, bas-tsa'-sa-shi, a ring, circle.
ta-bu'-e, to ring, as a bell.

rip, a-su'-tuk, to rip.

rise, tsi-na'-ke, to rise up.
tsi-na'-ke-ma'-tsiḥ (imp.), rise up and sit down.
tsi-ne' (imp.), rise up, get up.
a-sik', rising, as the sun.

river, aź-e'.
aź-ka'-te, a creek, or small river.
aź-kat'-it-se, Good Creek.
aź-e-ni'-tsi-a, Stinking River, a branch of the Big-horn.
aź-kat'-bak-aḥ'-pa, two parallel creeks.
aź-i'-sa, Great River, Missouri.
kan-tu'-se, the source of a river.

robe, ba-sa'-she, buffalo-skin with the hair on, a robe.

rock, ma-shi'-pit-e, a black rock.
ma-pu'-e, Rocky River.
ma-pu'-e-ma-nat-bi'-she, painted rock.

roll, iḥ-tsa'-miḥ-tsiḥ, to roll, as horses.
bi-ra'-miḥ-tsa-miḥ, to roll on the ground.
a-me-gīpé', rolling land, wave-lines.

rope, i'-eḥ-i-e, a rope made of buffalo-skin.
ma'-she-i-aḥ'-tse, the rope used for cordelling or towing a boat.

rose-bud, bits-ki-pe'.

round, ba-pa'-she, round, circular.

run, bat-si'-ri-tuk, to run a race.
ho-shik', it runs, or anything runs.
a-mo-a'-te, running water.

S.

saddle, a-na-gu-ruḥ-tse', to saddle, as a horse.
a-na'-gu-ru-shi'-be, to take the saddle off, as from a horse.
a-na-me'-ma-ga'-tsi-e, to cover over the saddle.

a-na′-gu-ruh′-pi-wah′-sa-ko, to make a saddle-cover.

wa-tsa′-ne-shi′-she, saddle stirrups.

sage, i′-sats-ho-me, a species of *Artemisia.*

i′-sats-ho-me-ha′-kūk. *Artemisia trifida.*

i′-sats-ho-me-i-ni′-tsi-tse, a kind of sage, used as a tea.

saliva, i-mi-ne′.

sash, ba-da-e′-pa-ta′-ée, a belt or sash.

satisfied, mih-pa-shik′, to be satisfied.

saw, i-ma′-ne-pus′-ku, a hand-saw.

i-ma′-ne-sa′-ée, a large saw.

scalp, mi-ne′.

a-éu′-ru-tu′-e, to take a scalp.

scatter, a-e-éa′-a-da′-éa, to scatter.

scrape, a-ka-ki′-ra, to file, to scrape.

bi-sa′-tse, steel edge, or scraper.

scratch, tap′-hi-e, bats-ha′-mih, } to scratch.

pa-ha′-ée, a scratch.

scream, i-mi′-shēk, to scream.

screw, mu′-me-mih.

see, a-ma′-ke, to see.

a-ma-ka′-muk, he will see.

send, de-bat′-sēk, to send anything.

a-nu′-ak, to send, as a message.

sensible, ba-ra′-tsi, good sense.

separate, wa-tsip′-mih, to separate the flesh from a skin.

set, o-maé′, to set anything down.

i′-mah-pik, the setting sun.

sew, inh′-aé, to sew.

ba-inh′-aé, I sew, as on cloth.

bat′-si-ka-tsih, to sew buttons or beads on anything.

shade, a-rat′-si-e, a shade or umbrella.

shake, ta-wu′-e, to shake or ring the bells.

bat-si′-u-bi-ri′-u-mih, to shake the dust from a blanket.

shame, min-o-shi′-éik.

shave, ba-sak′-she-ti′-a-wak, to cut or shave an arrow.

shell, bi-sho′-ée, ma-ka′-ki-e, } mussel-shells. *Unio.*

ba′-she-ri′-e-ka-te, small shells.

ba-hah′-e, "the shell that glistens," a shell obtained in California, and sold to the Indians by the traders for ornaments, a *Chama.*

ba-tu-wu′-e-pa-pa′-she, small shells, used as ornaments. *Dentalium.*

sheep, i-sah-pu′-e-ta-tse, mountain sheep. *Ovis montana.*

i-sah-pu′-e-ta-tse-a′-ze, the Big-horn River.

shield, mi-na′-tse.

shoot, sah′-e, to shoot one another.

ba-pe′-mih, to shoot down.

bi-bah′-pik, I shot it.

a-me′-to-ah′-pik, to shoot an object at a great distance.

bat-bat′-si-uk, to shoot at a man in battle.

bi-rup-si′-she, a shot-pouch.

shore, am-ni′-e.

short, bu′-meh-at.

shoulder, ba-rash′-pe, and ish-u′-re.

ah′-tse, suspenders, shoulder-straps.

a-pe-i-sūh′-e, a shirt-collar.

shout, te′-wa-tsi-mih′, to shout.

shut, bi-ri′-e-éi (imp.), shut the door.

sick, ba-ku′-pak, sickly.

wa-kūh′-pa, to be sick.

mi-ba-ku′-pak, I am sick.

side, ak-tus′-ko, on this side.

a′-ka-ko, ak-tsi′-se, a′-kūs, } on the other side.

a-ka′-re, on the opposite side.

ak′-tus-ko-ūm-pa′-se, on this side of the river.

sight, a-sēk′, in sight.

a-si′-sa, out of sight.

i-ma′-mih-tsu′-ste, the sights on a gun.

sinew, ba-tsu′-a, and a-ra-tsi′-se.

sing, ma-nah′-u-a, to sing.

a-kik′, to sing, as a bird.

ma-nah′-ik, singing.

sink, a-muh′-ak, to sink.

sister, a-ku′-pe, brothers and sisters.

mu-o′-i-sap, my sister-in-law.

sit, a-mat′-sih, to sit down.

wat′-sa-wah-a-mat′-mo-uk, sitting together.

skin, ba-hu′-a, the cuticle or skin of a person.

ba-ra-ku′-a, ba-ra-ka′-su-a, } a buffalo-skin stretched on the ground to dry.
ba-a-ta′-tse, any kind of a skin, as beaver, &c.
ash-ti′-shi-re, a grained skin.

sky, a-mah′-e, sky, or heaven.
a-mah′-a-ra-da, in the sky.

sleep, a-gi′-tse-mih, to sleep.
hin′-a-me-ka-ra-kō′, to feign sleep, like sleeping.

sleeve, a-ri-she′.

slowly, na-ni′-ka-se.

small, i-e-ka′-te.

small-pox, a-pa′-ke, ba-ka′-ke, ma-pa′-de.

smell, wa-pash′-ik, ma-nōp′-mih, } to smell.
ma-ōm′-pe-shi′-re-i-ni-ći′-će, sweet-smelling, yellow blossom.
pu-e′, it smells badly, to have a bad odor.

smile, bah′-ak, to laugh or smile.

smoke, pu′-e.

snake, i-ah′-i-se, any kind of a snake.
ma-kać′-ke, common striped snake.
i-ah′-i-se-a-ri′-shi-di′-e, a rattlesnake.

snore, sah′-e, to snore.

snout, a-pish′, snout or muzzle.

snow, bi′-pe, and bi′-a.
ba-ah′-pe, snowing.
du-pu′-re, a snow-storm.
bi-pa′-e, it snows.
bi-bi′-she, there is snow.

softly, ho′-kat, ha′-ho-kat, } softly, low, not loud; also slowly.

soldier, a-ki-sat′-ni, a body of men who constitute a sort of police about camp in time of peace.

some, hum-bi′-she, some, a part.
au-hu′-sak, there are some.
ba-bi′-she, something.

son, ma-nak-bat′-se, my son.

sore, pu′-a, a wound or sore.

soul, ba-de-nah′-e, the living spirit, the soul.
ah-pa-nah′-e, a spirit or ghost.

sound, po-ka′.
shi′-ri-ko′-ri-kat, to sound well, it sounds well.

Spaniard, o-ku′-she.

speak, ba-dēk′, I speak.

spear, ka′-e-ke, ba-a-ke′, } a spear or lance.
i-sa′-me, a wooden spear.
i-sa′-me-sho-shu′-ru-e, to hurl the spear or javelin.

spider, a-ma′-go-he.

spirit, ah-pa′-nah-ke, spirits of the dead.
is-ah′-e-hu′-e-te, the Great Spirit.
is-ah′-e-ka′-wi, the bad spirit.

splinter, a-sash′-ta-o.

split, i-nu′-shish, a-sa′-ća, } to split.

spring, mi-e-mah′-i-se, (season.)

sprinkle, ha-rah′-a-ra′-he, it sprinkles.

spyglass, i-ma-tsi′-nu.

square, sho-pa-tak′, four-cornered, square.

squirrel, sta-reh′.

stalk, wa-tsēh′-e-shi, the stalks of *Glycyrrhiza lepidota.*

star, ih-e′.
ih′-e-sa′-sat-nash, the stars twinkle.

start, kan-tu′-e-tūk, to start, to break up a camp.

steal, wa-ta′-nu-a, a-ta′-nu-a, } to rob or steal.

steel, bish-ke′-rah-u-a, a steel for striking fire.

stick, de-sa′-ćik, to stick.

still, ko-tak′, keep still! quiet! stop!
ko-tak′-mi-ne-ki′-shi (imp.), stop drinking water.
tsis, keep still!
ka-tsi′-se, still! be quiet!

stir, pa′-pa, to stir up, as in a kettle.

stirrup, ma-nu′-że, and ba-de′-i-ćan-a-sa′-she.

stomach, i-ah′-e.

stone, mīk, and mi′-a.
mi-a′-ra-ka-tse, a gravel-bank, gravel-stones.
mi-e-hi′-a, a war-club made of stone.
mi-de-ah′-e, a flint-stone.
i-mah-ah′-i-u, a whetstone.

stop, i-ma-shi′-o, to stop.
a-tsi′-sa, to delay a little, to stop.
tsi-tsi′-pe, to stop, obstruct, to put in the way.

storm, hu-pu′-me.

straighten, ba-tsih-yūh′-at, to straighten, as an arrow or ramrod.

ta-ćc′,
ka-ra-tats′-yat, } straight, not crooked.
baĥ-a-na′-miĥ, to make anything straight.

strap, ku-si′-re, any kind of leather strap.

strawberry, ko-shi′-te.

stream, ūm′-pa-se, up the stream.
bu-ru′-a-ka-se, down the stream.

strike, ma′-nesh-tash′-tu-e, to strike or whip, as to whip the dust off of cloth.

strip, is-ba-dūsh′-te, to strip one naked.
bas-be′-bo-rēsh′-tik, I stripped something.

strong, i-ći′-uk, strength.
i-ru′-kash, strong, hard, as to strike hard.

suck, a-tsi′-a, to suck.

suffer, ma-i-ni′-shēk, to suffer.

sugar, bat-siĥ-u′-a.

summer, mi-e-maĥ′-e.

sun, a-ka′-she.
a-ra-ka′-she, sunlight.

superfine, ba-rūĥ′-pe-rēt, superior, there is nothing like it.

surprised, i′-sa-si-u, to wonder, to be surprised.

suspender, ba-shi′-she-kai, suspenders to hold up the leggins.

swallow, īm-pi′-e-sa-te.
a-ma-ko′-mish-tsish-e-a′-su-a, nests of bank swallows.

swan, mi-ne-ći′-e.

sweet, tsiĥ-u′-a.

swell, ta-pu′-she, to swell up, from inflammation.

swim, mi′-me, to swim.

sword, nun-i-she′.

T.

take, ru′-shi-bi, to take off, as a saddle from a horse.
ru′-te (imp.), take it.
dis-mit-si′-e-ru′-te (imp.), take thy knife.
hi-te′ (imp.), take it.
ku-ra-ta′ (imp.), take from.

taste, ko-pik′, to taste, tasting.

tattoo, iĥ-i-e′-ra-pe′, to prick colored images into the skin.

tear, i-nūĥ′-etsĥ,
tūĥ′-e-tsu, } to tear or rend.

tears, is-tum′-ne, water from the eyes.

that, i-aé-bi-ruĥ′-pa-ka, that person, those persons.
i-aé-ma-no′-a, those things.

thaw, shi-shu′-shik, to thaw.

thick, i-rōp′-kat, large, thick.

think, ba-ći′-će-waŧ′-sik, I think.
ko-tin-paé′, I think so.

thirsty, a-kuć′-ik, to be thirsty.

this, hin-i′-a-te, this, this one.
hin-i′-at-kat, is this what you are looking for? in answer to a question.
hi-de′-dēk, this person, or a person here.
hi-dēd′-bi-ruĥ′-pa-ka, these persons.

thread, ba-tsu-pu′-a.

through, tsu-ka-sīk′, through any object.
tsi-ru′-shēk, gone through and through.

throw, a-muĥ′-i-a, to throw away.

thumb, is-mu′-se.

thunder, su′-a.
su′-ni-ćēk, the thunder-bird, that roars in the distance.

tie, baĥ-tsi′-miĥ, a knot, a noose, a tie.
baĥ-tsi′-ma-si-tsi-mik, to tie, to bind, to join anything.
dēĥ′-ći,
tu′-sa, } to tie anything.

tinder, mi-ni′-te, tinder, spunk.

tired, a-push′-a-he, to be tired.

tobacco, o′-pe, the common tobacco of commerce. *Nicotiana.*
o′-pi-she, Indian tobacco. *Lobelia.*
o′-pi-she-ba′-tsu-a, the leaves of Indian tobacco-plant.
ōp′-mi-o, to smoke tobacco.
ōp′-te-wits, to mix tobacco with bark or leaves, as kinnic-kinnic.
o′-pe-di-niĥt-shu′-me, to bring tobacco.
ōp′-ti-a-wa, to put tobacco in a pipe.
o′-pi-she-ōt-wa′-miĥ, to dry tobacco by the fire.

to-day, ka-na′-shik.
hin-e-ma′-pe, this day, to-day.

toe, ić-a-re′-te-be.

together, bat-saĥ′-pūk,
bat′-sa-waĥ, } together, in company.

bat'-sa-wah-ma'-ni-mo-uk, walking together.
bat'-sa-wah-pe'-mo-uk, sleeping all together.
bat'-sa-wah-pa'-wa-ku-re'-mo-uk, to run together.
bat'-sa-wah-pa'-wa-pa'-mo-uk, to slay or slaughter together.
bat'-sa-wah-pe'-mu-shi'-uk-a-shi, to throw the lodges together in one place.
bat'-sa-wah-pe'-shi-uk-aub-sa'-ro-ke, to have the Crows altogether in one place.

to-morrow, tsi-nak-ći'-uk.

tongue, de'-źe, the tongue.
de-źish'-ka, the palate.
de-źa'-źe, Tongue River, a branch of the Yellowstone.

tooth, bi'-e, and i'-e.

toothache, i-e-rēk'.

top, ak'-a-da, on the top of anything.

tough, tsi-tsu'-tse, tsi-tsu'-tsih, } tough, tenacious.

trade, ma-esh-tsi-we'-mih, to trade.

truthful, mi'-shi-sak, to speak straight.

turn, ta-bah-u', to turn over.

turtle, na'-ko, a soft-shelled turtle.

two, nu'-pe-re, both.
ni-nōmp'-ta, you two, both of you.

U.

under, bik-sa'-tsi-sa-re, under, underneath.

understand, hu-a-ka'-re-e'-wa-tsih, I understand it all.

untie, bu-ru-ship'-mik, to untie a knot or noose.

V.

valley, o-ma'-re-ću'-ke.
au-bat-su'-a, Wounded-man Valley.

vapor, a-ma-shi'-e, fog.

vein, a-pi-de', the jugular vein.

vermilion, a-mah'-o-me, red coloring material.
o'-me, a red earth, used by the Crows for painting.

virtuous, ba-bu'-ro-ke.

W.

wagon, wa'-pa-ta-tsi.

waist, ba-da-e'-han-sup'-te.

wait, o-tsi-ek-me-o'-ne, a-mo'-nik, o-tći'-e (imp.), stop. } to wait, to delay.

wake, ka-ni'-ta, to wake up.
it-sēk', to wake up, as from a sleep.

wampum, ba-da-ah'-e-da-ha'-ro-ka'-te.

warm, it-si-tum'-ēk, to warm.
a-rēk', the weather is warm.
a'-re, hot.

war-party, dōh'-a.
ōm-pa-te', a war-club, pogamoggin.

wash, i-shu'-me, to wash.
bih'-ta-sa-pi-a'-a-ni-shu'-mi, to wash clothes.

wasp, is-će'-de-ka'-she, yellow-jacket, the insect that bites with its tail.

water, min'-e.
min'-e-ka'-wi, bad water, whiskey.
min'-e-shi-pit'-e, black water, coffee.
min'-a-nah'-e, the noise of water rolling over stones, a waterfall.
min'-e-pah'-u, to spill water.
min-e'-is-nu'-mik, to drink water.
min-ēh'-pi-ra', to sprinkle, as water.
min'-e-ma'-a-mūk, deep water.
min'-e-hep'-kat, shallow water.
min'-e-a'-źe, river water.
min-e'-bu-he', foam on water.
min-e'-ma-ku'-me, pike-poles, to push a boat in the river.
min'-e-tum'-e, Hot-spring Valley.
min'-e-ni-net'-e, the water that does not run, Big Rose-bud.
min'-e-ro-ći'-pe, the water that drives, Cross Creek.
min'-e-tum'-e-aź-ka'-te, Warm Water Creek. The ice never freezes over this creek. A branch of the Yellowstone.
min-e-pu'-e-bi-she, smoky water.
min'-ić-ke-aź-ka'-te, Lake Fork of Bird River.
min-e'-nits, rapids in the river.
min-its-ke'-i-se, the sea, big water.
min-it'-si-ćūh'-e, a little lake.
min'-e-tsi-e', a lake.

min-e′-tsi-ka′-ta, willow-bushes.
min-it-shi′-re, yellow willow.
min-e′-i-ta′-ri, the common willow.
ma-ha′, ma-he′, } a spring of water.
ma-he′, to boil up, as water from a spring.
ma-ha′-e-ho, a multitude of springs.
ma-mi′-mih, to walk in the water.
i′-e-pu′-he, to weep, to make water come from the eyes; the name of a hill or butte on Crazy Woman's Fork, a branch of Powder River.

weak, ba-ba′-ćēk, feeble.

wealthy, ba-e′-tsih, rich.

weapon, bat′-su-rek, ba-ba-ku′-ra, } any kind of defensive weapon used as arms.
ma-e-tsi′-pe, a battle-axe.

wear, i-e-ke′-be, to wear, as clothes.

weasel, u′-te.

weed, ba-de-i-ćap′-de-ke, a nettle weed.
ba-a-pa′-ne, any kind of weed.

well, hin′-e-et-de′-te, healthy, well.
lai-tho-ke′, it is well.

wet, a-gi′-tsih.

what, sap.
sa′-pa, what is it?
sa-pe′, who is it?
sa-pah′-pi-ra, what are you looking after?
sap-ti′-re, what are you doing?
sap′-te, why is it?
sa′-me, how much? how many?
ma-no′-e-sa′-pa, what thing is it?
hin′-e-sa′-pa, what is that?
i′-mi-she, what is it? tell me.

where, sho.
sho′-rak, where is it?
sho′-tats, how do you do?
sho-te′-ra, where? in what place?
sho-ta′-će, how? in what way?
sho′-ka, where is that?
shōsh′-te-re, where are you going?
sho′-i-ni-ći′-re, when? when is it? at what time?

whip, is′-a-sin′-it-se, and it-si′-rit-se, a riding whip.

whistling, ki′-o-shik, the whistling of the male elk.

white, tsi′-e-kat.
sho′-rūsh, a white root.

wife, u′-a.

wild, ak-se′-re-te.

wind, ho′-će.
sah-ik′, wind from the stomach.
ap-će′, windpipe.
no-mi′-na, to wind up anything.

window, ba-sa-she′.

winter, ma-se′, and ma′-na.

wipe, ku-ru-sih′, to wipe.

wish, ma-o-ne′-ćik, to wish.

within, o-mu′-e-ke.

without, o-me′-na-ku.

wolf, tse′-e-te, a large wolf. *Canis occidentalis.*
tse′-e-će, a mad wolf.
tse′-e-te-a-pish′, a wolf's nose.
bu′-a-ta, prairie wolf. *Canis latrans.*

woman, mi′-e.
mi′-e-ka-te, a girl.
mi′-e-do-ki′-se, a bashful woman.
mi′-e-e′-pe, a jealous woman.
mi′-e-ba-bu′-ro-ke, a virtuous woman.
mi′-e-ka′-te-ba-bu′-ro-ke, a virtuous girl.
mi′-e-ka′-nis-te, a young woman.
ka-ne-ka′-te, an old woman.

wonder, ba-ra-će-ra′-shik.

wood, ma′-na, ma′-ne, } wood, or a tree.
ma′-ne-a-pe′-ta-ni′-o, leaves falling from the trees.
ma-ne′-sat-sih, a small strip of wood, a splinter.
ma-ne′-ka, a small piece of wood.
ma-ne′-ba-sa′-bi-sho-shu′-ru-e, a piece of wood with a spear-point in the end, a javelin.
ma′-ne-pi-ru′-pe, a war-club filled with nails.
ma′-ne-sa-će′, a forest, or grove of trees.
ma′-ne-ći′-te, green wood.
ma′-ne-ćo′-se, dry wood.
ma′-ne-u′-she, the root of a tree.
ma′-ne-ho′-pe, a hollow log or tree.
ma′-ne-hi′-te, rotten wood.
ma′-ne-pa′-će, a wooden picket, stake.

ma'-ne-ta'-re, sweet cottonwood.
ma'-ne-a'-ke-de, in the tree.
ma'-ne-sho'-pe, a game with sticks, played by the women.
ma'-na-po'-he, quaking asp.
ma-na'-ke-da, up a tree.
ma'-na-ma'-ta-ta-tsi, scattering trees.
ma-na-kat', the color of wood, wood color.
ma-ni'-aḣ-e, flood or drift-wood.
mi-mo'-e-ma'-ne, a tree standing in the water.
pe'-ri-ćis-ma'-ne, a large willow. *Salix.*

work, i-ba'-di-o, to work.
wound, a-hu'-ra-buḣ'-e, a fresh wound.
wrist, its-ka'-she.
its-kis'-kip-e, the arm from elbow to wrist.
miḣ-tse'-mi-tse, a string of beads, used as an ornament for the wrist.

Y.

yawn, mi'-sa-tsiḣ, to yawn, to gape.
yellow, shi'-ri-kat.
ōk-shi'-re, chrome yellow.
yes, kōt, to be sure, certainly, yes.
yesterday, hu-raź'.
yonder, i'-e-ćēk.
i-eć', yonder it is.
you, di (personal pronoun).
yours, dis (possessive pronoun).

CHAPTER XVIII.

XI. Minnitarees.

ETHNOGRAPHICAL HISTORY.

The Minnitarees, or Gros Ventres as they are called by the traders, formerly inhabited a mud village near the Mandans, when the latter were situated at Fort Clarke, with whom they have always sustained friendly relations. The construction of their houses is the same as that of the Mandans and Arikaras, as also are their usual occupations. Small patches of corn, beans, squashes, pumpkins, and a few other vegetables, have been cultivated by them from the earliest period known, even to the present time.

When living with the Mandans at Fort Clarke they numbered about one hundred and twenty lodges, averaging five souls to a lodge, making an aggregate of six hundred persons, but having suffered by the small-pox at the same time with the Mandans, were reduced to forty lodges, and these thinly peopled and badly provided. In this condition they removed to a large prairie sixty miles above on the opposite side of the river. At this point they now reside, and their village is composed of about eighty huts, which are tolerably well filled with occupants.

The similarity of their language with that of the Crows shows plainly that they were formerly the same people, each being able to talk with and understand each other without much difficulty, though their long separation has caused some variation, as will be seen by comparing the annexed vocabularies. No trace of their origin or migration from other

lands is now left, but many traditions are told of their creation, which are reliable only as forming a part of their mythology and affording some index to their intellectual status.

These Indians should not be confounded with the Atsinas or Fall Indians, who inhabit the country of the Blackfeet. The languages of the two tribes are entirely distinct, nor do we know that they have ever held any association with each other whatever, or ever been at war with each other. This is the only tribe in the Northwest to which the name Minnitaree is in any way applicable or proper. Lewis and Clarke present us with a very complete view of the condition of the stationary tribes of the Upper Missouri as they saw them in 1804. In order that we may compare their history and condition at that time with their present state, we will quote the following paragraphs from the excellent Journal of Lewis and Clarke, which, from the well-known character of the travellers, and their advantages for obtaining information, we suppose to be in every way reliable.

"The villages near which we are established are five in number, and are the residence of three distinct nations: the Mandans, the Ahnahaways, and the Minnitarees. The history of the Mandans, as we received it from our interpreters, and from the chiefs themselves, and as it is attested by existing monuments, illustrates, more than that of any other nation, the unsteady movements and the tottering fortunes of the American nations. Within the recollection of living witnesses, the Mandans were settled forty years ago in nine villages, the ruins of which we passed about eighty miles below, and situated seven on the west and two on the east side of the Missouri. The two finding themselves wasting away before the small-pox and the Sioux, united in one village and moved up the river opposite to the Ricaras. The same causes reduced the remaining seven to five villages, till at length they emigrated in a body to the Ricara nation, where they formed themselves into two villages, and joined those of their countrymen who had gone before them. In their new residence they were still insecure, and at length the three villages ascended the Missouri to their present position. The two who had emigrated together still settled in the two villages on the northwest side of the Missouri, while the single village took a position on the southeast side. In this situation they were found by those who visited them in 1796, since which the two villages have united into one. They are now in two villages, one on the southeast of the Missouri, the other on the opposite side, and at the distance of three miles across. The first, in an open plain, contains about forty or fifty lodges, built in the same way as those of the Ricaras; the second the same number; and both may raise about three hundred and fifty men.

"On the same side of the river, and at the distance of four miles from the lower Mandan village, is another, called Mahaha. It is situated on a high plain at the mouth of Knife River, and is the residence of the Ahnahaways. This nation, whose name indicates that they were 'people whose village is on a hill,' formerly resided on the Missouri, about thirty

miles below where they now live. The Assiniboins and Sioux forced them to a spot five miles higher, where the greatest part of them were put to death, and the rest emigrated to their present situation, in order to obtain an asylum near the Minnitarees. They are called by the French, Soulier Noir, or Shoe Indians; by the Mandans, Wattasoons, and their whole force is about fifty men.

"On the south side of the same, Knife River, half a mile above the Mahaha, and in the same open plain with it, is a village of Minnitarees surnamed Metaharta, who are about one hundred and fifty men in number. On the opposite side of Knife River, and one and a half miles above this village, is a second village of Minnitarees, who may be considered as the proper Minnitaree nation. It is situated in a beautiful, low plain, and contains four hundred and fifty warriors. The accounts which we received of the Minnitarees were contradictory. The Mandans say that this people came out of the water to the east and settled near them in their former establishment, in nine villages; that they were very numerous, and fixed themselves in one village on the southern side of the Missouri. A quarrel about a buffalo divided the nation, of which two bands went into the plains, and were known by the name of Crow and Paunch Indians, and the rest moved to their present establishment. The Minnitarees proper assert, on the contrary, that they grew where they now live, and will never emigrate from the spot, the Great Spirit having declared that if they moved they would all die. They also say that the Minnitarees Metaharta, that is, Minnitarees of the Willows, whose language, with very little variation, is their own, came many years ago from the plains, and settled near them; and perhaps the two traditions may be reconciled by the natural presumption that these Minnitarees were the tribe known to the Mandans below, and that they ascended the river for the purpose of rejoining the Minnitarees proper. These Minnitarees are part of the great nation called Fall Indians, who occupy the intermediate country between the Missouri and the Saskatchewan, and who are known by the name of Minnitarees of the Missouri, and Minnitarees of Fort de Prairie, that is, residing near, or rather frequenting, the establishment in the prairie on the Saskatchewan. These Minnitarees, indeed, told us that they had relations on the Saskatchewan whom they had never known till they met them in war, and having engaged in the night, were astonished at discovering that they were fighting with men who spoke their own language. The name of Gros Ventres, or Big-bellies, is given to these Minnitarees, as well as to all the Fall Indians. The inhabitants of these five villages, all of which are within the distance of six miles, live in harmony with each other. The Ahnahaways understand in part the language of the Minnitarees; the dialect of the Mandans differs widely from both; but their long residence together has insensibly blended their manners, and occasioned some approximation in language, particularly as to objects of daily occurrence and obvious to the senses."

Brackenridge says that there are remnants of seventeen villages of Mandans and Gros Ventres. They are included in seven villages; five of the Gros Ventres, and two of the Mandans, within a distance of fifteen miles. He says, that though there is not the least affinity in their languages, the Gros Ventres is spoken by all the Mandans.

Morse probably over-estimated the number of the Minnitarees. He observes that they number 3250 persons, have their village on the south side of the Missouri, east of the Little Missouri, about half way between the Mandans and the Yellowstone.

Say, in the account of Long's Expedition to the Rocky Mountains, presents a very interesting account of the customs, habits, and religious opinions of this tribe, but in Prince Neuwied's excellent work, before alluded to, the most minute and accurate description of the Minnitarees is given which can be found in any memoir. He says, however, that the word "Manitarie" was given by the Mandans, and signifies "those who came over the water." From the most reliable information which I could obtain, I am inclined to think that the true meaning is "people of the willows." This opinion is farther strengthened, from the fact that a species of willow, most abundant in the Minnitaree country, is called in their language, min'-i-it-a'-ri, "growing by the water."

The present location of the stationary tribes of the Upper Missouri is as follows. The village of the Minnitarees is situated on the north branch of the Missouri, near latitude 47° 30′, and longitude 102°. The village of the Arikaras is located on the south side of the Missouri, at Fort Clarke, in latitude 47°, longitude 101°, and the Mandan village is on the same side of the river, and about four miles above the last.

Several vocabularies of the Minnitaree language have been already published, but the only ones worthy of note are, by Professor T. Say, in Long's "Expedition to the Rocky Mountains," and by Prince Neuwied, in his "Travels in North America." In the Transactions of the American Ethnological Society, Vol. II, Gallatin proved very clearly the affinities of the Minnitaree with the Crow language, and that both of them belonged to the Sioux or Dakota stock.

In treating of the stationary tribes, no mention has been made of the extent of their lands, or of the portion of territory they claim as their own. Properly speaking, they have no land, except their corn-fields, and the prairie immediately around and defended by their village. The moment they leave their huts, they are liable to be attacked and driven back by the Dakotas. The Arikaras, when they leave their homes, hunt in the Dakota country, and by their permission, whilst the Minnitarees depend on their peaceable relations with the Assiniboins when engaged in hunting, as they do annually in the vicinity of the Great Bend. In case of a general war, none of the stationary Indians could leave their village at all. They are too few to contend with the surrounding tribes, and even if united, would not be able to sustain a position in the Dakota country without

the shelter of their mud cabins. Still, from Apple River below to the Great Bend of the Missouri above, the country is more hunted by these Indians than by any others, and consequently, it may be called the territory of the three tribes residing in mud villages, though in reality it is neutral ground belonging to particular tribes.

VOCABULARY OF THE MINNITAREE DIALECT OF THE AUB-SA'-RO-KE OR CROW LANGUAGE.

above, ma-ku'-ka.
afraid, bi-di'-tu, I am afraid.
alive, i'-di.
all, huk-a-he'-ta.
ankle, i'-ća-re-shu'-ka.
antelope, ūh'-i.
arm, a-ra'.
arrow, a-ru'-ti-sha.
autumn, ma-ta'.
axe, bi-ip-sa'.

back, ish-i-te'-ru.
bad, ish-i'-a.
beard, i-ki'.
black, shi-pish'-a.
bladder, u'-shi-ka-ruh'-e.
blood, i'-de.
blue, she-pa'-ći.
boat, ma'-te.
body, a-hu'-a.
bone, ma'-di-ki.
bow, bi-ru'-ha-pa'-ro-wa.
boy, ma-ka-ris'-te-mat'-se, a little boy.
breast, e'-wa-ki.
breechcloth, ma'-i-dip-sha'-ki.
brother, ba'-ta-wa'-će.
bull, ki'-ro-pi.
burn, o'-te, to burn.
by, u-te'-ru.
tut-a', by and by.

calf, na-ka-ći'-ri.
call, ba-ki-ko'-ha.
chickadee, is-ko-pi'.
chief, bau-tse'-it-se.
coat, ma-i-to'-ke.
cold, ći-di'-a.
cow, bi-ti'-a.
bi-ta-ka'-sha, a young cow.
crow, pe-rit-ska'.
cry, i-bi'.

dance, di'-sha, to dance.
day, ma'-pi.
dead, ta'-ih.
deer, ći-ća'-pi-sha, black-tailed deer.
die, dēsh.
dog, bi-de'-de.
ći'-pa, prairie dog.
drink, ma-će'-ko-di, to drink.
duck, mi-hah'-a.

ear, a'-pa.
earth, a-wa'.
eating, ba-ru'-te.
enemy, ma-i-ha'.
eye, is-ta'.

face, bi-ta'.
far off, ti'-ći.
father, ta-tish'.
fin, i-to'-i-ka-te.
finger, sha-ki'-nu.
fire, bi'-da.
fish, bu'-a.
bu-a-ka'-te, a catfish.
bu-a-na'-ka, roe of a fish.
bu-a-ća'-she, small fish.
flesh, a-ru'-du.
flint, ba-ći-ka'-sha.
foot, ma'-ći.
forever, ko-ći'-te.
friend, ba-e-ku'-e.
girl, ma-ka-ris'-ti-mi'-a, a little girl.
go, da, to go.
good, sa-ki'.
great, a-ru'-ke-ri'-ći.
green, to-hish'.
gun, o-wut'-se-we-du'-ha.

hail, ma-ka-pit'-a-wi.
hair, a-da'.
hand, sha-ke'.
handsome, sa-ki-ku'-a.
hawk, mu-ki'-ra-ki.
head, a'-tu.
head-dress, ma-i-shu'-a-po-ka.
hear, bi-ke-ku'-a, to hear.
heart, na-ta'.
heaven, a-pah'-e-ru'-she.
heel, i'-će-ki.
hill, it-i'.
hot, bi-ća'-we.
house, a'-ma-ti.
husband (my), ma-ki'-da.

I, bi.
ice, ba-ru'-he.
in, a-ma-hu'-ru.
Indian, hi-na-tsa'.

kettle, bi-duh'-e.
kill, ti'-pe, to kill.
knee, e-re-shu'-ka.
knife, ba-ći'.

lake, bi-di'-ka-ku'-pe.
laugh, ba-ka'.
leg, i-di'-ke.
leggin, hōp-će'.
light, a-muh'-a-hi.

lightning, ka-di′-ka.
live, i-dĭts′, to live.
liver, au-pi-sha′.
love, ba-ki-dush′-i.

man, bau-tse′.
ba-shi′, a white man.
mast, ma-re-ko′-peh-e-hūm′-pa.
midday, bi-di-wa′-pa-re-pe′-hi.
midnight, bi-di-i′-nuk-pi.
moon, ma′-ku-mi′-di.
morning, bi-da-ha′-ru-te.
mother, i-kūsh′.
mountain, a-ma-ha′-wi.
mouth, a-pu′-a-te.

nail, sha-kih′-pu.
navel, ma′-i-te-re′-pa.
near, au-tsa-ka′-ti.
neck, am′-pa.
never, huk-a-hi′-ta.
night, o′-ksi.
no, de′-sha.
nose, ma-pa′.
nothing, ba-ru-a-na′-shēsh.

oar, i′-e-ho′-ke.
old, hi′-e.
on, di-ki′-di.
owl, da-ku′-pe.

part, su′-ta.
people, a-ma-she′, people who live in mud houses.
pepper, bi-di-ho′-ha-ta.
perhaps, ha-she-ié′-ki.
pipe, ki′-pi.
plain, a-ma′-ra-su′-ka.
polecat, hu′-ke.

rain, ha′-re.
red, hish′-e.
ring, ma-sha′-ki-o-psa′-ki, brass ring.
river, a′-źe.
a-źe-ka-ris′-ta, a small river.
run, hi-ru′-te.

salt, au′-ma-ho′-ta.
sash, ma′-i-pat-su′-a.
scale, bu-i-shi′-she.
scalp, a′-da-du.
sea, bi-di-ti′-a.
seat, ma-a-shi′-ta-ra-hu′-pi.
see, au-muk′-auk, to see.
sheep, a-shi-ti′-a, big-horn.
shell, o-tish′-ka, shells for ornament.
shoe, bi-di-hōm′-pa.
ba-du-shi′-ish, to untie shoes.
shot-pouch, bi-rut′-se-pi-she.
shoulder, a-ri-ru′.
sinew, bau′-tsu-a.
sing, ma-ke-pa′-hi, to sing.
sister (my), ba-ta-wi′-a.
skin, dah′-pe.
sky, a-pah′-e.
small, ka-rish′-ta.
snipe, a-pit′-sa.
snow, ma′-pi.
something, ma-ho′-a-wi′-tu.
son (my), ba-di-sha′.
sour, a-da′-wi.
speak, ba-de′.
spear, bi-re′-te-ru-te.
spring, ma-ha′ (season).
bi-a-ha′-ku-te, spring, fountain.
squirrel, ko-kōk′-shi, prairie squirrel.
star, i′-ka.
stomach, e′-di.
strike, ma′-di-ki, to strike.
strong, it-ći′-uk.
summer, a-ba′-de.
sun, bi-de-wa′-pi.
sunrise, ma-pa′-wi-di.
sunset, mi-di′-e-wuk′-pi.
swan, bi-da′-tuk-i.
sweet, si-ku′-a.

thigh, ma-na-ta′-ro.
think, ba-ki-ri′-she, to think.
thou, di.
di-he′-di, thou, thyself.
thread, ba-e-ke-ka′-ka, yellow thread.
through, he-ru′-te.
thunder, ta′-ho.
tie, ba-ra-tu′-wi, to tie.
tobacco, o′-pe.
to-day, hi-di-ma′-pe.
toe, i-ći′-pu-wi.
to-morrow, a′-te-rūk.
tongue, de′-źe.
tooth, i′-a.
town, a′-ti.
turkey, si-ah′-ti.

ugly, i-te′-shi-a.
under, bih-ta′-ru.

valley, ta-rūh′-te.
vein, ma-ho′-i-de.

walk, di′-di, to walk.
wampum, ma-ih′-a-ma-ra-ku′-tse.
war-club, mi-re-ku′-tsa.
warrior, bau-tse-i′-di-ki.
water, bi-di′.
weak, ha′-sha.
what, ta′-pa.
ma-ru′-a-ta′-pa, what thing?
which, ta′-pa-tōk, which person or thing?
whiskey, bi-di-a′-ra-wi.
white, ih-o-tuk′-e.
who, tup-e′.
wife (my), ma-ta′-e-wi′-a.
wind, ho′-ći.
windpipe, no′-tish-ka.
wing, ih′-pa.
winter, ma′-na.
wish, hid-ish′, to wish.
within, a-mu-hu′.

without, a-ta-shi′-ku-a.
wood, bat-se-ta′-she, petrified wood.
woodpecker, tōsh′-ka.
woman, mi′-a.
year, a-mȧ′-e-ća.
yellow, tsi′-ri.
yes, ko-ush′-ik.
yesterday, hu-ri-shi′-ru.

CHAPTER XIX.

XII. MANDANS.

ETHNOGRAPHICAL HISTORY.

ALTHOUGH one would suppose that all the tribes of the Upper Missouri, being the same barbarous people, accustomed to like occupations, and possessing the same advantages, would exhibit no great national difference, yet each tribe or nation has marked distinctions of character, as much and even more, perhaps, than the several divisions of the European race. This must depend, to a great extent, upon their physical organization, for the pursuits of all Indians inhabiting the plains are or should be radically the same. Hunting and war, amusements and devotion, idleness and activity, divide their time, and would without some peculiarity of constitution lead to a general resemblance of character. The small amount of agricultural labor bestowed upon the soil by the stationary tribes, cannot be reckoned as an item in their national education, or as influencing the conduct of the men, for this is done altogether by the women. The presence of the men is not required in the corn-fields, and if found there, it is from far different purposes than aiding in the work. The question then arises, how it happens that the Arikaras present such grovelling, debased, and mean general features, with scarcely any redeeming qualities, whilst the Mandans, residing but a few miles distant, possess an almost opposite character?

The Mandans, or Mi-ah′ta-nēs, "people on the bank" (of the river), as they call themselves, must have resided on the banks of the Missouri at a very remote period, perhaps not near their present residence, but in several places along the river. It is also probable that if they migrated at all, they came from a southern direction, as the sites of different villages of very ancient date are seen along the Missouri, as low down as the present boundary between the United States and the Dakota country. Some of these antique ruins are said to have been Arikara villages, which is doubtless the case. The fact sought to be established is, that all these stationary tribes migrated in the same direction, from southeast to northwest along this river, which may be inferred from the circumstance, that no remains of their villages are to be seen along any other stream than the Missouri, nor are they found in any place on the plains.

Prior to the visit of Lewis and Clarke in the autumn of 1804, very little information of

a reliable character was known in regard to the origin and early history of the Mandans. Col. D. D. Mitchell, in a letter to Mr. H. R. Schoolcraft, published in the third volume of the "History of the Indian Tribes," refers to an early writer by the name of Mackintosh, who it seems was connected with a French trading company as early as 1772. From his own account, he left Montreal in the summer of 1773, crossed over the intervening country, and reached the Mandan villages on Christmas day. He says that at that time, the Mandans occupied nine large towns situated very near each other, and that at short notice they could muster 15,000 warriors. Col. Mitchell is of the opinion that this author exaggerates in his statistics, but that they were a formidable nation, the ruins of numerous villages along both sides of the Missouri bear ample testimony. In 1804, Lewis and Clarke speak of five distinct villages belonging to three distinct nations, viz., Mandans, Ahnahaways, and Minnitarees. They also allude to a lower Mandan village, called "Mahaha." At the present time, the Mandans occupy a small village about three miles above Fort Clarke, and do not number over two hundred and fifty or three hundred souls. The Ahnahaways were undoubtedly a portion of the Mandan nation, but I cannot ascertain that any trace of them exists at this time. In 1833, at the time of the visit of Prince Neuwied to the Upper Missouri, two Mandan villages were standing, the southern village about three hundred paces above Fort Clarke, on the same side of the river, and the other about three miles higher up on the same bank. It is evident that the former is now occupied by the Arikaras, while the latter is in possession of the small remnant of the Mandan nation now living. At the time of the Prince Neuwied's visit, the first village was composed of sixty-five huts, with about one hundred and fifty warriors, and the latter of thirty-eight huts, with eighty-three warriors, both villages, perhaps, possessing nine hundred to one thousand souls.

Our knowledge of this nation, obtained from the American Fur Company, commences in the year 1829, when, through that Company, the fur trade on the Upper Missouri became established on a more solid basis than it had been by the French traders. Anterior to the above date, the latter had been trading with these Indians in their usual way, by building wintering houses, putting therein a trader and a few men, with a small supply of goods, and abandoning the post in the spring, taking with them down the river their returns of furs and skins. At that time the Mandans occupied the same village in which the Arikaras now live, and also had another a few miles up the river. The lower town consisted of two hundred cabins, and the upper of eighty, both built in every respect as described in the chapter relating to the Arikaras, the latter, at that time, occupying their own village near the mouth of Grand River. We thus see that the account given by the American Fur Company of the condition of the Mandans in 1829, does not differ materially from that of the Prince Neuwied, as observed by him in 1834. In the year 1829,

the American Fur Company erected Fort Clarke, for the express purpose of trading with the Mandans and Minnitarees, the former nation numbering about six hundred warriors, or eighteen hundred souls, and the latter about half as many.

It is somewhat remarkable that notwithstanding all the misfortunes that have befallen this tribe for so many years, it even to this time preserves its independence and individuality as a nation. Nearly all of the Mandans speak the Minnitaree language, and many of them are familiar with the Dakota and Arikara tongues, but very few if any of the surrounding tribes have acquired that of the Mandans. But one white man has ever learned to speak the language fluently, and he resided among them over twenty years. I cannot ascertain that there are any peculiar difficulties in the sounds or structure of the language, which should prevent individuals of other nations from acquiring it readily; indeed, I think the evidence is quite clear, as suggested by Mr. Gallatin, that it is remotely allied to the Dakota stock, and presents few if any more obstacles to its acquisition than the other dialects of that group.

In the year 1833 these Indians were in their most prosperous state, industrious, well armed, good hunters and good warriors, in the midst of herds of buffalo, mostly within sight of the village, with large corn-fields, and a trading-post, from which they could at all times obtain supplies, and consequently at that time they might have been considered a happy people. In their personal appearance, prior to the ravages of the small-pox, they were not surpassed by any nation in the Northwest. The men were tall and well made, with regular features and a mild expression of countenance, not usually seen amongst Indians. Their complexion also was a shade lighter than that of other tribes, often approaching very near to some European nations, as the Spaniards. Another peculiarity was that some of them had fair hair, and some gray or blue eyes, which are very rarely met with among the other tribes. A majority of the women, particularly the young, were quite handsome, with fair complexions, and modest in their deportment. Instead of the brazen, forward look and manner, customary with females of some of the tribes of the Northwest, they were diffident and shy, avoiding any approaches of strangers or of their own people. They were also noted for their virtue. This was regarded as an honorable and most valuable quality amongst the young women, and each year a ceremony was performed, in the presence of the whole village, at which time all females who had preserved their virginity came forward, struck a post, and challenged the world to say aught derogatory of their character. As this was a religious ceremony, any of those present who could with truth contradict the statement felt bound to do so, and if detected in the deception, the female lost her standing forever afterward among the young of both sexes. In ordeals of this kind, it was remarked that more than two-thirds of the Mandan females came off victorious, which is regarded as a great proportion when the early training and the influences

that surround them are taken into consideration. The fact that a ceremony of this kind exists among savages, tending to promote virtue and discourage vice, is of itself sufficient evidence of their mental as well as moral superiority.

Both males and females of every age, especially the young, were very cleanly in their persons and neat in their dress. It was their custom, and still is, growing out of some ancient tradition, to bathe in the river every morning. Even in the winter season they cut holes in the ice, immerse the body, and it is no uncommon thing to see them after taking their cold bath sit naked on the ice, comb their hair, and paint themselves in a snow-storm, the thermometer from 10° to 30° below zero. This constant ablution at all seasons had the effect of inuring the system to cold, for they never shiver, be the weather ever so severe, and sometimes they seem to prolong the making of their toilet in proportion as the air is intensely cold. At all events the practice was a good one for the Indians, inasmuch as it kept their bodies free from most diseases and eruptions incident to their manner of life, and it was remarked that they were uniformly healthy and vigorous. As a general rule the females despised the promiscuous and illicit intercourse with the other sex, so much practised by some of the other tribes, and consequently they were free from syphilitic diseases.

The great object of the young of both sexes was to dress well; and everything they could get was lavished on their persons in clothing and ornament. Some of their dresses were very costly, particularly those of a young brave, the war-eagle feathers of which alone would equal the price of two horses, or one hundred dollars. They were, as a nation, fond of amusements; dances were frequent, and different clans required separate costumes, some of which, although made of skin wrought with figures of beads and porcupine quills, cost six months' labor to complete them. The taking of the war-eagle, whose tail furnishes the most costly ornament of a warrior's dress, requires great patience, and is thus accomplished. About sixty-five or seventy miles above the Mandan village, there is a river called the Little Missouri, which takes its rise in the Black Hills and empties into the Missouri at the lower end of the Great Bend. Along the whole course of this stream the surface is much broken, resembling that described as Mauvaises Terres in the Dakota country. It is a wild region, seldom visited by any persons except passing war-parties, and is the secure abode of the grizzly bear, big-horn, and war-eagle. A Mandan wishing to make an eagle hunt, goes through several days' fasting, offers sacrifices to the Great Spirit, and implores His protection and aid in the success of his expedition. When, by a propitious dream, he believes the time favorable, he proceeds alone to the place above mentioned, killing some animal on his way, the meat of which he will need as bait. When he reaches the wildest and most solitary spot, he digs a hole in the ground large enough to contain his body in an upright position; over this hole is placed a cover-

ing of willows, which is overlaid with grass, leaving only a hole large enough for the hand. A stick is then laid over this lid or covering, directly over the hole for the hand, to which the meat or bait is tied. The man descends into the hole, covers it up with the lid, and patiently awaits the approach of the eagle. The eagle, soaring above, sees the bait, and then gradually approaches in circles, and when within a few feet darts down and fastens its claws into the meat, and at the same moment the hunter grasps the bird by the legs, thrusts his knife upwards into its body, and opening the cover draws it in. In this way, during a week or ten days of constant watching, two or three birds are secured, and this is considered a good hunt, though the hunter more frequently returns unsuccessful. The risk attending these solitary hunts in dangerous places, and the rarity of the bird, causes the high value to be set upon the feathers, of which the twelve forming the tail are the only ones used in dress. Two of these tails are sold for a horse, or fifty dollars.

In the palmy days of their national prosperity, when the population comprised six hundred warriors, and as many handsome women very gayly dressed, much time was spent in amusements of every kind. But short intervals elapsed between dances, games, races, and other manly and athletic exercises. One of these was Olympic in its character, and was thus performed. A race-course of three miles on the level prairie was laid off, cleared of every obstruction, and kept in order for the express purpose. Posts were planted to mark the initial and terminating points, and over the track the young men tested the elasticity of their limbs during the fine summer and autumn months, to prepare themselves for the hardships of their winter hunts. On the occasion when races were determined on by the chiefs, the young men were informed by the public crier, and every one who had confidence in his prowess was admitted to the lists. Each of the runners brought the amount of his wager, consisting of blankets, guns, and other property, and sometimes several judges or elderly men were appointed by the chief of the village, whose duty it was to arrange the bets, regulate the starting, and determine the results of the race. As the wagers are handed in, each is tied to or matched with one of equal value, laid aside, and when all have entered, the judges separate, some remaining with the property staked at the beginning of the race-course, and others taking their station at its terminus. Six pairs of runners whose bets have been matched, now start to run the three-mile course, which is to be repeated three times before it can be decided. The ground is laid out in the form of an arc describing two-thirds of a circle, the starting-point and goal being but a few hundred yards distant from each other, the intermediate space being filled up by the young and old of the whole village. The runners are entirely naked, except their moccasins, and their bodies are painted in various ways from head to foot. The first set having accomplished about half the first course, as many more are started, and this is continued as long as any competitors remain, until the entire track is covered with runners,

at distances corresponding with their different times of starting, and the judges award the victory to those who come out, by handing each a feather painted red, the first six winning the prize. These, on presenting the feathers to the judges at the starting-point, are handed the property staked against their own. The first and second heats are seldom strongly contested, but on the third every nerve is strained, and great is the excitement of the spectators, who with yells and gestures, encourage their several friends and relations. The whole scene is highly interesting, and often continued for two or three days in succession, to give every one an opportunity to display his abilities. Those who have shown great fleetness and powers of endurance, receive additional reward, in the form of praise by the public crier, who harangues their names through the village for many days afterwards. This is a fine national amusement, and tends much to develope the great muscular strength for which they are remarkable. They also, immediately on finishing the race, in a profuse state of perspiration, throw themselves into the Missouri, and no instance is known where this apparent rashness resulted in any illness.

At all times in fine weather, the Mandan village presents a gay and lively appearance. Ball-playing, horse-racing, and gambling in various ways may be seen going on. These amusements are too numerous to be described in detail here. The dances are of the most brilliant character known among the Indians, displaying a great variety of costumes, adapted to the different occasions, and made of the most gay and costly materials. This is the only nation in which the women are allowed to join the men in their dances. With other tribes, they never mingle, except in the scalp dance, though in one or two medicine ceremonies they perform alone. In admitting women as associates in their amusements, and otherwise treating them with respect, this nation has shown great kindness of disposition. Instead of regarding them in the light of slaves or property, as is the case with other tribes, they never abuse them or impose heavy burdens on them, and this course is rewarded by their usefulness, cheerfulness, and fidelity. Such a thing as divorcing a woman for illicit intercourse is unknown, or at least of very rare occurrence amongst them, and the disgrace and humiliating public ceremony to which female offenders in this way are subject, is worse than death.

The Mandans are a very devotional people. No war excursion is entered upon, corn planted, eagles sought, or any important labors commenced, without propitiating the Great Spirit, in accordance with their traditional customs. Some of these rites consisted merely in sacrifices, accompanied with prayer and fasting, but when a young man is starting out on his first war expedition, or any great benefit is to be derived from supernatural power, they practise self-torturing ceremonies little less severe than those of Hindoo devotees. The place where these religious performances are observed, is back of their village on the prairie, where a post is planted in the ground, and a circle of buffalo-skulls

formed round it, about twenty feet in diameter. A young man about commencing his career as a warrior, or a leader on the eve of starting with a party against the enemy, feels bound to undergo the tortures about to be noticed, in order to secure the aid of the Great Spirit in these undertakings. These rites are repeated at different periods when circumstances require their observance. The person under the influence of this superstition, usually prepares himself by three or four days of fasting, lying on the ground without shoes or covering of any kind, without food or water, and without speaking to any one. At the end of this period, he is visited by the medicine-men, who after much incantation, make incisions about three inches long and half an inch deep, lengthwise down the back opposite each shoulder-blade, through which a stout stick is thrust, and a strong cord being attached to the stick, he is drawn up a few feet from the ground by passing the cord through a hole in the top of the post, his entire weight being supported by the skewer in the back. When suspended in this way, the medicine-men take hold of his feet, and running rapidly around, give an impetus to the body so as to wind up the cord, after which the devotee, using his feet, could in the same way unwind himself, and thus keep himself constantly swinging round by striking his feet on the post. Here he hangs for one or two days and nights, until, fainting and exhausted, he is let down by the medicine-men. After being liberated from the post, four or five buffalo-skulls are tied to the end of the cord, the stick still remaining in the incision, and he is obliged to drag these skulls, a weight of fifty or sixty pounds, over the prairie, with the horns ploughing up the ground, and the blood streaming down his back. This is persisted in until the flesh breaks loose, or the person fainting, is carried away by his friends. The ceremony being over, food and drink are given him, and when fully revived, he is considered in a fit state to undertake any dangerous expedition, though he still is compelled to wait, until by favorable dreams he is advised of the proper time. Most warriors of note have passed through this ordeal, and many have repeated the same several times during their lives.

Another and scarcely less painful rite is to burn across the breast with a red-hot iron, making deep sores, about four inches long, six or eight in number, and about an inch apart. Sometimes the burns are made in large circles on the breast, and again on one or both shoulders. This actual cautery is very severe, on account of the slow operation of the medicine-men, who with smoking and invocation require at least an hour to inflict one wound.

In the spring of 1838, that dreaded scourge of the Indians, small-pox, made its appearance among the Mandans. By some accident portions of the clothing belonging to one of the employés of the Fur Company, who had suffered from the disease on the lower part of the Missouri River, were retained on the steamboat, although no appearance of the infection was visible until the boat arrived at Fort Pierre. Here it broke out amongst the

voyageurs, and although every precaution was taken in delivering the goods at the different posts, yet it was communicated to the several tribes along the river. All the tribes suffered more or less, but none approached so near extinction as the Mandans. The summer was intensely hot, the disease was general in both villages, and owing to their confined, dark, and ill-ventilated cabins, proved fatal to a degree far beyond that of other nations. It was almost impossible that life could be sustained, on account of the impure state of the air, and the disease usually assuming the confluent form, almost invariably resulted in death. Remedies were tried at first, the principal of which were sweating, cold bathing, and depletion. Of these none succeeded. The first aggravated the fever to delirium, and the sufferers died during the operation. Bleeding produced no more beneficial results, and this, together with all treatment, was soon abandoned, whole families lying helpless, waiting death, in different stages of the disease. The banks of the river were strewn with the dead and blackened carcasses, which were daily pushed into the stream by the traders. The drums and rattles of the medicine-men soon ceased, for they too were overtaken by death. The men committed suicide or murdered their suffering children; the women mourned their fate; and all was misery, despair, and death. The trading-post was closed, the traders confined to their rooms, and the cannon loaded and placed in the bastions, so as to protect them, if need be, against their hitherto most excellent friends. I need not pursue this subject farther than to say, that a period of darkness reigned, in which their fierce passions, being wrought up by disease and frenzy, these Indians committed acts at which the imagination revolts, and which were not witnessed by others than themselves. When the disease had abated, and when the remnant of this once powerful nation had recovered sufficiently to remove the decaying bodies from their cabins, the total number of grown men was twenty-three, of women forty, and of young persons sixty or seventy. These were all that were left of the eighteen hundred souls that composed the nation prior to the advent of that terrific disease, and even those that recovered were so disfigured as scarcely to be recognized.

When the survivors had rallied and recovered, they left the village at the fort, and took up their residence in the other cabins, a few miles above. Here some attempt was made to reorganize their social system, but the race could only be propagated by intermarriage without regard to relationship, unless closely allied. To this they were forced by circumstances. The disease had only left one of a family, here and there, and no choice was offered for new connections. However, they conformed as nearly as practicable to their customary laws, avoiding as well as they were able contracts of marriage with blood relatives, although their condition imposed the necessity of perpetuating their nation by alliances which, had they been differently situated, would not have been resorted to. This appears to be an evil more or less incident to all stationary tribes. Women are very

seldom taken from other tribes, for the reason that they usually speak a different language, and the consequence is, that a degree of relationship runs through the whole village, which perhaps is the cause of their living more harmoniously together than the roving tribes. Quarrels very seldom occur, and no great division of feeling or rule is observed, but the ultimate effect of this interconnection is a disregard of the natural barrier of blood relationship, which in its progress, and sanctioned by custom, results in actual incest.

About the time that the Mandans left the lower village, the Arikaras came and took possession, the former readily consenting to this arrangement, because it placed a large body of strangers between them and the Dakotas, with whom, in their now feeble state, they were unable to contend.

The Mandans at this time (1855) number about thirty-five or forty huts, perhaps nearly three hundred souls, raise corn, squashes, beans, &c., same as the Minnitarees and Arikaras, and hunt the buffalo when these animals are near their village. The destroying and humbling effects of the disease referred to could not change their indomitable spirit of pride and independence. They will not join with the other nations near whom they reside, connect themselves with them by marriage, nor practise any customs but those of their ancestors. Their religious rites and ceremonies are preserved entire, and the system of self-inflicting tortures is practised at the present day. Being too few in number to form war-parties, they remain at home and defend themselves.

All of their noted chiefs are dead, and sketches of their lives would be interesting, but will not be related in this place, though they exhibited many amiable features. While living their laws were seldom infringed upon by the claims and pretensions of other aspirants to power. They were respected for their judgment, and loved for the patriarchal care they took in the general welfare, and not feared on account of their personal bravery or extensive relationship, as is the case with the migratory bands. Old age in both sexes is held in veneration and made comfortable. The Mandans deposit their dead on scaffolds near the village, and this also has a tendency to produce diseases in warm weather; but every attempt to induce them to inter the bodies has proven unsuccessful. They cultivate the soil to some extent, raising corn and beans, but seldom more than they need for their own consumption. Their destiny seems tending toward final extinction.

The most complete and accurate history of the Mandans ever published, is given in the excellent work of Prince Neuwied, who spent one winter among them, under the most favorable circumstances for obtaining reliable information. His vocabulary is also quite full, and he has exhibited the grammatical structure with considerable detail. Catlin, also, in his account of the North American Indians, enters quite minutely into their history, manners, and customs, which, though highly colored, are, for the most part, correct. The notion which he entertained that the Mandans are of Welsh origin has been so

thoroughly exploded, that it is unnecessary to allude to it farther. His vocabulary of the language, however, is a very excellent one. Schoolcraft also gives a somewhat lengthy vocabulary, derived from Mr. James Kipp, for many years a trader among these Indians. I may as well state here, that not only the information obtained by me in regard to the Mandan language was given by Mr. Kipp, but the same man aided Prince Neuwied and Catlin, so that our present knowledge of the Mandan language has been derived from very nearly the same source. So far as I can learn, the most important contributions to the knowledge of the Mandan language, and the only ones worthy of especial notice, are those of Prince Neuwied, Catlin, and Schoolcraft. That of Prince Neuwied is by far the most important, containing much of the grammatical structure of the language, and, as above observed, it was obtained under circumstances which entitle it to confidence. The latter, though important, are merely lists of words, and convey but a partial idea of the language.

CHAPTER XX.

OBSERVATIONS ON THE GRAMMATICAL STRUCTURE OF THE MANDAN LANGUAGE.

I. Nouns.

1. With few exceptions, Mandan nouns have both a singular and plural form, as is shown by their termination; as, a-pe′, a leaf; a-pīsh′, leaves; ma-he′, a weed; ma-hōsh′, weeds; si, a feather; si′-ish, feathers.

2. The gender of nouns is indicated by the use of different words to express the sex; as, nu′-maŋ-ke, a man; mi′-he, a woman; be′-ro-ke, a bull; p'tīn′-de, a cow; ni′-ka, a calf.

3. The case of a noun is known by its position in a sentence.

II. Adjectives.

4. Adjectives always follow the nouns which they describe; as, mi-he′-shi-na-shūsh, a handsome woman; nat-kaŋ′-ka-sīsh, a hard heart.

5. The numeral adjectives of the cardinal kind are as follows:

one, maȟ′-a-na.
two, nūm′-pa.
three, na′-men-i.
four, to′-pe.
five, keȟ-ūn′.
six, ki′-ma.
seven, kū′-pa.
eight, te-tuk′-e.
nine, maȟ′-pe.
ten, pi′-raȟ.
eleven, a-ga-maȟ′-a-na.
twelve, a-ga-nūm′-pa.
thirteen, a-ga-na′-men-i.
fourteen, a-ga-tōp′.

fifteen, a-ga-hūn′.
sixteen, a-ki′-ma.
seventeen, a-ku′-pa.
eighteen, ak′-te-tuk′-e.
nineteen, a-ga-mah′-pe.
twenty, nūm′-pa-pi-rah′.
twenty-one, nūm′-pa-pi′-ra-ka-ro-mah′-a-na.
thirty, na′-men-i-am-pi′-ra-kōsh.
forty, to′-pa-pi′-ra-kōsh.
fifty, keh-ūn′-am-pi′-ra-kōsh.
sixty, ki-ma′-am-pi′-ra-kōsh.
seventy, ku′-pa-am-pi′-ra-kōsh.
eighty, te-tuk′-e-am-pi′-ra-kōsh.
ninety, mah′-pe-am-pi′-ra-kōsh.
one hundred, i-sūk′-mah-a-na.
one thousand, i-su′-ki-ka-ku′-hi.
one hundred thousand, i-su′-ki-ka-ku′-hi-i-sūk-mah′-a-na.

6. na-ka-mah′-a-na, first one, or first time.
i-ka-ha′-sha-mah′-a-na, last one, or last time.

III. Adverbs.

7. Some of the principal adverbs are as follows: tash-bak′-tōsh, perhaps; ho-ra′-ke-ku′-ser-o, day before yesterday; mat-he-o′-mas-ta, day after to-morrow; tēn′-hash, afar off.

IV. Prepositions.

8. Prepositions follow the nouns which they govern; as, peh′-ti, by; mi-peh′-ti-nak′-ta, sit by me; mun-i-kūsh′-ta, through the water; ti-rōk′-ta, in the house.

V. Conjunctions.

9. ken′-i and ek-tēk′, and; ken′-i-e-pīsh′, and I said; ken′-i-wa′-ki-wa′-wa-ūsh, and I told him.

VI. Interjections.

10. sha! oh! sha! shi-ni′-hūsh! oh! how cold it is! sha! ma-na′-rūsh! oh! what pain I am in! sha! da′-de-shūsh! oh! how hot it is! i′-na! he′-he-he! i′-he! han′-ta! hark! i-hamp′-ta! hist! hush! ha-nis′-ta! look! behold! wa-he-teh′! you surprise me!

VII. Pronouns.

11. Pronouns are simple or fragmentary. The fragmentary pronouns are used in the declension of nouns and adjectives, and in the conjugation of verbs. The following may be regarded as an example of the intensive form of the simple pronoun:

mi′-o-na, I, myself, or I am.
ni′-o-na, thou, thyself, &c.
i′-o-na, he, himself, &c.
nu′-o-na, we, ourselves, or we are.
ni′-a-o-na, you, yourselves, &c.
i′-a-o-na, they, themselves, &c.

The form of the fragmentary pronouns is shown in the following declensions of nouns and adjectives.

mi-hūn′-de, my mother.
ni-hūn′-de, thy mother.
i-hūn′-de, his mother.

min′-i-ke, my son.
nin′-i-ke, thy son.
i-ko′-ni-ke, his son.
min′-i-kōsh, my sons.
nin′-i-kōsh, thy sons.
i-ko′-ni-kōsh, his sons.

mi-nu′-haŋ-ke, my daughter.
ni-nu′-haŋ-ke, thy daughter.
i-ko-nu′-haŋ-ke, his daughter.
mi-nu′-haŋ-kōsh, my daughters.
ni-nu′-haŋ-kōsh, thy daughters.
i-ko-nu′-haŋ-kōsh, his daughters.
nu-nu′-haŋ-kōsh, our daughters.
ni-a-nu′-haŋ-kōsh, your daughters.
i-o-na-nu′-haŋ-kōsh, their daughters.

mōŋs, my wife.
nōŋs, thy wife.
kōŋs, his wife.
mōŋ′-ker-ish, my wives.
nōŋ′-ker-ish, thy wives.
kōŋ′-ker-ish, his wives.

mi-be′-ro, my husband.
ni-be′-ro, thy husband.
i-be′-ro, her husband.
mi-be′-rōsh, my husbands.
ni-be′-rōsh, thy husbands.
i-be′-rōsh, her husbands.

ma-shīsh′, I am good.
ni-shīsh′, thou art good.
iŋ-shīsh, he is good.
nu-shīsh′, we are good.
ni-a-shīsh′, you are good.
i-a-shīsh′, they are good.

VIII. Verbs.

The following examples show the forms of the verbs so far as determined, though quite incomplete.

i-wa′-sek-ōsh, I do anything.
i-da′-sek-ōsh, thou doest anything.
i-i′-sek-ōsh, he does anything.
nu-i-sek′-ōsh, we do anything.
ni-i-sek′-ōsh, you do anything.
i-a-i-sek′-ōsh, they do anything.
nu-nōmp′-sha-sek′-ōsh, we both do anything.

i-wa-sek′-tōsh, I will do anything.
ni-de-sek′-tōsh, thou wilt do anything.
i-sek′-tōsh, he will do anything.
nu-i-sek′-tōsh, we will do anything.
ni-a-sek′-tōsh, you will do anything.
i-o-na-sek′-tōsh, they will do anything.
nu-nōmp′-sha-sek′-tōsh, we both will do anything.
ni-a-be′-sek-ta (imp.), do it, all of you.
i-sek′-ta (imp.), do.

wa-dēk′-tūsh, } I am going.
wa-de′-hūsh, }

tha-de′-hūsh, thou art going.
i-de′-hūsh, he is going.
nu-de′-hūsh, we are going.
ni-a-de′-hūsh, you are going.
i-a-de′-hūsh, they are going.
nu-nomp′-sha-de′-hūsh, we both are going.

wa-dēk-tūsh′, I will go.
tha-dēk-tūsh′, thou wilt go.
iŋ-dēk-tūsh′, he will go.
nu-dēk-tūsh′, we will go.
ni-tha′-dēk-tūsh′, you will go.
iŋ-a-dēk-tūsh′, they will go.
nu-nomp′-sha-dēk-tūsh′, we both will go.

wa-ki-su′-kōsh, I go out.
tha-ki-su′-kōsh, thou dost go out.
iŋ-ki-su′-kōsh, he goes out.
nu-ki-su′-kōsh, we go out.
ni-a-ki-su′-kōsh, you go out.

iŋ-a-ki-su′-kōsh, they go out.
nu-nōmp′-sha-ki-su′-kōsh, we both go out.
ki-sūk′-ta (imp.), go out you.
sūk-ta (imp.), go out.

wa-wa′-ru-tōsh, I eat, or am eating.
tha-wa′-ru-tōsh, thou eatest, &c.
i-wa′-ru-tōsh, he eats, &c.
nu-wa′-ru-tōsh, we eat, &c.
ni-a-tha-wa′-ru-tōsh, you eat, &c.
i-a-wa′-ru-tōsh, they eat, &c.

wa-wa′-rūsh-tōsh, I will eat.
tha-wa′-rūsh-tōsh, thou wilt eat.
i-wa′-rūsh-tōsh, he will eat.
wa-nu′-rūsh-tōsh, we will eat.
ni-wa′-rūsh-tōsh, you will eat.
i-o-na-wa′-rūsh-tōsh, they will eat.

wa-wa′-rūt-wa-ke-he′-rūsh, I have done eating.
ni-wa′-ra-rūt-tha-ke-he′-rūsh, thou hast done eating.
iŋ-wa′-rūt-ke-he′-rūsh, he has done eating.
rūsh′-ta (imp.), eat, used in addressing a woman.
rū-ta′-na (imp.), eat.
wa-rūsh′-ta (imp.), eat on.
ru′-tōsh, eating, to eat.
wa-ra-ru′-tōsh, will you eat?
tash′-ka-ki-wa′-ra-ru-te′-ni-hōsh, what is the reason you do not eat?

wa-wa′-ka-pu-sōsh, I paint or write, or am painting, &c.
tha-ka-pu′-sōsh, thou dost paint or write, &c.
iŋ-ka-pu′-sōsh, he paints or writes, &c.
nu-ka-pu′-sōsh, we paint or write, &c.
ni-a-ka-pu′-sōsh, you paint or write, &c.
i-a-ka-pu′-sōsh, they paint or write, &c.
nu-nomp′-sha-pu′-sōsh, we both paint or write, &c.

wa-ka′-pūs-tōsh, I will paint or write.
tha-ka′-pūs-tōsh, thou wilt paint or write.
iŋ-ka′-pūs-tōsh, he will paint or write.
nu-ka′-pūs-tōsh, we will paint or write.
ni-a-tha-ka′-pūs-tōsh, you will paint or write.
i-a-ka′-pūs-tōsh, they will paint or write.
nu-nōmp′-sha-ka′-pūs-tōsh, we both will paint or write.
wa-ka′-pu-sōsh, to write.
wa-ka′-pu-se, a painting or writing.
ka′-pūs-ta (imp.), write.
a-be-ka′-pūs-ta, write, all of you.

wa-ka-pu′-sa-ma′-mank-a-hōsh, I am painting or writing all the while.
ni-tha-ka′-pu-sa-ma-mank′-a-hōsh, thou art, &c.
iŋ-ka′-pu-sa-ma′-mank-a-hōsh, he is, &c.
nu-a-na-ka-pu′-sa-ma-mank-a-hōsh, we are, &c.
ni-a-tha-ka-pu′-sa-ma-mank-a-hōsh, you are, &c.
i-a-ka-pu′-sa-ma-mank-a-hōsh, they are, &c.
nu-nōmp-shōs-ka-pu′-sa-ma-mank-a-hōsh, we both, &c.

i-wa′-push-i-de′-hūsh, I am thinking.
i-da′-push-i-de′-hūsh, thou art thinking.
iŋ-push-i-de′-hūsh, he is thinking.
nu-i-push-i-de′-hūsh, we are thinking.
ni-a-push-i-de′-hūsh, you are thinking.
i-a-push-i-de′-hūsh, they are thinking.

wa-hu′-na-wa′-kik-a-na′-kōsh, I will come and sit down.
tha-hu′-na-tha′-kik-a-na′-kōsh, thou wilt come, &c.
iŋ-hu′-na-kik-a-na′-kōsh, he will come, &c.
nu-nōmp′-sha-nu-hu′-ni-kik-a-na′-kōsh, we both will come, &c.

kas-ke′-wa-her-i-ki′-tōsh, I will tie.
kas-ke′-tha-her-i-ki′-tōsh, thou wilt tie.
i-kas-ke′-her-i-ki′-tōsh, he will tie.
nu-kas-ke′-her-i-ki′-tōsh, we will tie.
ni-kas-ke′-her-i-ki′-tōsh, you will tie.
i-a-kas-ke′-her-i-ki′-tōsh, they will tie.
nu-nōmp′-sha-kas-ke′-her-i-ki′-tōsh, we both will tie.

kas-ke′-wa-her-ish, I have tied.

wa′-hīŋsh, I have been there.
tha′-hīŋsh, thou hast been there.
i-wa′-hīŋsh, he has been there.
no′-hīnsh, we have been there.

ni-a-tha′-hīnsh, you have been there.
i-a-wa′-hīnsh, they have been there.

wa-hēn′-dūsh, I drink, or am drinking.
tha-hēn′-dūsh, thou drinkest.
iŋ-hēn′-dūsh, he drinks.
nu-hēn′-dūsh, we drink.
ni-a-hēn′-dūsh, you drink.
iŋ-a-hēn′-dūsh, they drink.

wa-he-na′-ma-ma′-ka-hōsh, I have been drinking all the while.
tha-he′-na-ma′-ka-hōsh, thou hast been drinking all the while.
iŋ-hēn′-da-ma′-ka-hōsh, he has been drinking all the while.
nu-hēn′-da-ma′-ka-hōsh, we have been drinking all the while.
ni-a-hēn′-da-ma′-ka-hōsh, you have been drinking all the while.
i-a-hēn′-da-ma′-ka-hōsh, they have been drinking all the while.
wa-ra-hēn′-dūsh, have you drank?
wa-wa-he′-ni-hōsh, I have not drank.
tha-hēn′-tha-ke′-he-rūsh, you have done drinking.

o-mun′-i-te-o′-wa-hē-rish-wa-ru′-he-shūsh, I cut it off with an axe.
wa-ki-sūk′-wa-de-i-wa′-ki-su′-kōsh, I go out anywhere I please.

i-ma′-pet-kik-u′-na-kōsh, he sits down on the ground.
tev′-e-ti-hiŋ′-kūsh, whose pipe is that?
tev′-e-ta-mi′-ni-swe′-ru-te, whose dog is that?
tev′-e-ta′-o-tēsh, whose lodge is that?
tev-e-ya′-ki-ta-rūsh, who are you looking after?
ma-tev′-e-tha-ki′-ta-rūsh, what are you looking after?
tev′-e-ta-min′-i-skē-rish, whose horses are those?
īk′-haŋ, laughing.
īk-haŋ′-ma-ka-hōsh, laughing all the while.
ra-tuk-he′, crying.
ra-ta′-hōsh, to cry.
ra-tuk′-he-a-ma′-ka-hōsh, crying all the while.
nak′-ta (imp.), sit down (to a man).
na′-ka-na (imp.), sit down (to a woman).
ra-ta′ (imp.), go.
ra-ha′-na (imp.), go (to a woman).
shi-ha′-ra-ta (imp.), do well.

kap′-kēsh, it snows.
kap-ke′-kōsh, it will snow.
kap-ke′-a-maŋ′-ka-hōsh, it is snowing all the while.
ra-she-de′-hūsh, it thaws, or melts.
ra-she′-dēk-tūsh, it will thaw or melt.
ktaŋ′-hōsh, it freezes.
ktaŋ′-tōsh, it will freeze.
ra-pa′-na-rūsh, it hails.
ra-pa′-nak-tūsh, it will hail.
he-i′-ni-hūsh, it thunders.

CHAPTER XXI.

VOCABULARY OF THE MANDAN LANGUAGE.

A.

above, a-ke′-ta.
afar off, tēŋ-hash′.
affection, pah′-a-de, affection, love.
all, aŋ′-be.
and, ken′-i.
ken′-i-e′-pish, and I said.
ken′-i-wa-ki′-wa, and I told him.
ek′-tēk, and, also.
ants, ka′-ra-si-sīt′-ka.
anything, i′-tas-kash-ka.
arm, a′-de (sing.), a′-rūsh (pl.), an arm or wing.
arrow, ma-hi′-pe-kōsh.
autumn, ptan′-de.
axe, o′-ma-na-te.

B.

back, nūp'-he.
bad, he'-kōsh.
beans, o-min'-i-ke.
o-min'-ik-sa'-ni-ker-e, peas.
o-min'-i-ke-hti'-ker-i, potatoes.
bear, ma-to'.
ma-to'-pa, a bear's head.
ma-to'-ker-i, all bears.
ni-shi'-da, a black bear.
beard, hi'-ke-ru'-kis.
bed, o-munk'-e-i-sik-ōsh, to make a bed.
behold, ha-nis'-ta, look! behold!
below, ma-pit'-a.
ma-pit', down, below.
belt, i-ūh'-pa-e-te', a sash or belt.
bird, ma-dēk'-su-ke, a small bird.
bladder, i-dah'-e.
blood, i'-da.
i-de-she'-ro-rūsh, cholera, when the blood turns to water.
blue, to'-he.
boat, mi-na'-ki.
bone, a-hu'-de.
both, nōm'-psha, two, both.
bow, wa-ra'-i-ru'-pa.
box, wi-du'-ke.
ma-ne'-wi-du'-ke, a wooden box.
boy, sūk'-nu-mak, a boy.
breast, tah'-a-rah'-e.
breechcloth, mik'-e.
buffalo, ptin'-de.
be'-ro-ka, a bull.
be-rūk'-nat-ka, a bull's heart.
burn, rap-tēsh', to burn.
by, peh'-ti.
i-sa'-kaŋ-a-sōsh', by and by, after a while.

C.

call, ru-ker'-ish, to call.
cheat, ma-nōh'-a-ha-rūsh, to cheat any one.
chicken, si-pu'-ska, prairie chicken.
clear, de'-he.
cloud, ha'-a-de.
ha-de-ku'-ta, sky, beyond the clouds.
ha-de'-to-he-kūsh'-ta, in the blue cloud or sky.
coat, i-ma-shu'-te.
cold, shi'-ni-hūsh.
corn, ko-haŋ'-te, corn or grain of any kind.
ma-pe-her'-i, pounded corn or meal.
i-pe'-ke, a mortar for pounding corn.
count, pa-ki'-ri-rūsh, to count.
crow, ho-ki'-ha-ka. *Corvus.*
crying, ra-tuh'-e.
ra-tuh'-e-a-ma'-ka-hōsh, crying all the while.

D.

darkness, haŋ-pe'-a-rēsh'-ka.
day, ka-she'-kōsh.
mat-he'-o-nas-ta, day after to-morrow.
deceive, ka-uh'-ash, to deceive.
deer, ma-mo-na'-ku.
ma-mo-na'-ku-dōp'-he, a skin of a deer.
ma-mo-na'-ku-de'-si-ke, the tongue of a deer.
destroy, ki-mih'-er-ēsh, to destroy.
die, te'-rūsh, to die.
dirty, wa-rat'-ker-i, dirty, foul.
dog, men-i-swe'-ru-te, eaters of dung.
door, be-de'-he.
drink, hēŋ-dūsh', to drink.
duck, pa'-to-he.

E.

eagle, ma'-si, war eagle.
ptan'-rūsh, gray eagle.
ear, as'-kash.
eating, ru-tōsh'.
egg, si-ko'-he.
si-ko'-hōsh, (pl.)
elevation, ma-ah'-te.
elk, ōm'-pa.
end, o-na'-ke-o-hank'-ta, the end of all being, the end of the world.
enemy, wi-ra-taŋ'-de.
evening, i-stūn'-de-hūsh, the latter part of the day.
eye, is-ta'.
is-ta-su'-ni-ke, eyes of a cat.

F.

face, is′-ti.
fall, dōp-hēsh′, to fall.
ma-pit′-a-dōp-hēsh′, to fall down.
father, ratz.
feather, si.
si-ish′, (pl.)
wo′-ki-rūsh, a head-dress of feathers.
female, mi′-ka, the female of any animal.
finger, ōŋ-ka′-he, fingers, claws, &c.
fire, wa′-ra-de.
fish, po, a fish.
po-taŋ′-de, a catfish.
po-tuk′-e, a long, slender fish.
pōp-shi′-de, "silver eye," a white, flat fish.
po-su′-nak-er-ish, small fish.
po′-ni-ka, the roe of a fish.
flint, ma-hik′-shu-ke.
flower, o-sed′-e-he.
follow, waĥ-a-hūsh′, to follow.
food, wo-ru′-te, food of any kind.
foot, shi.
fox, i-ru′-te.
o′-ĥa, a prairie fox.
friend, pta-ni′-naĥ-aĥ.

G.

girl, sūk′-mi-he, a girl.
sūk-ham′-a-he, a little child.
go, de′-hūsh, to go.
good, shēź.
shēź′-ku-shōsh, very good, truly good.
goose, mi′-haŋ.
grass, haŋ-he′.
haŋ-he′-sa-kōsh, dried grass, hay.
haŋ-shi′-he-na, sharp grass, thistles.
grease, i-ker′-i, grease, fat.
great, htēsh, large, great.
gun, wa-ta′-shi-rū′-pa.

H.

hail, ra-ka-nan′-de.
ra-pa′-na-rūsh, it hails.
hair, pa′-hi.
hand, oŋ′-ke.
handsome, shi-na′-shūsh.
hark! haŋ′-ta!
hawk, i′-na, and i′-he.
ōm′-psi, a yellow hawk.
head, pa.
hear, wa-ēsh′, to hear.
heart, nat′-ka.
nat-kaŋ′-ka-sīsh, a hard heart.
nat-kaŋ′-si-hūsh, a strong heart.
heel, shi-ru′-te.
hereafter, haŋ′-ka, time to come, hereafter.
highlands, ma-hank′-wa′-ko-rōsh, highlands, or hills.
hist! i-hamp′-ta! hist! hush!
hot, da′-de-shūsh.
house, o′-ti, house, or lodge.
ti-rōk′-ta, in the house.
hūsh′-ta, the back part of the house.
hurrah! uk-a-he′! hurrah! all hands!
husband, i′-be-ro.

I.

I, mi.
ice, ho′-de.
in, rōk′-ta.
inquire, ki-maĥ′-ēsh, to inquire of any one.
iron, wa-tush′-e-ma′-he.
wa-tush′-o-te, white iron.
wa-tush′-up-si, black iron.
wa-tush′-se-ker′-i, red iron, copper.
wa-tush′-se-de, yellow iron, brass.
wa-tush′-i-wi-pu′-shi, a file, or iron whetstone.
wa-tush′-e-du′-ke, a shot-pouch.
island, wīt′-ka.

K.

kettle, bi-ru′-he.
kill, te-her′-ūsh, to kill.
knee, iŋ-ta′.
knife, ma-hi′.

L.

land, maĥ-i-ki′, bad land.
laugh, ik-haŋ′, ki-ki-da′-shōsh, } to laugh.

leg, do′-ke.
leggin, hōŋ′-shi.
level, ōp-shi′-de-shīsh, a level prairie.
life, i′-ni-hūsh, alive, health, life.
i′-ni-he, alive.
i′-ni-sēsh, to live.
light, i-de-aḣ′-e.
lodge, o′-ti.
ti-hink′-o-ti, a skin lodge.
long, ha′-ska.

M.

man, nu-mang′-ke.
nu-mang-ka′-ki, the people.
nu-mang-ka′-hi-kōsh, a man's acts.
nu-mang-ka′-ke-nat-kaź′, a man's heart.
nu-mank′-shi, a chief.
many, hank-tēsh′, a great many.
meat, mas-kap′-e, meat of all kinds.
moon, i-stūn′-mi-na′-ke.
morning, mam′-psi-ta.
wa-mam′-psi-ta, early in the morning.
mother, hūn′-de, and i-hūn′-de.
mouth, i′-a.
mud, tūn′-tu-ke.
ma-tūn′-tu-kōsh, soft mud.
tūn′-tu-kōsh, soft, a bog or marsh.
muskrat, shan-ću′-ke.

N.

nail, ōŋ-ka′-o-sha-ke.
navel, dōp′-ta-su.
near, sha′-ha.
neck, i-ta′-e-nu.
night, i-stūn′.
north, mi-si′-a-hank′-ta.
mi-si-hank′-ta-ro-push′-a-hank′-ta, northeast.
pa-sha-hank′-ta-ro-ta-hank′-ta, southeast.
a-ga-hank′-ta-ro-ta-mi-sa-hank′-ta, northwest.
nose, pa′-hu, nose, beak of a bird.
pa-hu-ptap′-taḣ, moose, animal with a long nose.
nothing, mīk′-ska.
now, na-ka′, na-kan′, } now, at this time.

O.

oh, sha!
old, hi′-hōsh.
open, rūp-shuk′-ōsh, to open.
rūp-shuk′, opened.
outside, ma-tīn′-da, out of doors, outside.
owl, iḣ-i′-he, large hooting owl. *Bubo Virginianus.*
iḣ-ik′-shu-ke, small owl.

P.

paddle, i-pa-ha′-ka, oar or paddle.
part, o-kup′-e.
perhaps, tush′-hak-tōsh.
pine, ma-na′-ho-pin′-i.
pipe, i-hink′-e.
polecat, shōnk′-te.
poor, a-ka′-ri-he.
pox, hed′-e-pe, small-pox.
pumpkin, ko′-de.
ko′-de-se-ha′-ru-tōsh, melons or pumpkins eaten uncooked.
push, put-kēsh′, to push.

R.

rabbit, maḣ-tik′-e. *Lepus campestris.*
maḣ-tiḣ′-shu-ke, small rabbit. *Lepus artemisia.*
rain, hai′-dūsh.
hai′-i-kūn′-dūsh, a rainbow.
raven, ke-ka′.
red, se.
river, pa-sa′-he.
pa-sank′-shu-kōsh, small rivers, creeks.
robin, ma′-de-kaŋ′-ka. *Turdus migratorius.*
rock, mi-su′-ne-ke-htēsh, a large rock.
mi-su′-ne-ke-ha-ma′-he-na, a soft rock.
run, pte′-hūsh, to run.

S.

salt, wa-sku-sho′-te, white sugar.
sandstone, wi-pu′-shi, whetstone, sandstone.
scalp, pa-dōp′-he.
seat, i′-ta.
see, wa-hēsh′, to see.
shake, ka-tid′-i-ri-sōsh, to shake.

sheep, aŋ-sah′-te, mountain sheep, big-horn.
shoe, hōm′-pa, shoe, moccasin.
shoulder, a′-kit.
sinew, hi′-se.
sing, wa-ki′-ki-na′-rūsh, to sing.
sister, ta-mi′-he-na.
ptan′-kōsh, elder sister.
skin, dōp-hi′.
small, ham′-o-he.
smooth, saŋ′-sīsh.
ka-saŋ′-sōsh, to smooth or make smooth.
snow, wa-he′.
soldier, ka-wa′-ka-ra-kah′-a.
something, i-ko-tu′-i.
son, ko′-ni-ke.
sour, ha-rūsh′.
speak, rōt-kīsh′, to speak.
spirit, ma-nah′-i-ke.
spread, phi′-her-ish, to spread.
spring, be′-hi-nūn-de (season).
star, hkik′-e.
hkik′-e-wa-ha-ne-hōsh′, the star that does not move, north star.
steal, wa-nūn′-dūsh, to steal.
stone, mīn′-dēh-tēsh, a large stone or rock.
strike, ro-rūsh′, to strike.
strong, si-hūsh′.
summer, ra-ske′-ke.
sun, ma-hamp′-mi-na′-ke.
surprise, wa-he-tēh′, you surprise me.
swan, ma-de-hōp′-ni.
sweep, īp-kuk′-i-shūsh, to sweep.
īp-kuk′-i-sha, a broom, or anything to sweep with.
sweet, sku′-hosh.

T.

tail, shōn′-te.
shōn-te-ha′-ska, long tail, a panther.
tallow, sīn′-de.
thaw, ra-she′-de-hūsh, it thaws, or melts.
thief, wa-nūn-deh′-te.
thigh, do-kōsh′, the thighs.
think, wa-push′-i-de, to think.
this, ant.
an-to-rash′, this one, this thing.
ant-wi-do′-ke, this sack.
tie, kas-kēsh′, to tie.
toad, hat′-ka.
tobacco, ma-na-she′.
to-day, i-ham′-pe.
toe, shi′-pa, the great toe.
shi-ha′-pa, the second toe.
shi-ni′-ka, the little toe.
to-morrow, mat-he′.
tongue, de′-si-ke.
tooth, hi.
trade, wi-ka′-rūsh, to trade or barter.
tree, ma′-na, wood, or a tree.
ma′-na-i-nīn′-dūsh, a tree.
ma-na-a′, the bark of trees.
ma-na′-i-ta-hu, an oak tree.
ma-na′-ho-pin-i, a pine tree.
ma-na′-o-ki-saŋ-ka, forks of a tree.
ma-na′-wa-ra-wi-rūsh, elm-wood, of which bows are made.
ma-na-wah′-e, cottonwood.
ma-na-sūk′, a shrub or bush.
ma-na-pe′, or, a′-pe, a-pish′ (pl.), leaves.
ma-na-rōh′-te, a forest.
ma-na-ker′-i, all wood.
ma′-na-i-nīn′-de-a-ke′-ta, on the tree.
ma′-na-ka-kīn′-he, a wooden wedge.
ma′-na-i-tu-rūk′-shu-ke, a spear or lance.
tremble, ka-tid′-re-kōsh, to tremble, quake.
turkey, ma-ru′-si.
turnip, ma-hōsh′.
turtle, kip-saŋ′-de, turtle or tortoise.
twisted, ka-min′-ish.

U.

ugly, hik′-a-na-shōsh.
upon, a-ki′-a, on or upon.

V.

vein, i′-du-ke, a vein or channel.
i-i′-du-ke, a vein or channel for the blood.
very, ku-shōsh′, truly, very.

ku-she′-mi-ka, very good, very true.

village, mi′-ti.

mi-ti′-o-tōsh, with the camp or village.

W.

walk, nīn′-dūsh, to walk.

war-club, mih′-a-ske.

warrior, ka-ha′-re-kōsh, a brave or warrior.

water, mun′-i, and men′-i.

men-i-ker′-i, all water, the sea.

men-i-wa′-rat-ker′-ish, dirty water.

men-i-ka-tu′-sōsh, quick or rapid water.

men-i-i-wa′-ka-he, runners on the river shore, plover.

mun-ih′-te, a lake.

mun-i-hin′-i, a spring of water.

mun-i-pu′-shu-hūsh, to swim.

men-i-e′-ha-ka-he, at the water's edge.

men-i-kūsh′-ta, through the water.

we, mi′-o-na.

weak, a-hi′-kōsh.

weed, ma-he′.

what, ta.

ma-tev′-i, what is it?

which, ko-tev′-i, which one?

white, sho′-te.

wa-sku-sho′-te, white sugar, same as salt.

wa-shi′, and wa-shi′-ta, a white man.

wa-shi′-psi, a black man.

wa-shi′-ta-ko-haŋ′-te, the white man's corn.

wa-shi′-ta-ptīn′-de, the white man's cow.

wa-shi′-ta-ma′-to, the white man's bear, or hog.

wa-shi′-tas-hte, white man's big-horn, sheep.

who, tev′-e.

wife, kōns.

wind, she.

windpipe, i-ni′-he.

wish, i-te′-rūsh, to wish.

with, o-tōsh′.

ko-ke′-ta, within.

kūsh′-ta, under, within.

wolf, she-he′-ke, prairie wolf.

woman, mi′-he-mi-he-shi′-na-shūsh, a handsome woman.

wood, ma′-na.

writing, ka-pu′-se, painting or writing.

Y.

yellow, psi′-de.

yes, hōŋ.

hai′-i, same as Dakota, "how?" "yes," "it is good."

yesterday, ho′-da-ke.

ho-ra-ke′-ku-ser′-o, day before yesterday.

CHAPTER XXII.

XIII. Omahas. — XIV. Iowas, or Otos.

SKETCH OF THE OMAHA, AND IOWA OR OTO INDIANS.

Having made comparatively few observations in person in regard to the Indian tribes of the Lower Missouri, I shall not at this time attempt to present a detailed history of them. It is my intention at some future period to investigate with care all the languages of the Indian tribes now located in the Valley of the Missouri, which have not already been sufficiently studied for ethnological and philological purposes, and to work out the history of their migrations from all the materials within my reach. As I remarked of the tribes previously described, but little information of a reliable character can be ob-

tained from their own traditions farther back than one hundred years. It so happens, however, that most of the Indians at the present time living on the Lower Missouri migrated from the eastward, and were visited and noticed by the earliest explorers of the country. The writings of the Jesuit fathers are invaluable to the student of Indian history. I shall, therefore, content myself with making a few extracts from such of their works as are within my reach, without pretending at this time to exhaust the subject.

That the Iowas migrated from the Mississippi westward to their present location on the Missouri, we have very reliable written evidence. According to Schoolcraft, Father Marquette visited the Iowas as far back as 1673, and records their residence near the mouth of the Des Moines River. Allusion is also made to them in the narrative of the adventures of one of La Salle's party, Father Zenobius Membré, who seems to have visited the different tribes located in the Mississippi Valley in 1680. He remarks that the Kickapoos and the Ainones (Iowas) live on the western side (of Mississippi), and occupy two villages. In Le Sueur's Voyage up the Mississippi, in 1699–1700, several references are made to this tribe, called by him Ayavois. On page 101 of Mr. J. G. Shea's admirable collection of "Early Voyages up and down the Mississippi," Le Sueur says: "At this spot (near Mankato or Blue Earth River, latitude 44° 13′ N.), he met nine Scioux, who told him that this river was the country of the Scioux of the West, of the Ayavois, and the Otoctatas (Otos), a little further; that it was not their custom to hunt on the grounds of others without being invited by those to whom they belonged; that when they should wish to come to the fort to get supplies, they would be exposed to be cut off by their enemies coming up or going down these rivers, which are narrow, and that if he wished to take pity on them, he must settle on the Mississippi, in the neighborhood of the mouth of St. Peter's River, where the Ayavois, the Otoctatas, and the Scioux could come as well as they." It seems also that even at that time, the Iowas as well as the Otos were to some extent an agricultural people. On page 104: "On the 22d, two Canadians were sent out to invite the Ayavois and the Otoctatas to come and make a village near the fort, because these Indians are laborious and accustomed to cultivate the ground, and he hoped to obtain provisions from them, and make them work the mines." Again, we may from Le Sueur's account arrive very nearly at the time when the Iowas and Otos migrated across the country westward to the Missouri. On page 106 of the same work: "On the 16th (of November, 1699), the Scioux returned to the village, and it was ascertained that the Ayavois and Otoctatas had gone to station themselves on the side of the River Missouri, in the neighborhood of the Maha, a nation dwelling in those quarters."

In Alcedo's Spanish Geography, we find the following paragraph in regard to Iowa River: "Which runs southeast into the Mississippi, sixty-one miles above Iowa Rapids, where, on the east side of the river, is Iowa Town, which twenty years ago could furnish

three hundred warriors. The upper Iowa town is about fifteen miles below the mouth of the river, on the east side of Mississippi, and could formerly furnish four hundred warriors."

This tribe, which they call Ayauways, seems not to have attracted the special attention of those remarkable travellers and explorers, Lewis and Clarke, yet from incidental allusions to them, we know that they resided on the Missouri near the commencement of the present century. We cannot now attempt to trace out the different villages of the Iowas along the track of their migration, a work which has already been so well done by Mr. Schoolcraft in the third part of his Report. They are at this time located on a reservation on the west side of the Missouri, near latitude 40°. They number about four hundred and fifty persons, have progressed much in the cultivation of the soil, and many of them are partially civilized. Like most of the Indians on the frontier, they seem, however, to contract more readily the vices than adopt the virtues of the white race. Mission schools have been established among them, at which from thirty to fifty scholars are instructed.

The grammatical structure of the Iowa language has been carefully wrought out by those indefatigable missionaries, Messrs. Hamilton and Irvin, and published in several small volumes at the Mission. These books having been prepared especially for the use of the Mission, they have not been circulated to any extent for ethnological and philological purposes. The most important publications on the Iowa language prepared by these gentlemen are,

1st. An Elementary Book of the Iowa Language, with an English translation, by Wm. Hamilton and S. M. Irvin, under the direction of the Board of Foreign Missions of the Presbyterian Church. J. B. Ray, interpreter. Iowa and Sac Mission Press, Indian Territory, 1843. Small octavo; pp. 101.

2d. An Iowa Grammar, illustrating the principles of the Language used by the Iowa, Oto, and Missouri Indians. Prepared and printed by Rev. Wm. Hamilton and Rev. S. M. Irvin, under the direction of the Presbyterian Board of Foreign Missions. Iowa and Sac Mission Press, 1848. Small octavo; pp. 152. There is also a small volume of hymns, but without an English translation.

In the preface to the Grammar, the authors make the following very interesting and truthful remarks:

"The language used by the Iowa and Oto and Missouri tribes is the same; a slight difference is perceptible in their mode of speaking, and a few words are common to one tribe that are not common to the others, yet the difference is not greater than is often found to prevail among the inhabitants of the different States.

"There is so much similarity in the languages of many of the Indian tribes, that it shows them to have had one common origin, while others, again, differ as widely as two

languages can differ. This dissimilarity is seen in the Iowa and Sac languages, in which no two words are alike.

"If the language of the Iowa Indians be taken as the starting-point (though tradition says that they, with many other tribes, were originally Winnebagoes), then those of the same family would, as far as has been ascertained, stand related to it in the following order:

1st. Iowa.
Oto.
Missouri.
2d. Winnebago.
3d. Kansas.
Osage.
Inapaw.
Omahaw.
Ponca.

"A number of words are common to all these tribes, and not a few words differ only in the accent and the change of a few letters, indicating a common origin; yet time has produced such a change that in conversing together an interpreter is necessary.

"The barrenness which is supposed to belong to most Indian languages, does not result from the structure or nature of the language, but from the want of ideas in those who use it. So far as they have ideas, they do not lack words to express them, though the mode of expression among them is often as different from that in use among us as their language is from ours."

A few vocabularies of the Iowa language were obtained by early explorers, but they are all superseded by the more complete and accurate works of Messrs. Hamilton and Irvin.

The history of the Otos and Missouris does not differ materially from that of the Iowas just given. By reference to the map it will be seen that they occupy at the present time a reservation on the parallel of 40°, on the Big Blue River, near the head waters of the Big Nemaha River, a portion of their land being included within the boundary of Nebraska and a part in Kansas. They formerly ranged over an extensive area south of the Platte River. They number about six hundred persons of both sexes.

The Omahas formerly ranged over a large area extending from the mouth of the Platte to the Niobrara, on the south side of the Missouri. They are now located on a reservation north of parallel 42°, and bordering upon the river, as indicated on the map accompanying this memoir. A mission school has long been established among them, and their attempts

to cultivate the soil have been attended with great success. They number about eight hundred souls.

The Ponkas speak the same language, though forming a distinct tribe, and have their reservation on Ponka River, south of the Niobrara. They make some feeble attempts to cultivate the soil, and obtain thereby a partial support, but they are, for the most part, in their original wild condition, and owing to the almost entire absence of game from their borders, are most of the time in a state bordering on starvation.

A number of vocabularies of the Omaha and Ponka language have been published by various writers, as Long, Prince Neuwied, Gallatin, &c., but no attempt has ever been made to work out its grammatical structure. A small pamphlet of perhaps sixteen pages was prepared some years ago by a gentleman connected with the Mission, containing a few words, phrases, and hymns, in the language, but inasmuch as the English equivalents are not given, it is of no use to the student of general philology.

VOCABULARY OF THE OMAHA LANGUAGE.

A.

above, ma′-shi-a-ta.
alive, nit′-a.
all, waŋ-gi′-re.
ankle, si-taȟ′-e.
arm, a.
arrow, ma.
autumn, ta, taȟ, } dead, it is dead.
axe, man′-the-pe.

B.

back, nang′-ka.
bad, pi′-a-źi.
bean, ham′-bre-eŋ-ge.
bear, man′-ću, grizzly bear.
wa-tha′-be, black bear.
beard, i′-hi.
beaver, źa′-be.
bird, wa-źing′-a.
bison, te.
bitter, tōȟ′-a.
black, tha′-be.
bladder, neȟ′-e, and naȟ′-e.
blood, wa′-mi.
blue, to.
boat, man′-de.
ta-de′-i-ga-da, ship drawn by the wind.
body, źu′-ga.
bog, nish-tash′-ta.
bone, wa-hi′.
bow, nan′-de.
boy, nu-shing′-e.
bread, wa-mūth′-ke.
breast, mang′-e.
brother, wi-shen′-se, my elder brother.
wi-thang′-e, my younger brother.
burns, a′-ne, he burns.
by, ka′-ha.
nīng′-ka-ha, by the shore.
ath-ka′-de, by and by.

C.

call, ba, he calls.
cattle, te-tha′-be, black cattle.
chief, ni′-ka-ka-hi′, and nu′-da-ha-ga′.
claw, sha′-ge, hoof, claw.
cloth, źe-a-di-gra′, breechcloth.
coat, wo-na′-źi, thin coat.
corn, wa-ta′-the.

wa′-ri-to′-be, corn-meal.
cold, thni.
crow, ka′-he.
cry, ha′-ge.
ha-ga′-i, crying.

D.

dance, nan′-te, he dances.
darkness, o-kah′-na-pa′-zi.
daughter, wi-shang′-e, ni-nis′-i, } my daughter.
day, am′-ba.
deer, tah′-ti.
door, ti′-ze-be′-o-gra, house entrance.
drink, rat′-i, he drinks.
rat′-a, drinking.
duck, nih′-a-shing′-a.

E.

ear, ni′-ta.
earth, tan′-de.
eat, wa′-ra-te, he eats.
wa′-ra-ti, he is eating.
wa′-ra-te, wa′-ra-ta, } eating.
egg, wet-a′.
elk, am′-pa.
embark, man-de′-o-kre, he embarks.
enemy, o-ke′-te.
evening, pa′-ze.
exist, an-go′, we are, exist.
thi-ah′, you are.
e′-ga, he is.

F.

face, en′-de.
far, wi-a-hi′-de, far, far off.
fat, we-hre′.
father, en-da′-de, my father.
fin, we-u-thu′-ka-he.
finger, nam-be′-we-pa′-zu, the forefinger, to point with.
fire, pe′-te.
fish, hu′-hu.
hu′-hu-shing-a, small fish.
we′-to-kre, roe of a fish.
flash, zu.
flint, ma′-hi-si.
flower, za-hra′.
fly, hau′-te-ga.
foot, thi, and si.
forest, hra′-be.
fox, te.
friend, ka′-ge.

G.

ghost, o′-wi-ya′-wa, angel.
girl, mi′-shing-e, a young girl.
go, the, he goes.
good, o′-da, and u′-da.
goose, mih′-e.
mih-a-hi′, goose-hair, feathers.
great, ah′-te.
gun, wa-hut′-a.

H.

hail, ma′-se.
hair, na-zi′-ha.
hand, nam′-be.
handsome, o-ro-kam′-be.
he, e, he or she.
head, pa.
wash′-ki, top of the head.
wa-ra′-ge, head-dress.
hear, wa-na′-e, he hears.
heart, nan′-de.
heel, thi′-re-de.
hill, pa-he′.
horse, shun′-ga.
hot, nah′-a-de.
husband, wi-e-krang′-ke, my husband.

I.

I, wi.
ice, nuh′-e.
in, man′-te.
ti-man′-te, in the house.
ma′-ha-te, in the sky.
infant, shing′-e-shing′-e.

insect, wa-kre′, wa-gri′, } worm or insect.
źa-gri′-ska, wood insect, flea.
iron, man′-the.
man-thēth′-ka, white iron, silver.
man-thēth′-ka-thi, gold, yellow iron.
man-the′-shi-de, man-the′-shu-de, } copper, red iron.
man-the′-ma, lead.
island, ni-ran′-da.

K.

kettle, ner′-he, ther′-he, } iron kettle.
kill, wa-te′-re, wa-na′-a-he′-re, } he kills.
knee, shi-nan′-de.
knife, ma′-hi.

L.

lake, ne-o-ri′-sha.
late, kan′-te-da.
laugh, īh′-a.
leg, źe′-ga, and źi′-be.
leggin, o-tah′.
life, ta′-źi.
light, o-kam′-ba.
lightning, thi-am′-ba, and thi-gre′-the.
limb, źa′-ka-ha.
liver, te-ra′-he.
lodge, ti, house or lodge.
log, za, and źa.
love, nit′-a.

M.

man, no, and nu.
ni-a-she′-ge-o-ke′-ni, red man, Indian.
meat, ta.
wash-e′, fat meat.
melon, tha′-ka-ra′-te.
midday, mi-ro-mash′-źi.
midnight, ha-ūth-kath′-ka.
mink, to-shing′-e.
moccasin, him′-be.
wa-him′-be, shoe, wooden moccasins.
mole, ma-ni′-gra.
moon, mi-am′-be.
morning, ha′-hi-kat-e.
mother, e-na′-ha, my mother.
mountain, pa-he-mah′-shi.
mouth, i.

N.

nail, sha′-ge.
navel, re′-ta.
near, ash′-ka.
neck, pa′-hi.
never, sha′-sha.
new, te′-ka.
night, ha.
no, ang′-ka-źi.
nose, pa.
nothing, e-da-das′-the-źi.

O.

oats, shang′-e-wa-rat′-e, horse-feed.
old, i-sha′-ke.
on, a-gra′.
hra′-be-a-ga′-ha, on the tree.
otter, nu′-zhra.

P.

paddle, man′-de-o-ro′-ka-hi, oar.
part, do′-pa.
partridge, u-shi-wa′-re.
pepper, we-u-ki′-hi.
pipe, ni′-ni-bah.
plain, tan′-de, prairie.
polecat, man′-ga.
potato, nu, and nu′-tan-ge.

Q.

quill, mă′-sha.

R.

rain, na-źe′.
red, źe′-de.
river, ni.
run, tan′-re, he runs.

S.

sail, wah-eh'-a, muslin, cloth.
sash, i-pi'-ra-ge', belt.
scale, shi-she'.
scalp, ni-ka'-na-zi-ha.
seat, nin'-de, rump.
see, tam'-be, he sees.
shirt, wo-na'-zi-bre'-ka.
shot-pouch, ma-u'-za.
shoulder, eng-ke'-de.
sinew, ta-ka'.
sing, wa-a', he sings.
sister, wi-shan'-se, wi-tang'-e, } younger sister.
skin, nah.
sky, mah'-e, clouds.
smooth, shi'-ah-ci.
snake, wes'-a, and weth'-a.
snow, mas'-he.
something, e-da'-das-the.
son, wi-shing'-e, my son.
soon, oh-re', early.
sour, tha'-re.
speak, i'-e, he speaks.
spear, man'-de-hi.
spirit, wa-kan'-da, Great Spirit.
wa-na-he'-pi-a'-ze, evil spirit.
spring, ni-hang'-a, of water.
me, mme, } a season.
squash, wa'-ta-mo'-he.
squirrel, thin'-ga.
star, mi-ka'-e.
steamboat, pe'-te-man'-de.
stomach, nih'-a.
stone, i'-e.
i-e-tan'-ga, big stone, rock.
stream, wa-te'-ska.
strike, o-ti', he strikes.
strong, a'-wa-zi.
summer, nu'-ge.
sun, mi.
sweet, thi'-re.

T.

that, she.
she'-ta, that man.
she'-ra, that thing.
thigh, ze'-shu.
think, e-re'-ga, he thinks.
this, the.
thou, thi.
throat, we-nam'-bre.
through, a-ku-than'-de.
ni'-a-ku-than'-de, through the water.
thunder, ing-re'-ho-ta.
tie, han'-ta, he ties.
toad, i-han'-gi-ta.
tobacco, ni'-ni.
to-day, am'-ba-de.
toe, si'-pa.
to-morrow, kath'-a-ni.
tongue, re'-ze, and re'-se.
tooth, hi.
tree, hra'-be.
turnip, nu'-kre.
turtle, ke.

U.

ugly, u-kash'-ni-da.
under, ki'-ke.

V.

valley, woh-mis'-ka.
vein, kah.
village, ta'-we, town.
wa-kan'-da-ta'-we, heaven, God's village.

W.

walk, na-ni', he walks.
wampum, wa-nam'-pi.
war-club, wah-pe'.
warrior, wa-na'-she.
water, ni.
ni-tan'-ga, great water.
we, an'-go.
weak, wa-he'-hi.

weed, ma′-hi.
what? e-da′-da, what is it?
wi′-a-wa′-tha, what thing?
wheat, wa-mūth′-ka.
white, thka.
who, e′-be.
wife, wi-ha′-he-na, my wife.
wind, te′-de.
wing, a′-hi.
winter, mar′-e.
wish, eth′-ka, he wishes.
within, man′-te.
without, a′-shi.
wolf, shūn-tan′-ga.
woman, mi-źing′-e, and gath-za′-se.
she′-mi-shing′-e, an unmarried woman.
wood, źa.

Y.

year, o-ma′-re-ka.
yellow, thi.
yes, a-ha′.
yesterday, thi-da′-di.
young, shin′-ga, little.

VOCABULARY OF THE IOWA, OR OTO LANGUAGE.

A.

above, mang′-kri.
i-ro′-ma-ha, above, on a stream.
alive, ih′-a.
all, pro-ke′.
ankle, thi′-ka.
another, o-ki-će′.
ant, na-kan′-yi-ske.
arm, a-kra′-će.
arrow, ma.
ash, ko-hūn′-ye.
autumn, wa-ha′-he, full harvest.
tan′-yen-ta, falling of leaves, dead leaves.
axe, en′-thwe.

B.

back, nang′-ke.
bad, pīsh′-kun-yi, not good.
bark, na′-ha.
beak, pa-thūh′.
bean, ōn′-ye.
bear, man-to′, grizzly bear.
mun-će′, black bear.
beard, i′-hi, hair of the mouth.
beaver, ra-we′.
bird, wa-yeng′-e.
bitter, pa.
black, the′-we, and she′-we.
bladder, će′-ye-he, and wa-će′-ye.
blood, wa-pa′-ke.
blue, to′-ho-će.
boat, pa-će′.
pa-će′-han-ye, ship, large boat.
ta-će′-re-ta-u′-kra, mast, support for the sail.
body, i′-ro.
bone, wa-hu′.
bow, mah′-tu.
boy, i′-ćin′-to-ing-e.
breast, man′-ge.
breechcloth, de′-ro-ken′-ye.
brother, hi-yi′-na, my elder brother.
burn, ta-ho′-ke, ta-ho′-hi-ka, } he burns.
by, i-ta′-na.
to′-ri-ke-ing′-e, to′-ri-ke, } by and by.

C.

call, wang′-ke, he calls.
ki-wang′-ke, he calls for.
cat, mung′-ka, polecat.
cattle, će, bison.
će-the′-we, black cattle.
ćēth′-ka, white cattle.
chief, wang′-e-ka-he.
coat, wo-na′-ye.

cold, thni.
corn, wa-tu-ćeʹ-di-to-we, cornmeal.
crow, kaʹ-he.
cry, haʹ-ke-ke.
haʹ-ki-nang-a-ke, crying.

D.

dance, wa-shiʹ-ke, } he dances.
ćeʹ-ke, }
darkness, o-hanʹ-the.
day, haʹ-we.
dead, ćeʹ, and ćeʹ-ke.
deer, ta.
dog, shūngʹ-ko-ken-yi.
drink, ra-tangʹ-ke, he drinks.
ra-taʹ-na, } drinking.
ra-taʹ-nang-a-ke, }

E.

eagle, hra.
ear, nanʹ-twa.
early, haʹ-we-kri, day come.
earth, maʹ-ya, } ground.
maʹ-ha, }
eat, ru-ćeʹ-ke, he eats.
ru-ćeʹ-na, } eating.
wa-ruʹ-ćе-nang-a-ke, }
elk, huʹ-ma, and hoʹ-ma.
elm, eʹ-hu.
embark, pa-ćeʹ-o-mi-naʹ-re-ke, he went and sat down in a boat to embark.
enemy, wo-re-kēshʹ-kūn-ye.
evening, pi-hiʹ-re, sun declines.
exist, ke. } he is.
reʹ-ke, }
niʹ-ke, } to be, to exist.
a-reʹ-ke, }
shniʹ-ke, you are.
eye, īshʹ-ta.

F.

face, enʹ-ćе.
far, pa-ćeʹ-ma.
ha-reʹ-ta, far off, at a distance.
father, hengʹ-ka, my father.
nan-ćeʹ, your father.
an-ćeʹ, his father.
feather, mēhʹ-e, and mi-ahʹ-e.
fin, aʹ-we.
fire, peʹ-ćе.
fish, ho.
pēhʹ-e, catfish.
flesh, iʹ-ro.
flint, meʹ-thu.
flour, wa-pūthʹ-ke-shoʹ-sho-ćе.
flower, o-hraʹ.
fly, paʹ-pru-he.
foot, thi.
for, haʹ-ri.
forever, i-yaʹ-mahi-ći, and a-mahʹ-ći.
fox, mēsh-reʹ-ke.
friend, i-taʹ-ro, and wo-re-kenʹ-ye.

G.

girl, i-ćengʹ-ching-e, and i-ćihʹ-mi-ing-e.
go, reʹ-ke, he goes.
good, pi.
piʹ-ke, he is good.
goose, mehʹ-e.
mehʹ-shing-a, little goose.
mehʹ-athʹ-ka-hanʹ-ye, a swan, white goose.
grass, haʹ-me, and haʹ-ćе.
haʹ-ćе-pi-the, dry grass.
great, tanʹ-ra.
green, to.
gun, i-yo-ćеʹ.

H.

hail, pa-thuʹ.
hair, nanʹ-tu.
hand, naʹ-we.
na-weʹ-pa, finger, nose of the hand.
handsome, i-roʹ-kam-pi.
hawk, hreʹ-ta.
head, nanʹ-thu.
head-dress, woʹ-krang-e.
heart, na-ćеʹ.
heaven, nangʹ-kri-nan-ga, above.

heel, thi'-re-će.
hill, a-he'.
a-he'-mak-shi, high hill, mountain.
hog, ko-ko'-tha.
hot, tah'-na, and tah'-a-na.
house, ći-ro'-ta-ta, in the house.
husband, heng'-kra.

I.

I, men'-re, and mi'-e.
ice, nōh'-e.
iron, man'-the.
man-thēth'-ka, white iron, silver.
island, će-ro-men'-ćе, and i-ro-man'-ćе.

K.

kettle, der-he'.
man'-the-der'-he, iron kettle.
kill, ćе'-hi-ke, he kills.
knee, shas'-ke.
knife, ma'-hi.
ma-thang'-ke, ma'-hi-han'-ye, } big knife.

L.

lake, će-ki'-he, and ni-a-pa'-ćе.
late, pi-a-hōn'-ye-hu'-ta.
laugh, ik-sha-nang'-a-ke, laughing.
ih'-sha-nang-a-ke, he is laughing.
ih-sha'-ke, ik-sha'-ke, } he laughs.
lead, man'-the-mi.
leaf, na'-we.
leg, hu.
hu'-ro, calf of the leg.
leggin, a-ku'-ta.
life, i'-ha, and ih'-a.
light, o'-ha-we.
lightning, ru-kri', and ru-gri'.
liver, pi.
lodge, ći.
ći-ho-the-ćе', skin tent, log house.
ći'-na, village.
ći-o'-ke, door, house entrance.
log, na'-kri-we.
love, kra'-hi-ke, he loves.

M.

male, wan'-ge.
man, wang'-kwa-sho-she, a brave man.
wa-shi'-ke-shu'-ćе, wa-shi'-ke-o-ken'-ye, } red man, Indian.
meadow, wa-tūsh'-ra.
midday, hi-mash'-ćе, warm sun.
midnight, ha-he'-o-ki-nan'-the-te.
mink, tōh-shing'-e.
moccasin, a-ku'-ćе.
moon, pi'-ta-we.
morning, he-ro-tah'-ći, and ta-ra-men'-ta.
mother, hi'-na, my mother.
mouth, i.
muskrat, ut-wa'-ke.

N.

nail, sha'-ke.
navel, de'-twa.
near, as'-ke, and as'-ki.
neck, ta'-she.
nettle, han'-to.
never, i-ya'-ha.
night, ha'-he.
no, heng'-e-ko.
nose, pa.
nothing, ta-ku'-pash-kūn'-ye, and o-ken'-ye.

O.

oak, pu'-tu, and na-pu'-tu.
old, ya'-ke, and sha'-ke.
on, a-ha'-ta-ta.
na-a-hōn'-ye, on the tree.
a-hōn'-ye, to climb.
otter, tōsh'-nang-e.
owl, mam'-po-ke.

P.

part, to'-he.
o-keth'-ra, half.
partridge, to'-shra-eng-a.
perhaps, as-ku, and a-rēh'-nas-ki.

pigeon, pu-ćé'-eng-e.
pipe, raȟ'-no-we.
plain, a-prath'-ke, prairie.
poor, wa-hwa'-ta.
post, na-po'-hro-ke.
potato, to-haŋ'-ye.
pumpkin, wat-wa'-ing-e, squash, little pumpkin.
tha-ke-ra'-ćé, melon, anything eaten uncooked.

R.

rain, ni'-yu.
raven, ka'-he-haŋ'-ye.
red, shu'-ćé.
river, nēsh-nang'-a.
rough, ma-ha-i'-yo-yo-ke, a bog.
run, nang'-e-ke, he runs.

S.

sail, ta-ćé'-re-ta.
salt, nith'-ku, sweet water.
sash, ćé'-hi-i-pi-re.
scale, ki-shu'-we.
scalp, wa-nan'-thu-hu'-ha.
seat, shen'-ćé, rump.
see, a-ta'-ke, he sees.
she, e-e, he or she.
shirt, wo-na'-ye.
shoe, thi'-re-yo'-ke.
shore, i-ru'-shi-shi'-we-ta, by the shore.
shot-pouch, man'-the-mi-wo'-yu.
shrub, hra'-he, any low bush.
sing, ya-me'-ke, he sings.
sister, he-yu'-na, elder sister.
hen-tan'-ga, younger sister.
skin, ha, and i-hu'-ha.
sky, ke-ra'.
u-hi'-he, in the sky.
slender, thu-eng'-e.
snake, wa-ka'.
snipe, wi-tūh'-e.
snow, pa.
something, ta-ku'-ra-shu.
son, hi-yeng'-e, my son.
di-yeng'-e, your son.
i-yeng'-e, his son.
sour, nath'-ta.
speak, i-ćé'-ke, i-be'-ta-ke, } he speaks.
spear, wi-yo'-kre.
spirit, wa-kan'-ta, Great Spirit.
wa-kan'-ta-pīsh'-kūn, evil spirit.
wa-kan'-ta-ći'-na, the Great Spirit's village, heaven.
spring, pe'-ta.
star, pi-ka'-e.
steamboat, pa-ćé'-ta-ko.
stomach, sho'-ke, and sho'-ku-hōn'-ye.
stone, en'-ro.
en'-ro-haŋ'-ye, big stone, rock.
stream, nesh-nang'-a, nesh-naȟ'-shing, } a small stream.
strike, i-ćé', o-ći'-ke, } he strikes.
strong, prēȟ'-e.
sucker, kōn'-ye.
summer, to'-ke-ta, wet season.
sun, pi.
sweet, thku.

T.

that, ka'-e.
thigh, re'-ke, and re'-ku-haŋ'-ye.
think, kēȟ'-thu-ke, i-ru'-ka-na'-ke, } he thinks.
this, ée.
thistle, wēȟ'-i.
thou, di'-re, and di'-e.
through, wa-ho'-ée.
thunder, ka.
tie, rūth-ki-ée'-ke, i'-re-ske, } he ties.
toad, ée-wa'-ho.
tobacco, nan'-ye.
to-day, ha'-we-ke.
toe, thi'-ha.
to-morrow, han'-ro-ta.
tongue, re'-the.

tooth, hi.
tortoise, ke′-ta.
trout, to′-thi.

U.

ugly, i-ro-kam′-pesh-kūn′-ye, not handsome.
under, ku′-ha.
up, o-me′-si-ta, up the country.

V.

valley, kro′-ke, hollow.
vein, ka.
a′-ka, vein in the arm.
village, ći′-na-pro-ki, the whole village.

W.

walk, man′-ye-ke, he walks.
wampum, u-nam′-pi, beads.
war-club, ma′-ya-ki-ta-wi′-ro-ći.
water, ni.
ni-hūng′-e, through the water.
će′-ta, ni′-han-ye, } great water.
we, hi′-e.
weak, pren′-ra-ra.
weasel, hen-thli′-tha.
weather, mash′-će, warm weather.
weed, ha′-će, and ha′-mi.
what, wa-ye′-re-će.
ta-ku′-ra, what is it?
wheat, wa-pūth′-ka.
which, ta′-na-ha.
white, thka.
who, wa-ge′-re.
wife, hen-ta′-mi, my wife.
wind, ta′-će, and tak′-tha-ke.
windpipe, to′-hu-hu.
wing, a′-hu.
winter, pan-ye′-ta, when it snows.
thni′-ta, when it is cold.
wish, kūn′-re-ke.
within, ro′-ta-ta.
without, tan′-gri-ta.
wolf, shūn′-ta.
man-yi-ka′, prairie wolf.
woman, i-nūn′-ge, and wa-shi′-ke-mi.
wood, na.
na-pu′-pa-na, pine, sweet-smelling wood.
na-pa-krun′-će, stump, wood cut off.
na-ro-tang′-kre, tree, upright wood.
na-kra′-će, arm of a tree, limb.
pa-će′-hra-we, undergrowth, forest, brush, &c.
hi′-sku, bass-wood.
woodcock, thka′-ge.
woodpecker, to′-kre-kre′-the.
worm, ma-shi′-we.

Y.

ye, di′-re-wi.
year, pa′-yi.
yellow, thi.
yes, hūn′-će.
yesterday, ta′-nan-yi′-ta.
young, shing′-e-ći.

NOTE.

THE materials composing this memoir have been accumulated during several expeditions to the Northwest since 1855. A considerable portion of the information in regard to the history of the Indian tribes was obtained during the years 1854 and '55, while the author was exploring the Valley of the Missouri River, under the patronage and protection of the American Fur Company. The greater part, however, was secured in 1856 and '57, while under the command of Lieut. G. K. Warren, T. E. U. S. A., and in the years 1859 and '60, while attached to the Exploring Expedition to the head waters of the Missouri and Yellowstone, under the command of Capt. William F. Raynolds, T. E. U. S. A. From both Lieut. Warren and Capt. Raynolds, the author cheerfully acknowledges great aid and encouragement in his researches. The results have been prepared and published in their present form by permission of the War Department.

The proof-sheets have been read with great care by a very critical philologist, Mr. Pliny E. Chase, of Philadelphia, and for his kindness and courtesy in this matter, the author gladly acknowledges his indebtedness.

EXPLANATION OF PLATES AND MAP.

The plates of Indian portraits were added to the memoir at the suggestion of an eminent ethnologist after the paper was completed, and this will account for the absence of any allusion to them in the text. It was a favorite design of the late lamented Prof. W. W. Turner, to prepare a work on the Indian languages of America, accompanied with portraits, so far as they could be secured, of the Indians from whom the vocabularies were obtained, showing the mental status of the man, as the representative of his tribe or language. So far as possible I have adopted this plan in the present memoir. The figures on the plates accompanying this work are copied from photographs taken in the Indian country, under the direction of Mr. J. D. Hutton, Topographical Assistant to Capt. William F. Raynolds, T. E., and published by permission of the latter. They are quite characteristic of the tribes they represent.

FIG. 1, Plate I, represents one of the most noted Crow chiefs, who wields great influence in his tribe, is a fine orator, and possessed of strong native talents. From him I obtained much reliable information in regard to the history and the language of the Crow tribe. FIG. 2 is a Shyenne brave, an excellent hunter, with fine natural powers, quick perceptions and intelligence, increased by long association with the whites. He formed the medium through which I obtained all the materials in regard to the Shyennes and their language. He is alluded to in the text under the name of "Rib," on page 276. FIG. 3 is the portrait of "Iron Horn," one of the most noted medicine-men in the Dakota nation. He possesses great influence in his tribe, is a warm friend of the whites, and has done much to harmonize difficulties among his people. He has often acted as guide and hunter to United States Exploring parties in the Dakota country. FIG. 4 represents the daughter of a late chief of one of the principal bands of the Dakota nation, and is now the wife of Mr. Charles E. Galpin, one of the chief partners in the American Fur Company. She is a woman of much intelligence and fine natural capacities, and may be regarded as the highest type of her sex among the Indian tribes of the Northwest.

FIG. 5, Plate II, is a Crow Indian of the more common sort, somewhat below the average grade. FIG. 6 represents one of the most influential chiefs of the Yancton band of the Dakotas, "Smutty Bear," as his Indian

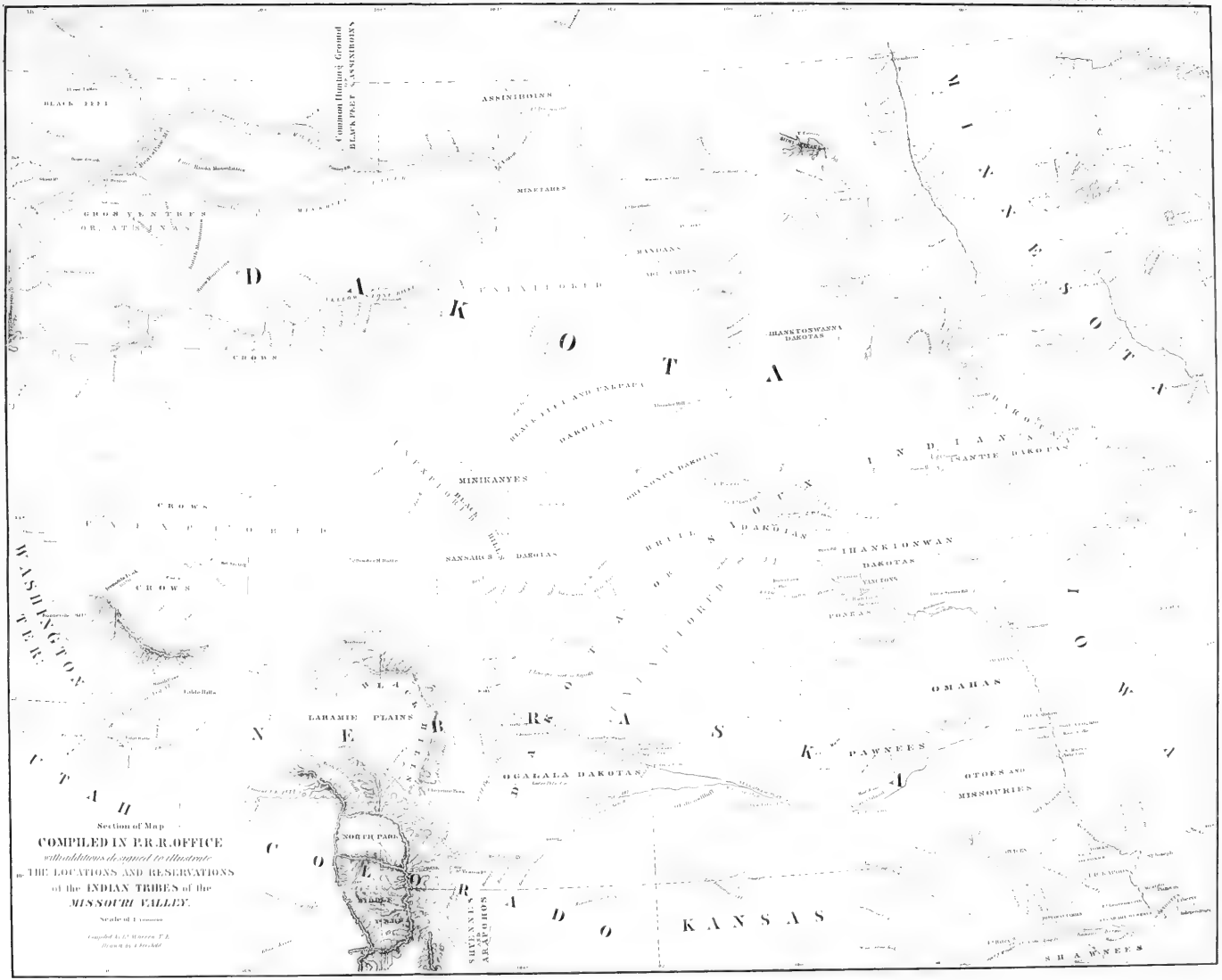
name has been interpreted by the traders. He is a fine orator, and manages the affairs of his people with ability and prudence. FIG. 7, *a*, *b*, *c*, are Arapoho chiefs. FIG. 7, *d*, is a tolerably good likeness of "Friday," whose history is given briefly on page 322 of this memoir.

The MAP accompanying this memoir will serve to illustrate the present geographical position of the different Indian tribes inhabiting the Missouri Valley. The discrepancies in the spelling of proper names, which has become so complicated at this time, could not be remedied in the present paper. The names of tribes in large letters indicate their range prior to treaties with the United States. The Reserves on the Lower Missouri are shown by dotted lines.

INDEX.*

* This Index is not intended to be a complete one, but to include only the principal proper names employed in the text.

AUTHORITIES.



Section of Map

COMPILED IN P.R.R.OFFICE

with additions designed to illustrate

THE LOCATIONS AND RESERVATIONS

of the INDIAN TRIBES of the

MISSOURI VALLEY.

Scale of 1 Inch

Compiled by J. C. Morrow T.E.

Drawn by A. Brickell

fig. 1.

CROW CHIEF.

fig. 2.

SHYENNE BRAVE.

fig. 3.

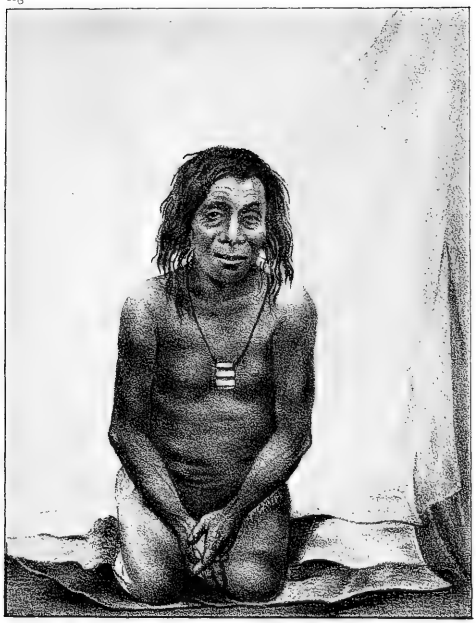
T. Sinclair's lith. Phil.ª

DAKOTA MEDICINE MAN.

fig. 4

DAKOTA WOMAN.

fig 5

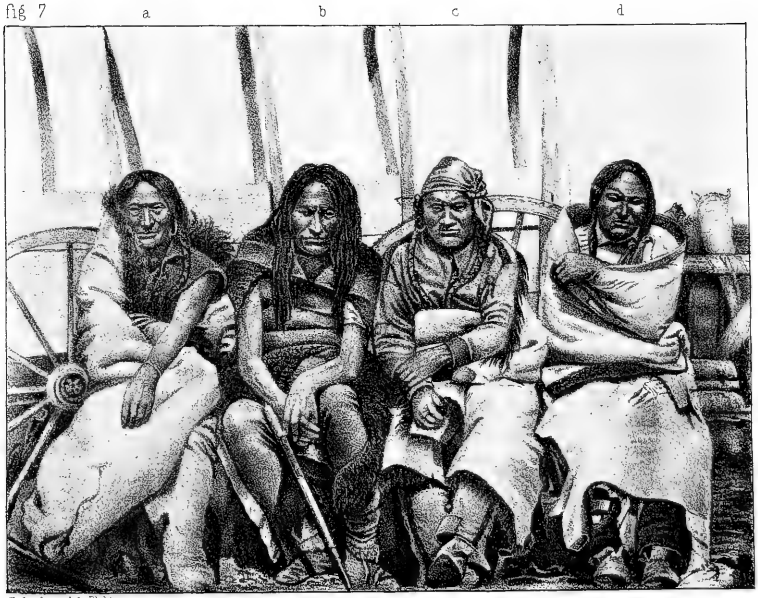


CROW INDIAN.

fig 6.

YANCTON CHIEF.

fig 7 a b c d



T Sinclair's lith. Phila

PRINCIPAL CHIEFS, ARAPOHO TRIBE.

ARTICLE IV.

INTELLECTUAL SYMBOLISM: A BASIS FOR SCIENCE.

BY PLINY EARLE CHASE, M.A.

Read, December 5th, 1862.

PREFACE.

"The nearer we come to Nature, the more does it seem to us that all our intellectual endowments are merely the echo of the Almighty Mind, and that the eternal archetypes of all manifestations of thought in man are found in the Creation of which he is the crowning work."—*Agassiz: Atlantic Monthly*, Vol. X, p. 94.

ויברא אלהים את האדם בצלמו בצלם אלהים ברא אתו:

GENESIS 1 : 27.

THE intimate connection of religion and true philosophy is attested by the profound wisdom embodied in the teachings of the Bible, as well as by the most valuable records of all past history, yet there are many who unwisely try to divorce them, or to regard them as essentially antagonistic. But the tendency to inquiry is so natural, that any attempt to resist or suppress it will not only always prove futile, but it will even stimulate curiosity to an increased activity, which may be exerted in secret, and therefore, with greater danger of leading the investigator into pernicious error.

Those who discourage the discussion of religious or other dogmas, not only act in direct opposition to Paul's precept to the Thessalonians, "Prove all things; hold fast that which is good," but their action may be unwittingly instrumental in spreading the very evil that they wish to remove. Their opponents charge them at once with fearing investigation, and the plausibility of the charge often enlists the ardent sympathies of youthful inquirers, inducing them to listen to subtle reasonings that are cloaked in a fallacy too skilfully woven for them to unravel, and the fear of opprobrium deters them from discussing the arguments with those who might easily expose the fallacy.

True faith and true reason are handmaidens,—reason acknowledging its dependence on faith as the source of its authority, and faith demanding the assent of reason to no absurdities,—however important it may regard a belief in the mysterious and the incomprehensible. Both faith and reason may be often strengthened by the study of mysteries, and by forming such dim conceptions of their significance as may be traced in their faint shadowings, while both will be surely weakened if they become entirely self-reliant.

A fondness for philosophy is, then, fit cause for rejoicing, provided the spirit of inquiry is rightly guided. It is easy to show that no dictum of reason can be depended on as true, unless it can be traced to an infallible source, and that source can be none other than a Perfect Intelligence. All knowledge must, therefore, ultimately rest on revelation; the general knowledge of the race on a general revelation, and the special knowledge that may be adapted to newly arising needs of human liberty, on a special revelation. The question of faith, therefore, should not be, "Is this teaching perfectly comprehensible?" or "Is it such as unaided reason could have demonstrated for itself?" but "Is it such as the teacher knew to be true?"

Although all knowledge rests ultimately on direct revelation, it is modified and extended by faculties whose proper use may be regarded as a secondary or mediate revelation, and no satisfactory pursuit of knowledge is possible, without determining the extent, validity, and limitation of those faculties. On this account, Philosophy should begin with the study of Consciousness, and that study, like any other, may be most satisfactorily pursued, if it is pursued systematically. All system rests on laws of thought, and all laws imply relation. Relation may, therefore, be reasonably assumed as the natural basis of mental classification, and in the following pages I have attempted to show that a broad and comprehensive system may be developed from the necessary sequences of relation.

That the system as yet is far from complete, and that its present crude deductions will prove in many respects unsatisfactory, I am fully aware. One of the first teachings of faith is, as has been intimated, that the human Consciousness is not on the highest plane, but that the validity of its dicta rests on the infallibility of a higher Divine Consciousness, of which it is a faint and imperfect reflection. It is the instrument of philosophical investigation, but it can give us no information, except of that which is modified by its own relations. Parallel with it there may, perhaps, be always an accompanying Moral Inspiration, and an Active Genius, which bear to it relations similar to those of Motivity and Spontaneity to Rationality, but the province of these hypothetical parallel faculties we can never hope to investigate except through Analogy.

Generalization is always necessarily superficial, yet it often leads to the most satisfactory results. The very fact of its superficiality relieves memory from a heavy burden, and facilitates the use of symbols, by which the labors of reasoning and investigation are greatly abbreviated.

Whatever originality there may be in the symbolism by which I have endeavored to indicate the broadest of all possible generalizations, will naturally excite some degree of interest, but the final verdict as to its merits will rest on the answer to the old question,—*Cui bono?* To that question I dare not yet attempt to give or to seek a full response. If the system is, as I most fully believe, grounded on the eternal necessities of truth, it

cannot be altogether insignificant, neither can it degenerate into a toy, fit only for the amusement of idle curiosity.

It may be said, indeed, that a mere notation can lead to no discoveries in Mental Science. This is in one sense true, but may not the same be said with equal, nay, with greater propriety, of the different notations of Mathematics, Logic, and Chemistry? The arbitrary signs of Algebra and the Calculus, do not contain in themselves the elements of any new truth, but they furnish a concise and precise language, by means of which, the results of a long process of investigation may be briefly expressed, and employed as the basis for new researches. A system of symbols that should render similar aid to Ethical, Social, and Intellectual Science, could hardly fail to yield important advantages.

A symbol in any case is not to be regarded as a box or wrapper in which some valuable but unknown truth is hidden, but it may be properly employed to represent, in the simplest possible form, an analysis that has already been made, and to keep the pure, unmixed results of that analysis so steadily in view, that they may be most conveniently used to facilitate farther investigation. Thus, although the Intellectual Symbols can convey very little meaning, until they are interpreted in familiar language, our operations with them may possibly lead us to reflect upon relations that had never before been observed, and by the study of these relations, new discoveries may be made.

If I am right in supposing the eternal necessity of an entity of the same order as Space and Time, for which I have proposed the name of Position,* the steps which led to its discovery, will well illustrate my meaning. Many have supposed "formal conditions of experience," or "logical antecedents of phenomena," different from Space and Time, but in every instance that has fallen under my notice, those conditions or antecedents have had either a subjective coloring, or a concrete reference. Take, for example, the ideas of personality, substance, cause, finitude, and figure. If there had never been manifestation, it is difficult to conceive either their necessary or their possible existence. But even if we suppose manifestation to be annihilated, Space, Time, and Position would still remain.

Since most, if not all our ideas of the Objective are derived from the material world, and our ideas of the Subjective from our own activity and its results, the necessary involution of space in the former, and of time in the latter, must have been evident to the earliest philosophical observers. But the necessity of a third form could never appear, until either the necessary triplicity of relativity, or the essential difference of relation from both the subjective and the objective, was perceived. The study of relativity led me to seek for the third formal condition, under which alone its triplicity was possible. Of my success in defining that condition by the sphere that I have assigned to Position, I must leave others to judge.

* See Chapter XII.

The following development would have been more entirely self-consistent, and for that reason it would, perhaps, have recommended itself to a more immediate and general approval, if it had stopped on the second plane below Consciousness, limiting its analysis to the determination of the three primary and nine secondary faculties. It would even then have covered a wider psychological field than has ever before been embraced in any systematic classification,—a field nearly as extensive as has ever been explored by any purely empirical philosophy. But I felt that it was desirable to indicate the direction of possible future discoveries, by a tentative analysis, that claims validity for none of its hypotheses, but seeks only to awaken an interest and stimulate an inquiry that may either verify or correct those hypotheses.

Still, if the success of this tentative analysis be judged by a comparison with previous attempts of a similar character, and not by a reference to the standard of absolute and necessary truth, it will, perhaps, be deemed sufficient to increase and justify the interest which may be first awakened by the mere novelty of the system. That the first Essay should fail of giving complete satisfaction in all its details is not strange, for the more minute the special subdivisions of any classification become, the slighter will be their distinguishing shades of difference, the more numerous and marked their various points of resemblance, and consequently, a greater degree of critical skill, and a more profound knowledge will be requisite, in order to make such an assignment of species as will stand every test of subsequent discovery. But if the fear of imperfection discourages us from using the resources at our command, we shall not only fall short of perfection ourselves, but we shall retard the progress of those who are to follow us, by neglecting to take the first steps which are necessary for all progress.

The spread of truth does not extinguish skepticism, but only banishes it to a remoter field. As the infinite limits the finite, so may the boundless realm of the doubtful and unknown be regarded as the limit of faith. The man who aims at a positive philosophy which shall embrace nothing that he does not understand,—refusing to accept anything on mere faith,—if he is consistent, will doubt everything, and even his boasted reason will be of no avail. But such consistency is fortunately impossible, for all are obliged practically to exercise a degree of faith which they often theoretically deny. Question closely and perseveringly as we may, we all finally arrive at simple truths that are accepted with implicit faith, not because our own authority is supreme, but because the clear perception of truth has been given us by the Supreme.

Any one who fully recognizes the relativity of Consciousness, and the correlations that it necessarily implies, will not only find absolute skepticism or atheism impossible, but by the very necessity that he discovers for revelation, he will be prepared to seek for the evidences of such revelation, and to consider favorably the arguments by which it is sup-

ported. If such a state of mind is more desirable than the carping, self-sufficient spirit, that scorns all external mental illumination, and tests the sunlight of eternal verities by the dim glimmer of its own flickering taper, I may reasonably ask for friendly criticisms on an attempt to determine some of the primary laws of relation, as well as for the co-operation of those who are interested in the development of those laws, and the determination of their consequences.

CHAPTER I.

DEFINITIONS AND FUNDAMENTAL RELATIONS.

1. SCIENCE is knowledge based on belief; FAITH is belief based upon revealed knowledge.*

2. Every object of human inquiry is an object either of Science or of Faith.

3. Belief is either absolute or relative.

4. Absolute belief is fundamental, simple, primary, necessary, independent, and irresistible. All absolute or self-evident beliefs are revelations from God,† being implanted in us by the Creator.

5. Relative belief is derivative, complex, subordinate, contingent, dependent, and debatable. Every relative belief is, however, the necessary resultant of all the data on which it is based, and all men would think alike *under the same circumstances.*‡

6. The sphere of knowledge is more extensive than that of absolute belief, embracing not only all primary, self-evident truths, but also every logical inference from absolute or indisputable premises.

7. Relative belief transcends knowledge, for it embraces inferences of every kind, whether logical or illogical, from premises true or false, together with all the convictions of feeling, and all the tenets of faith.

* Plato, *Republic*, B. 6, pp. 510–511, speaks of four different operations of the mind (*ψυχή*): intelligence (*νόησις*), demonstration (*διάνοια*), faith (*πίστις*), and conjecture (*εἰκασία*).

† Descartes appears to have been the first metaphysician who introduced into philosophy the evident truth, so beautifully expressed by Job, that men can acquire no knowledge except as "the inspiration of the Almighty giveth them understanding."

‡ Among the "circumstances" that determine erroneous belief, are improper assumption of premises, undetected fallacy, diseased mental action, ignorance or oversight of important facts, misunderstanding, hasty conclusion, defective generalization, wrong estimate of data. When men understand each other, they always agree in what they *know*, and they either harmonize in belief, or perceive that they would do so if they occupied the same standpoint.

8. Revelation is knowledge communicated in any manner by the Deity to his creatures. It is either direct or mediate.

9. Direct revelation is knowledge acquired without the aid of human reasoning, or the intervention of any human intelligence except our own.

10. Mediate revelation is knowledge which was originally acquired by direct revelation, and transmitted either by oral instruction, or by written record.

11. Belief, knowledge, faith, revelation, all imply thought and intelligence. The capacity of mind fixes the limits of knowledge.

12. All knowledge necessarily implies a dual existence, or an existence in two relations,* the existence of the knowing, and of the knowable.

13. From the dual or multiple, the mind naturally desires to ascend to the single or general, from the dependent variety to the independent, self-existent unity, which embraces and reconciles the plural or diverse.

14. That which knows, and that which is knowable, can only be united in a self-knowing intelligence. The highest conceivable unity is therefore a self-sufficient or "Absolute," self-conscious Being,—the Source or Originator of all actual as well as of all possible existence. Any other supposable highest intelligible or conceivable unity, must either be a unity of the knowing but unknowable, or of the knowable but unknowing, and therefore one of the forms of the highest duality, but by no means the all-embracing unity.†

15. Descartes, in his celebrated dictum, "Cogito Ergo Sum," was the first philosopher who clearly stated the fact, that consciousness necessarily involves the existence of the conscious being, and that all our knowledge must be based upon our personal consciousness. The same truth was more faintly shadowed forth in the "know thyself" of the Greek schools, but Descartes gave to the idea a clearness, simplicity, and fecundity of expression, that have revolutionized all metaphysical investigations.

* "If we appeal to consciousness, consciousness gives, even in the last analysis, in the unity of knowledge, a *duality of existence.*" *Hamilton, Discussions,* p. 66. "The necessary condition of intelligence is consciousness, that is, difference." *Cousin, Hist. of Mod. Phil.,* Vol. I, p. 88.

† We are apt to imagine, in the progress of philosophical investigations, that we discover a number of necessary but independent unities or realities, such as space, time, position, &c.; but a searching analysis will demonstrate that they are all merely forms of the knowable, standing in relation to our capacities of knowing, and that whatever necessity we may discover for their existence, is evidence of the necessary existence of a still higher unity.

If the essentiality and permanence of this duality, as well as its dependence on "the necessary condition of intelligence," is fully appreciated, Mahan's forcible statement of one of the strongest arguments in favor of immortality (p. 435), will seem almost axiomatic. "At death, not a particle of the physical organization, with which the soul is here connected, perishes. How unreasonable and absurd the supposition, that the soul, for which all else was made, is the only reality that then ceases to be."

16. All knowledge, therefore, starting from Intelligence, is limited by the nature and laws of Intelligence, and every Science must rest for its foundation on the Science of Mind. The Science of Science, which embraces all possible knowledge, was dignified by Socrates with the name of Philosophy, or the love of wisdom.

17. The simplest possible form of division is dual, but in treating of the faculties or capacities of Mind, there has been a very general recognition of triplicity. From the days of Pythagoras, who recognized in the soul three elements, Reason (*νοῦς*), Intelligence (*φρήν*), and Passion (*θυμός*),* to those of Hegel, who finds the manifestations of the *Idee* in Soul, Consciousness, and Reason, a fundamental ternary division has been adopted, with a marvellous unanimity which I can account for only by supposing it either to have been taught among the esoteric mysteries that shadow forth some of the earliest direct revelations to our race, or to have been founded on some obscure and dimly seen necessity of things.

18. For every general tendency, it is reasonable to suppose that there is some natural cause, yet no such cause appears to have been assigned or suspected, for the preference of any special form in the arrangement and classification of mental phenomena. There must be a great degree of uniformity in the facts that are made the objects of our study, and it is the duty of the critical investigator, to search for the law of which that uniformity is typical. "Facts are the words of God, and we may heap them together endlessly, but they will teach us little or nothing till we place them in their true relations, and recognize the thought that binds them together as a consistent whole."†

19. Among the many marvellous aphorisms of Aristotle, one of the most marvellous and productive is to be found in Book XI, Chap. XI, of his Metaphysics. "That which is changed is changed either from a characteristic‡ into a characteristic, or from a non-characteristic into a characteristic, or from a characteristic into a non-characteristic. I call that a characteristic which is made known by affirmation, so that it is necessary that

* Lewes. See also in *Anderson*, p. 76, the following citation from *Fragmenta Pythag. ex Theage in Opusculis Mythologicis*. "The soul consists of three parts: reason, irascible passion, and cupidity. Reason has subjected to it knowledge; passion, the bravery of strength; cupidity, appetite." Aristotle (*ἠθικῶν Εὐδημίων*, B. II, Chap. 7), says: "But of these three things, there would seem to be one; either according to longing (*κατ' ὄρεξιν*), or according to intention (*κατὰ προαίρεσιν*), or according to understanding (*κατὰ διάνοιαν*)." Many modern metaphysicians, adopting a more imperfect, because less comprehensive division, admit but three principal faculties of the mind: will, judgment, and understanding.

† *Agassiz: Atlantic Monthly*, July, 1862.

‡ I can think of no better translation for *ὑποκείμενον* than *characteristic* or *constituent*. The more obvious interpretations, *subject* and *substantial*, have been appropriated to denote more special meanings.

there should be three changes; for that from a non-characteristic into a non-characteristic is not a change."

20. On this view of the possible relations that can constitute the groundwork of propositions, the whole philosophy of Hegel appears to rest. He teaches "that everywhere the idea or notion appears first of all in its immediateness or intrinsic reality, that it then passes judgment upon itself, or becomes resolved into its opposite, and ultimately coalesces from out these antagonisms. From this very method results the whole structure or subdivision of the system. The Absolute, the being-thinking or *Idee*, has to pass through three momenta, and in the first place, to present itself as bare idea in and for itself. Secondly, in its differentiation or objective state, externality; and thirdly, as the idea that has returned from its externality into itself. In the first state, it is the purely logical *Idee*, the *thinking process* taken in the stricter sense as such in and for itself; in the second, it is the *Idee* in its externality, or departure from itself into a temporospatial disjunctivity, *i. e. nature;* and in the third, it is the *mind* or intelligence. Accordingly the whole of philosophy, or the thinking process, which has comprehended itself in this its active state, has three cardinal divisions, the Logic, which with Hegel, as is readily seen, implies also *Metaphysics;* the Philosophy of Nature, and Philosophy of Mind. . . .

21. "Within each of these three cardinal divisions, the same rhythmical movement repeats itself, and produces a like threefold division. The Logic has to deal (*a*) with the first immediateness, or with being; (*b*) this divides itself into the antagonism of essence and existence, and these finally coalesce together to form the idea (*Begriff*), with which we have already become acquainted, both in its real as well as ideal import, as the living circulation of momenta including itself within itself."*

22. These expositions of some of the most profound thoughts of Greek and German philosophy are well worthy of attention, and notwithstanding the obscurity with which they are clothed by foreign idiomatic forms of thinking and expression, it is easy to discern, in the general idea of which they are special and profitable applications, the grand, fundamental idea of all philosophy,—the idea of relativity, as the basis of analysis and synthesis. This idea, in its broadest generality, may be thus stated with mathematical vigor.

23. Given *a* and *b*, there can be four, and only four relations of antecedent and consequent, viz., *aa*, *ab*, *ba*, *bb*.

Of these four possible relations, only three can concern either of the given terms, *e. g.*, *a* is involved only in the three relations, *aa*, *ab*, *ba*, and *b* only in *ab*, *ba*, *bb*.

24. The fundamental relations involved in Philosophy are, as we have already seen, the

* Chalybäus, pp. 343–5.

relations of the knowing, or as it is technically called, the *Subjective*, and of the knowable, or the *Objective*.*

25. These relations may be thus designated:

1. The Subjective-Subjective, in which the Subjective is both antecedent and consequent.

2. The Subjective-Objective, in which the Subjective is antecedent, and the Objective is consequent.

3. The Objective-Subjective, in which the Objective is antecedent, and the Subjective is consequent.

4. The Objective-Objective, in which the Objective is both antecedent and consequent.

26. In all inquiries connected with the science of Mind, the subjective is necessarily involved, and in consequence of this necessity, mental investigations can be in no way concerned with the last of these four relations. Of the merely objective-objective, we can have no possible knowledge and no positive conception, all our ideas of the action of objects upon each other, or of their mutual relations, being derived from the union or comparison of objective-subjective and subjective-objective impressions.

27. There are then left for our consideration, but three primitive relations, each of which represents a distinct phase or form of the Subjective Mind.

28. The *essential* attribute of Mind is CONSCIOUSNESS.†

29. There may be forms of immaterial substance that are devoid of Consciousness, of which Force is perhaps one, but we give the name of Mind only to that portion of our being which has the power of perceiving its own operations, and the impressions that are made upon it. We can neither feel, act, nor think, without being conscious at the moment, of the feeling, action, or thought. It is true that the conscious impression is often faint and momentary, and that it often slips instantly from our memory unless there is

* "In the philosophy of mind, *subjective* denotes what is to be referred to the thinking subject, the Ego; *objective* what belongs to the object of thought, the Non Ego. . . . The exact distinction of *subject* and *object* was first made by the schoolmen; and to the schoolmen the vulgar languages are principally indebted for what precision and analytic subtilty they possess." *Hamilton: Discussions*, p. 13; see also *Cousin: El. of Psychology*, p. 358.

The subjective can become objective to itself, but the objective cannot become subjective. The subjective or intelligent is therefore supreme.

† "The fact of consciousness is a complex phenomenon, composed of three terms: the *me* and the *not-me*, bounded, limited, finite; again, the idea of the infinite; and still again, the idea of the relation of the *me* and the *not-me*, that is, of the finite to the infinite." *Cousin: Hist. of Mod. Philos.*, Vol. I, p. 126.

"The first fact with regard to the soul is that it is intelligent and vocal,—that it is not merely a subject, but also an organ of THAT WHICH KNOWS in the universe." *D. A. Wasson: Atlantic Monthly*, Vol. XI, p. 40.

something to fix the attention, but we can study mind only in Consciousness, and it is entirely out of our power to form any notion of the nature or attributes of unconscious mind.

30. Consciousness, in its action, involves duration, or Time. Every conscious process has a beginning, an advance, and an end. The relations of the Subjective, are therefore relations in time,—the origin of the relation determining the chronological antecedent,—and the termination of the relation, the chronological consequent.

31. In the Objective-Subjective relation, the impulse commencing externally and terminating in Consciousness, our attention is aroused, and we are induced to exercise our activity in various ways. To this form of Consciousness, which corresponds very nearly to the Passion (θυμός) of Pythagoras, the name of Passivity or Receptivity might be given, to designate the condition of the mind as the recipient of an impulse not originating in itself. But as the simplest exercise of Consciousness involves some degree of activity, and as the aroused attention tends to incite increased activity, the term MOTIVITY seems more appropriate.

32. In the Subjective-Subjective relation, the impulse begins and ends within Consciousness, which is said to act "of its own accord," or "spontaneously." I propose to designate this form of the subjective by the term SPONTANEITY.

33. In the Subjective-Objective relation, we are subjectively conscious of an effort commencing in our own minds, but tending towards the objective, an effort to perceive, know, understand, the nature of the object, or the proper mode of using it to accomplish some particular end that we have in view. This is especially an Intellectual or Rational effort, and the term RATIONALITY seems peculiarly fit for the form of Consciousness in which this effort originates.*

34. It is extremely difficult, if not absolutely impossible, to bring this primary division of Consciousness purely under our observation, because we can never observe the mind when it is merely motive, spontaneous, or rational. The very effort of observing involves a subjective exercise of Spontaneity and Rationality, and renders the mind while using its subjective energies, the object of its own observation. The effort to penetrate this labyrinth of complicated objective and subjective influences is perplexing, but no more so than

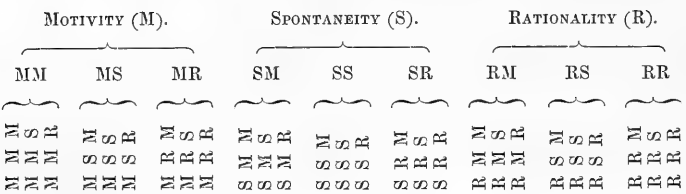
* I do not remember to have seen the boundaries of the primary divisions of Consciousness more clearly indicated, than by Mahan (p. 15), who employs the terms, "Intellect or Intelligence, Sensibility or Sensitivity, and Will. To the Intellect we refer all the phenomena of *thought*, of every kind, degree, and modification. To the Sensibility we refer all *feelings*, such as sensations, emotions, desires, and affections. To the Will we refer all mental *determinations*, such as volitions, choices, purposes, &c." Although this division, which is based upon pure observation, does not precisely correspond with our own, the resemblance is sufficiently striking to afford a very satisfactory confirmation of our theory.

the study of the relation that exists between our subjective ideas of matter and its attributes, and the objective attributes of matter as they exist in themselves, and if our clue is not long enough to thread the entire maze, it may at least enable us to effect an entrance, and gradually to explore a goodly portion of the labyrinth.

35. Though Motivity, Spontaneity, and Rationality may never be seen in pure and separate activity, in their combined action we can always, and usually without much difficulty, recognize one of the three as predominant. The respective degrees of influence severally exerted by the three Conscious forms, furnish us with a basis for division into primary faculties, and for subdivision to any required extent, according to subjective or objective tendencies, or rather according to motive, spontaneous, or rational resemblances. If any difficulty in precisely limiting and defining any particular faculty should appear discouraging, it may be well to glance at the various attempts that have been made at classification in the Natural Sciences, and to the proverbial difficulties that surround every attempt at system, introducing perturbations into most of our calculations, and producing exceptions to all general rules. Shall we discard the division of Physical Nature into three kingdoms, because it is impossible to determine the point at which the mineral is clothed with vegetable life, or to mark the precise boundary between the zoophyte and the plant? If Cuvier and Agassiz differ in opinion as to the genus or species to which a particular animal should be assigned, shall we pronounce the Science of Natural History worthless?

36. Our primary division of Consciousness has been logically deduced from a consideration of the relations which it necessarily assumes to the objective, but these relations do not in any way change the essential nature of the related terms. Like Consciousness itself, each of its subdivisions is subjective, and may be analyzed in its turn by regarding the modifications it assumes under different relations, as determining or determined by the objective, or as acting under subjective influences for purely subjective ends. If, then, we designate the Subjective under the objective-subjective relation by M, under the subjective-subjective by S, and under the subjective-objective by R, Motivity, Spontaneity, and Rationality may be severally indicated by the simple symbols, M, S, R, and their immediate subdivisions by MM, MS, MR,—SM, SS, SR,—RM, RS, RR. Extending this plan of subdivision, we obtain the following symbolic schema, which may be continued indefinitely, marking a precise, well-defined, and philosophical arrangement of the mental faculties.

37. CONSCIOUSNESS.



38. If we assign names to each of these symbols indicative of their exact significance, we may make an exhaustive catalogue of the powers of the mind. In selecting those names, it will be well to appropriate as far as possible, those that are already in use; for new and unfamiliar names would have no advantage over the simple symbols, and they would cumber the memory without conveying so distinct ideas as the symbols that they were supposed to illustrate and explain.

39. But when terms have become familiar, and have acquired a meaning somewhat precise, it is not wise to discard them altogether, especially if we can submit them to a system that will render their significance still more definite.* There are equally valid reasons for allowing observation and experiment to precede theory and scientific classification, in mental as in physical science. Every diligent observer will discover interesting and valuable facts, in whatever direction his inquiries may be turned, and the researches of mental philosophers will be found to have developed a mass of information and nomenclature, much more varied than that aggregate of physical ideas on which the modern natural philosophy was built. If this information were all arranged in accordance with any system, however imperfect, so that it could be readily learned, it would afford great aid to those who desire to pursue metaphysical investigations, and its value for educational purposes would be inestimable.†

40. Dr. Reid, starting from the division of the mental faculties into those of *understanding* and those of *will*,—a division which Hamilton traces "to the classification taken in the Aristotelic school, of the powers into *gnostic* or cognitive, and *orectic*, or appetent," recognizes the mutuality of the faculties in the following remarks:

41. "As the mind exerts some degree of activity even in the operations of understanding, so it is certain that there can be no act of will, which is not accompanied by some act of understanding. The will must have an object, and that object must be apprehended

* "The common terms of a language represent the results attained by the experience of all preceding ages."

† "But that each one says something concerning nature; and though each singly adds nothing or little to it, yet from all collected, there is some magnitude." *Aristotle: Metaphysics*, B. 2, chap. 1.

or conceived in the understanding. It is therefore to be remarked, that in most if not all operations of the mind, both faculties concur, and we range the operation under that faculty which has the largest share in it."*

42. An arrangement of faculties based upon this view, would appear to be quantitative, and the order of the symbols would indicate the supposed relative degrees of influence, exerted by Motivity, Spontaneity, and Rationality in mutual action. Nor would the results of such a hypothesis be altogether unsatisfactory, for in every mental operation, we could trace predominant traits, and secondary and subordinate characteristics, sufficiently marked to enable us to assign symbols in such order, as would fix its position in the schema we have adopted, and thus indicate the meaning that we attached to the name by which we described the operation. But according to our explanation of the symbols, the first letter indicates a modification of simple Consciousness, and the subsequent letters, *analogous* (not *identical*), modifications of the subordinate forms of Consciousness. By the former hypothesis, the symbol RM (Rationality-motive), would indicate a faculty in which Rationality was principally concerned, and Motivity in a smaller degree; by the latter, it would denote that form of Rationality which is modified by relation, in a manner similar to the modification of Consciousness in Motivity. The difference may be slight, and in the present state of Mental Science, perhaps inappreciable, still there is a difference.

* To this passage, Sir William Hamilton appends the following note: "It should be always remembered that the various mental energies are all only possible in and through each other" [should we not rather say, in and through Consciousness?] "and that our psychological analyses do not suppose any real distinction of the operations which we discriminate by different names. Thought and volition can no more be exerted apart, than the sides and angles of a square can exist separately from each other." *Reid*, p. 242. This fundamental characteristic of mental manifestation facilitates our analysis, by rendering a system that would otherwise appear arbitrary and artificial, perfectly philosophical and natural.

We might suppose, for instance, a classification of physical phenomena, based on the three dimensions, length, breadth, and thickness, that should represent all the facts of natural philosophy by combinations and permutations of the symbols L, B, T. Or we might undertake to explain the functions of civil government, by similarly combining the symbols M, A, D, which would severally represent monarchy, aristocracy, and democracy. But would those symbols, in either instance, denote *necessary* relations, the *only* necessary relations, and relations that are necessarily repeated and continued at each successive step of subdivision? We have seen that all this is true of the symbols M, S, R. Relativity is essential to Consciousness, and in whatever way we suppose Consciousness to be modified, it is Consciousness still, with a capacity for action under three and only three general relations.

CHAPTER II.

PRIMARY FACULTIES.

43. Although metaphysical writers have generally turned their attention almost exclusively to the rational phenomena, they have often recognized both the motive and the spontaneous element of Consciousness. The following are some of the prominent terms that philosophers have employed, to designate mental states that they have specially observed, with the symbol attached to each that seems most precisely to indicate its meaning:

Propensity (MM),	Instinct (SM),	Perception (RM),
Desire (MS),	Will (SS),	Judgment (RS),
Sentiment (MR),	Energy (SR),	Understanding (RR).

44. In order to determine the correctness of this relative assignment, it may be well to examine each of the terms somewhat carefully.

45. Propensity, as defined by Webster, denotes "bent of mind, natural or acquired; inclination; natural tendency."

46. Comte, treating of the phrenological subdivision of the affective faculties into propensities and sentiments, says that "the first and fundamental class" [propensities] "relates to the individual alone, or at most, to the family, regarded successively in its principal needs of preservation, such as reproduction, the rearing of the young, the mode of alimentation, of habitation," &c.*

47. Combe says, "All the propensities are blind," and "the faculties of the propensities and sentiments cannot be excited to activity directly by a mere act of the will," but "each faculty may be roused into activity by the *presentment of its appropriate objects.*"†

48. Whatever we may think of the comparative accuracy of these several definitions, there can be little doubt that their authors regarded Propensity as directly subject to an external, objective stimulus, and it may, therefore, be ranked unhesitatingly under Motivity. Inasmuch as it denotes a mere tendency, without any perceptible (quantitative) element of Spontaneity or Rationality, it may well be regarded as the simplest or motive form of Motivity (Motivity affected), the symbol of which is MM.

49. Desire, "even when its object is some action of our own, is only an incitement to will, but it is not volition."‡ (Motivity, but not Spontaneity, though somewhat like it.)

* *Positive Philosophy*, pp. 389–390.

† *Lect. on Phrenology*, pp. 140, 277, 278.

‡ Reid, p. 532.

50. "The uneasiness a man finds in himself upon the absence of anything, whose present enjoyment carries the sense of delight with it, is that we call desire."*

51. "That which immediately determines the will from time to time, to every voluntary action, is the uneasiness of desire fixed on some absent good."*

52. The symbol MS accords well with these definitions, denoting Motivity with a special tendency to voluntary or spontaneous action.

53. SENTIMENT "supposes the existence of some social relations, either among individuals of a different species, or especially between individuals of the same species apart from sex, and determines the character which the tendencies of the animal must impress on each of these relations, whether transient or permanent."†

54. "Authors who place moral approbation in feeling only, very often use the word *Sentiment*, to express feeling without judgment. This I take likewise to be an abuse of a word. Our moral determinations may, with propriety, be called *moral sentiments;* for the word *sentiment,* in the English language, never as I conceive, signifies mere feeling, but *judgment accompanied* with feeling."‡ (Say rather, feeling implying or suggesting the idea of judgment.)

55. These definitions justify us in regarding Sentiment as a feeling or affection of Consciousness, excited by any appropriate object, and tending to produce action in accordance with our position as social and rational beings. It therefore represents Motivity, tending towards subjective action with a rational object or end, and its appropriate symbol is MR.

56. INSTINCT, as defined by Reid, is "a natural blind impulse to certain actions, without having any end in view, without deliberation, and very often without any conception of what we do." This is exemplified in "that natural instinct by which a man who has lost his balance and begins to fall, makes a sudden effort to recover himself, without any intention or deliberation."§

57. Hamilton says, "An Instinct is an agent which proposes blindly and ignorantly, a work of intelligence and knowledge."‖

58. Comte, in noticing the relation of intelligence to instinct, observes that "the only meaning that can be attached to the word *instinct*, is any spontaneous impulse¶ in a determinate direction, independently of any foreign influence. In this primitive sense, the

* Locke, v. 1, pp. 149 and 160.

† Comte, p. 390.

‡ Reid, p. 674. On this paragraph, Sir William Hamilton remarks: "This is too unqualified an assertion. The term *Sentiment* is in English applied to the *higher feelings*."

§ Reid, p. 568.

‖ Reid, p. 761.

¶ Spontaneous impulse = Spontaneity-Motive, SM.

term evidently applies to the proper and direct activity of any faculty whatever, intellectual as well as affective, and it therefore does not conflict with the term *intelligence* in any way, as we so often see when we speak of those who without any education, manifest a marked talent for music, painting, mathematics, &c. In this way there is instinct, or rather there are instincts in man as much or more than in brutes."*

59. We may infer from the foregoing definitions, that the prominent or general characteristic of Instinct, is a tendency to spontaneous action, while the secondary or specific characteristic, is "a natural blind impulse," analogous to Propensity. If this impulse was considered as the most obvious feature of Instinct, its symbol would be MS, but if, as I believe, the first idea suggested by the term, is that of some kind of active potentiality, it represents the motive form of Spontaneity, and its symbol is SM. It will be found both interesting and useful, to observe the analogy and the quantitative distinction between Desire and Instinct,—the spontaneous-motivity and the motive-spontaneity,—the elements of each being the same, but Motivity being more prominent in the former, and Spontaneity in the latter.

60. WILL is so purely subjective, that its place may be assigned without hesitation under Spontaneity, of which it may be regarded as the spontaneous form, and its symbol is therefore SS.

61. It is difficult by any definition, to describe a faculty that is so familiar to every one by its constant action, so as to give any clearer idea of its limits, than we obtain by the very position we have given it in our schema, as the subjective, absolute, or spontaneous form of the subjective-subjective.

62. Bacon says: "The knowledge which respecteth the faculties of the mind of man, is of two kinds; the one respecting his understanding and reason, and the other his will, appetite, and affection; whereof the former produceth direction or desire, the latter action or execution."†

63. Locke says: "This at least I think evident, that we find in ourselves a power to begin or forbear, continue or end several actions of our mind and emotions of our bodies, barely by a thought or preference of the mind ordering, or as it were, commanding the doing or not doing such or such a particular action. This power which the mind has thus to order the consideration of any idea, or the forbearing to consider it, or to prefer the emotion of any part of the body to its rest, and *vice versâ*, in any particular instance, is that which we call the will."‡

64. According to Reid, "Every man is conscious of a power to determine, in things

* Comte, pp. 585–6. Taylor, *Elements of Thought*, p. 105, thinks that Instinct "cannot be imagined to reside in the animal."

† Bacon's Works, Vol. I, p. 206.

‡ Locke, B. 2, c. 21, § 5.

which he conceives to depend upon his determination. To this power we give the name of *Will*."*

65. Cousin observes as follows: "The peculiar characteristic of the me is causality, or will, since we refer to ourselves, we impute to ourselves only what we cause, and we cause only what we will. To will, to cause, to exist for ourselves,—these are synonymous expressions for the same fact, which comprises at once will, causality, and personality. . . . . The phenomenon of will presents the following elements, 1, to decide upon an act to be performed; 2, to deliberate; 3, to resolve. Now if we look at it, it is reason which composes the first element entirely, and even the second; for it is reason also which deliberates, but it is not reason which resolves and determines."†

66. Jouffroy says: "To *direct* and *to correct*, such is then the double action of the personal power over the development of our faculties. . . . *The personal faculty* (or that supreme power that we have to make use of ourselves, and of the capacities which are in us, and to dispose of them), is known under the names of *liberty* and of will, which designate it but imperfectly."‡

67. Energy, if we look merely to its etymological derivation, would appear to imply activity. Sir William Hamilton says: "Energy is often ignorantly used in English for force. . . *Operation*, *Act*, *Energy*, are nearly convertible terms, and are opposed to *Faculty*, as the *actual* to the *potential*."§ If this position of the distinguished philosopher is impregnable, there would be a manifest impropriety in ranking Energy among the faculties of the mind.

68. But whatever may have been the original meaning of the word, it is evident that its ordinary acceptation at the present day, does not necessarily involve the idea of activity. Moreover, by a common metonymy, the same word is often used to denote a faculty, or power of mental action, and also to designate the specific act of that faculty. Thus desire, sentiment, instinct, will, perception, judgment, are all employed with a twofold meaning,—one subjective, and the other objective; and if there is no impropriety in applying the term judgment indiscriminately, to the faculty of judging and to the decision of that faculty, there can be none in using the term Energy to denote the faculty of acting for a fixed purpose, as well as to denote the action itself.

69. Energy is variously defined by our principal lexicographers, as "power, inherent or exerted;" "force;" "vigor;" "operation;" "strength;" "efficacy;" "faculty." An energetic man is equally energetic, whether he is active or at rest; he is one who has the faculty of intelligent and successful activity, which he may exercise, like his other faculties, at his own pleasure.

* Reid, p. 530.

‡ *Melanges Philosophiques*, 2de edit., pp. 345–349.

† Cousin, pp. 384, 386.

§ Reid, pp. 515, 221.

70. Energy, therefore, in ordinary philosophical diction, as well as by common usage, seems to involve,

1. The power of subjective activity, or Spontaneity;

2. The power of directing subjective activity to a special or rational end. It is, then, the faculty of Spontaneity-rational, and its symbol is SR.

71. Rationality being, as we have already stated, specially concerned with the acquisition of knowledge, its subordinate faculties should be adapted to every possible method of acquisition.

72. Now Rationality may attain its end in three, and only three ways, viz.:

1. By the acquisition of new facts,—the rational ME affected by the NOT ME.

2. By combining or comparing two or more facts, drawn from the storehouse of Consciousness, in order to discover new forms of truth from their relations, the Rational ME acting within or upon itself.

3. By the examination of facts or conclusions, for the intelligent determination of their full objective meaning,—the Rational ME overstepping the bounds of experience, to declare the reality of the NOT ME.

73. In the acquisition of new facts, the rational Consciousness is sub-passive and receptive, influenced by the objective, and simply percipient of the fact which is presented for its cognizance. This motive form of Rationality is usually called PERCEPTION.

74. In comparing the facts which, either by original constitution or by appropriation, have become a portion of its own treasury of knowledge, the rational Consciousness is specially subjective, its action originating and terminating within its own borders. This spontaneous form of Rationality has the same characteristics as the faculty of JUDGMENT.

75. In ascertaining objective significance, the subjective Rationality assumes an objective tendency, and is evidently in its *affecting* or rational form. This form corresponds to the faculty of UNDERSTANDING.

76. PERCEPTION is confounded by Locke with thinking, and with the act of the Understanding.* He remarks, however, that "thinking, in the propriety of the English tongue, signifies that sort of operation in the mind about its ideas, wherein the mind is active; when it, with some degree of voluntary attention, considers anything. For in bare, naked perception, the mind is for the most part, only passive, and what it perceives, it cannot avoid perceiving."†

77. Kant defines perception as "empirical consciousness," and he remarks that phenomena, as objects of perception, "contain in themselves, besides the intuition, also matter for an object in general (whereby something existing in space or time is represented)."‡

* Essay, Vol. I, pp. 90, 98, 152. † Ibid. p. 98. ‡ Hayward's translation, p. 138.

78. Reid says perception "hath always an object distinct from the act by which it is perceived; an object which may exist, whether it be perceived or not."*

79. Combe regards perception as the act of a faculty which recognizes an object on presentation,—"the lowest degree of activity of the intellectual faculties."†

80. Hamilton says: "*External Perception* or *Perception* simply, is the faculty *presentative* or *intuitive* of the phenomena of the Non-Ego or Matter,—if there be any *intuitive* apprehension allowed of the Non-Ego at all. *Internal Perception* or *Self-Consciousness* is the faculty *presentative* or *intuitive* of the phenomena of the Ego or Mind."‡

81. We infer, therefore, that philosophers unite in regarding perception,

1. As a subjective-objective or rational faculty.

2. As sub-passive, empirical, active in the lowest degree, tending to incite rationality to greater activity,—attributes which should characterize Rationality-motive. We are therefore confirmed in our previous assignment of its position, as the representative of the symbol RM.

82. JUDGMENT is undoubtedly a rational faculty, involving a special active exercise of our subjective powers, such as should belong to the absolute or spontaneous form of Rationality. Its symbol is therefore RS. Compare this localization with the following definitions.

83. "The faculty which God has given man to supply the want of clear and certain knowledge, in cases where that cannot be had, is judgment; whereby the mind takes its ideas to agree or disagree, or which is the same, any proposition to be true or false, without perceiving a demonstrative evidence in the proof.§

84. "Judgment is the thinking or taking two ideas to agree or disagree, by the intervention of one or more ideas, whose certain agreement or disagreement with them it does not perceive, but hath observed to be frequent and usual."‖

85. "*Judgment* is, therefore, the mediate cognition of an object, consequently the representation of a representation of it. In every judgment there is a conception, which is valid for many, and under such many comprehends also a given representation, which last thing then is referred immediately to the object. . . . But we can reduce all actions of the Understanding to judgments, so that the *Understanding* in general can be represented as a *faculty of judging*."¶

86. "The definition commonly given of judgment, by the more ancient writers in logic

* Reid, p. 183.
† Op. citat., p. 284.
‡ Reid, Note B, § I, 8, p. 809.
§ Locke, v. 2, p. 427.
‖ Locke, v. 2, p. 445.
¶ Kant, p. 61.

was, that it is *an act of the mind whereby one thing is affirmed or denied of another.* I believe this is as good a definition of it as can be given."*

87. "In treatises of logic, judgment is commonly defined to be an act of the mind, by which one thing is affirmed or denied of another; a definition which, though not unexceptionable, is perhaps less so than most that have been given on similar occasions."†

88. "The arts intellectual are four in number, divided according to the ends whereunto they are referred; for man's labor is to invent that which is sought or propounded; or to judge that which is invented; or to retain that which is judged; or to deliver over that which is retained. So as the arts must be four; art of inquiry or invention; art of examination or judgment; art of custody or memory; and art of elocution, or tradition."‡

89. "Judgment is the action of the mind in deciding or pronouncing, concerning two things, when placed in comparison, that they are equal or unequal, like or unlike; that the one contains the other, or bears such or such a relation to it. It is by *successive judgments*, or by the regular comparing of one idea or notion with another, until we reach some one which at first was seen in the distance, that a process of reasoning is carried on."§

90. "Sound judgment is feeling rightly and perceiving correctly. The reflective faculties are the judges, but they depend on the other faculties for correct data."‖

91. This faculty of Judgment corresponds in part if not wholly with what Hamilton calls the Elaborative Faculty. He says: "These four acts of acquisition, conservation, reproduction, and representation, form a class of faculties which we may call the Subsidiary, as furnishing the materials to a higher faculty, the function of which is to elaborate these materials. This elaborative or discursive faculty is Comparison; for under Comparison may be comprised all the acts of Synthesis and Analysis, Generalization and Abstraction, Judgment and Reasoning. Comparison, or the Elaborative or Discursive Faculty, corresponds to the Διάνοια of the Greeks, to the *Verstand* of the Germans. This faculty is Thought Proper; and Logic, as we shall see, is the science conversant about its laws."¶

92. The difference between Energy (SR), and Judgment (RS), according to our schema, is that in the former the Spontaneous element, and in the latter the Rational, is the more prominent; the one being the faculty of subjective activity for a rational purpose or end, the other the faculty of rational action for subjective improvement or gratification.

93. UNDERSTANDING is the rational form of Rationality,—the supreme faculty of Intelligence to which Perception and Judgment are both subservient. Its symbol is RR.

94. "The commandment of knowledge is yet higher than the commandment over the

* Reid, p. 413.
† Stewart, p. 349.
‡ Bacon, Vol. I, p. 207.
§ Taylor, *El. of Thought*, p. 110.
‖ Combe, p. 290.
¶ Hamilton: *Metaphysics*, p. 284.

will, for it is a commandment over the reason, belief, and understanding of man, which is the highest part of the mind, and giveth law to the will itself."*

95. "As the fancy is the apprehension or seizing of an object, the reason a combination or distinction, so the understanding is the faculty which penetrates, and in its highest degree, clearly sees through its object. We understand a phenomenon, a sensation, an object, when we have discovered its inmost meaning, its peculiar character and proper significance. And the same is the case, even when this object be a speech and communication addressed to us,—a word or discourse given us to extract its meaning. If we have discerned the design which is involved in such a communication, its real meaning and purpose, then may we be said to have understood it, even though some minutiæ in the expression may still remain unintelligible, which, as not belonging essentially to the whole, we put aside and leave unconsidered."†

96. "But there is a spirit in man; and the inspiration of the Almighty giveth them understanding."‡

97. In Understanding, as in Propensity, the objective element largely predominates; the former being almost exclusively objective in its tendency,—the latter in its origin. Accordingly the mind is more nearly passive in the exercise of this faculty, than in either Perception or Judgment, for our activity proceeds so far, and so far only as the subjective is involved.§

98. As Motivity and Spontaneity are both developed before Rationality,—the animal and physical operating as conditions for intellectual growth,—so this sovereign faculty of Rationality matures more slowly, and attains its highest development at a later period of life than any of the other primary faculties. Indeed, in the mass of mankind, the Understanding always remains feeble, and, as it were infantile,—a power prophetic in its latent capabilities, of a higher state of existence, in which it will be called into full and proper exercise.

99. The powers of Perception and Judgment, are to some extent employed at almost every instant of our lives,—so frequently, that our familiarity with their objects is often mistaken for a complete understanding. How serious this mistake, let the meagreness of science, and the vast field of tempting speculation that continually allures baffled speculators, testify. Of how many men may it be said at all times, and how often may it

* Bacon, Vol. I, p. 182. † Schlegel, p. 54.

‡ Job, c. 32, v. 8.

§ Mahan (pp. 214–18), adopting the views of Coleridge, says: "The Understanding is the faculty of *believing*. The Reason is the faculty of *knowing*." This definition would not justify the use of the symbol RR, but it shows the need of some system for precisely indicating the meaning of the terms that we employ.

be said of all men, that they "seeing see not, and hearing they hear not, neither do they understand."

100. The relation between the objective and subjective, involved in the convictions of the Understanding, is and will perhaps always remain wholly incomprehensible. The attempt to explain it by "ideas," "sensible impressions," or the intervention of imaginary objects which are neither material nor immaterial, serves only to increase the obscurity, which envelops the mode of mutual action between mind and matter. We can only say that those convictions are irresistible, that they are in accordance with the intellectual nature given to us by the Creator, and as such we ground our faith upon them, as revelations from that Supreme Intelligence, "for whom are all things, and by whom are all things." "The entrance of thy words giveth light; it giveth understanding to the simple."*

101. Of the Divine Reason, that gives to the Understanding all its convictions,—the light "which lighteth every man that cometh into the world," Cousin discourses beautifully (though somewhat questionably), as follows:

102. "When we come to interrogate reason about itself, to inquire into its own principle and the source of that absolute authority which characterizes it, we are forced to recognize that this reason is not ours, not constituted by us. It is not in our power, it is not in the power of our will to cause the reason to give us such or such a truth, or not to give us them. Independent of our will, reason intervenes, and when certain conditions are fulfilled, gives us, I might say, imposes upon us these truths. The reason makes its appearance in us, though it is not ourselves, and in no way can it be confounded with our personality. Reason is impersonal. Whence then comes this wonderful guest within us, and what is the principle of this reason which enlightens us, without belonging to us? This principle is God, the first and the last principle of everything. Now when the faith of reason in itself is attached to its principle, when it knows that it comes from God, it increases not merely in degree, but in nature, by as much, so to say, as the eternal substance is superior to the finite substance in which it makes its appearance. Thus comes a redoubled faith in the truths revealed by the supreme reason in the shadows of time, and in the limitations of our weakness."†

103. Cousin quotes in illustration, the following passage from Fenelon: *Existence of God*, Part I, ch. 4, *Of Human Reason*. "In truth, my reason is in myself, for it is necessary that I should continually turn inward upon myself in order to find it, but the higher reason, which corrects me when I need it, and which I consult, is not my own, it does not make a part of myself. Thus, that which might seem the most our own, and to be the

* Ps. 119, v. 130.

† Cousin: *El. of Psychology*, pp. 299, 300.

very foundation of our being, I mean our reason, is that which least belongs to us, which we are to believe the most borrowed. We receive continually and at every moment, a reason superior to ourselves, just as we continually breathe an air which is not of ourselves, or as we constantly see the objects around us by the light of the sun, whose rays do not belong to our eyes. There is an internal school, where man receives what he can neither acquire himself, nor learn from other men who live by alms like himself. Where is this perfect reason which is so near me, and yet so distinct and different from me? Is it not God himself, the being for whom I am inquiring?"

104. "There are cognitions in the mind which are not contingent,—which are necessary,—which we cannot but think,—which thought supposes as its fundamental condition. These cognitions, therefore, are not mere generalizations from experience. But if not derived from experience, they must be native to the mind; unless on an alternative that we need not at present contempla[illegible], we suppose with Plato, St. Austin, Cousin, and other philosophers, that Reason, or more properly Intellect, is impersonal, and that we are conscious of these necessary cognitions in the Divine Mind. . . . . On the power possessed by the mind of manifesting those phenomena, we may bestow the name of the Regulative Faculty. This faculty corresponds in some measure to what in the Aristotelic philosophy was called Νοῦς,—νοῦς (*intellectus*, *mens*), when strictly employed, being a term in that philosophy for the place of principles,—the *locus principiorum*. It is analogous likewise to the term *Reason*, as occasionally used by some of the older English philosophers, and to the *Vernunft* (*reason*) in the philosophy of Kant, Jacobi, and others of the recent German metaphysicians, and from them adopted into France and England. It is also nearly convertible with what I conceive to be Reid's, and certainly Stewart's notion of Common Sense."*

105. Probably no English thinker has ever devoted so much attention to the limits and offices of the different Intellectual Powers as Sir William Hamilton, and I note with peculiar satisfaction, the exact accordance of his division of the Cognitive Faculties, both in order of development and relative position, with my own views of the province of Rationality. To show the extent of this accordance, I will quote the closing remarks of his twentieth lecture on Metaphysics.

106. "Such are the six special Faculties of Cognition; 1°, The Acquisitive or Presentative or Receptive Faculty, divided into Perception and Self-Consciousness;† 2°, The Conservative or Retentive Faculty, Memory; 3°, The Reproductive or Revocative Faculty,

* Hamilton: *Metaphysics*, p. 277.

† The only point on which I am inclined to question this division, is the propriety of regarding Self-Consciousness as a faculty collateral with Perception. I would rather view it as a form of Sense or of Intuition, each of which, in its turn, is a form of Perception.

subdivided into Suggestion and Reminiscence; 4°, The Representative Faculty, or Imagination; 5°, The Elaborative Faculty or Comparison, Faculty of Relations; and 6°, The Regulative or Legislative Faculty, Intellect or Intelligence Proper, Common Sense. Besides these faculties there are, I conceive, no others; and in the sequel, I shall endeavor to show you, that while these are attributes of mind not to be confounded,—not to be analyzed into each other,—the other faculties which have been devised by philosophers are either factitious and imaginary, or easily reducible to these."

107. As this division was purely the result of observation and study, the grouping is marked by no law except that of regular gradation, from the form in which the relative antecedence is most objective, to that in which it is most subjective. The Presentative, Conservative, and Reproductive Faculties may all be ranked under Perception,—the Representative and Elaborative Faculties under Judgment,—and the Regulative Faculty corresponds to Understanding.

CHAPTER III.

SUBORDINATE FACULTIES.

108. In seeking suitable terms to designate the secondary faculties (or the mental powers in the third order of our schematic division of Consciousness), we may proceed in either of three ways.

1. By selecting at random names that have been employed by different philosophers, and by a careful analysis of their meaning, assigning their proper place under the motive, spontaneous, or rational forms of Motivity, Spontaneity, or Rationality.

2. By the synthetic addition to each of the faculties that have already been determined, of the peculiar modifications, which may be considered as specially designating their motive, spontaneous, and rational forms, and assigning names that will indicate those modifications.

3. By comparing and combining the respective offices of two or more faculties that have already been ascertained, in order to form an approximate idea of the nature of a faculty that is designated by their united symbols. The symbolic faculty RSM, for example, may be regarded either as (R, SM) the instinctive form of Rationality, or (RS, M) the motive form of Judgment.

109. The farther this process of analysis is carried, the more minute become the distinctions between the several faculties. It is consequently more difficult to find names which

will be precisely and fully significant and exhaustive, and we can hardly hope that our first efforts at nomenclature will be faultless, even if they are anything more than tentative and suggestive,—furnishing a groundwork for the investigations and modifications of subsequent inquirers. But however imperfect our labors may be, the symbols will indicate with great accuracy, the meaning we attach to the terms we employ, and thus furnish to those who follow us, a key to our theories as well as a guide to their own studies, and a means of gradually perfecting the system which we are jointly striving to develop.

110. The result of considerable study and examination, according to each of the above enumerated methods, is the following list of secondary faculties:

MMM, Proclivity,	MMS, Appetence,	MMR, Attachment,
MSM, Selfishness,	MSS, Curiosity,	MSR, Purpose,
MRM, Enjoyment,	MRS, Approval,	MRR, Respect,
SMM, Cautiousness,	SMS, Forecast,	SMR, Constructiveness,
SSM, Attention,	SSS, Direction,	SSR, Resolution,
SRM, Vivacity,	SRS, Concentrativeness,	SRR, Decision,
RMM, Sense,	RMS, Memory,	RMR, Intuition,
RSM, Discernment,	RSS, Deliberation,	RSR, Discursiveness,
RRM, Conception,	RRS, Abstraction,	RRR, Comprehension.

111. The general assignment of these faculties can be made without much difficulty or hesitation, as follows:

Proclivity, Appetence, Attachment, Selfishness, Curiosity, Purpose, Enjoyment, Approval, and Respect are all aroused by directly objective influences, and tend to produce subjective action. They are therefore classed under Motivity.

112. Cautiousness, Forecast, Constructiveness, Attention, Direction, Resolution, Vivacity, Concentrativeness, and Decision, all indicate faculties which are influenced to peculiar modes of subjective action, by subjective motives. They are therefore classed under Spontaneity.

113. Sense, Memory, Intuition, Discernment, Deliberation, Discursiveness, Conception, Abstraction, and Comprehension are all employed with direct reference to objective truth, and are therefore faculties of Rationality.

114. The special place occupied in the general assignment, seems to require notice in a few instances, which will serve to illustrate our several methods of analysis.

115. Appetence may be regarded either as a propensity or a desire, according to the latitude of meaning we accord it. By giving it the symbol MMS, we may indicate this equivocal significance, for it will then represent the spontaneous form of Propensity (MM, S), and the desiring form of Motivity (M, MS).

116. Attachment partakes at once of the nature of Propensity and Sentiment, but its propense is rather more strongly marked than its sentimental character. The symbol

MMR represents the rational form of Propensity (MM, R), and the sentimental form of Motivity (M, MR).

117. Resolution may be ranked without much impropriety, either under Will or Energy. The more common usage, however, seems to imply that a man may have the will to resolve, without the requisite energy to perform, and whatever energy may be embraced in Resolution, seems therefore to be subordinate and not paramount. We therefore regard it as the rational form of Will (SS, R), and the energetic form of Spontaneity (or Spontaneity *tending* to Energy) (S, SR).

118. Concentrativeness might also be classed either under Will or Energy. It resembles the faculty of Resolution, but its character is rather more rational, which is indicated by giving precedence to the symbol of secondary Rationality (S, RS, instead of S, SR).

119. Discursiveness, or the faculty of logical inference, seems to involve the exercise of Understanding, but that exercise is consequent, and not antecedent. Logical reasoning implies comparison and judgment, and its faculty may therefore be properly considered as the rational faculty of Judgment (RS, R).

120. Abstraction, or the faculty which separates the essential part of any idea from what is merely accidental, contradictory, or alien,* seems to involve the exercise of Understanding upon the determinations of Judgment, and its symbol is therefore RRS.

121. Some of the remaining terms are used with such breadth of meaning, that their vulgar acceptation is not precisely defined by the symbolic boundaries which we have given them. This incomplete accordance invites special discussion as to the propriety of our limitation, and the desirability of seeking terms more exact and less ambiguous, for the places they occupy.

122. The office of the several secondary faculties may perhaps be rendered clearer by the following homogeneous classification:

1. Class of pure Motivity.

   MMM. Proclivity. The simplest form of disposition to action, on the presentation of objective impulse.

2. Class of duplicate Motivity and Spontaneity.

* "Abstraction is the selection by the mind of those partial phenomena which admit of being subsumed under one principle. Now it is clearly impossible that this uniting principle should originate in the objects, for another principle would always be necessary in the subject, in order to recognize the unity of the principle in the objects. The principle therefore originates in the subject, and as this is valid of all our observation of phenomena, it follows that the sphere of the application and validity of causality is limited by subjective principles of thought, and cannot be predicated of those things with which the subject has no concern, *i. e.*, of things which are not objects for it at all." *Solly*, p. 69.

MMS. Appetence. Spontaneous Propensity (MM, S), or desiring Motivity (M, MS). A disposition to seek after the simplest form of subjective gratification.

MSM. Selfishness. Motive Desire (MS, M), or instinctive Motivity (M, SM). Spontaneity is more prominent than in Appetence; the disposition to activity is therefore greater, and the subjective gratification that is sought is of a higher order.

SMM. Cautiousness. Motive Instinct (SM, M), or propense Spontaneity (S, MM). The still greater prominence of Spontaneity produces a special reference to the active subject, while the inclination to action (MM) is so feeble, that it may be easily overcome by external obstacles.

3. Class of duplicate Motivity and Rationality.

MMR. Attachment. Rational Propensity (MM, R), or Sentimental Motivity (M, MR). Principally Motive, but implying a certain feeling, or objective tendency.

MRM. Enjoyment. Motive Sentiment (MR, M), or perceptive Motivity (M, RM). The sentiment, feeling, or rational motive is more prominent than in simple Attachment.

RMM. Sense. Motive Perception (RM, M), or Propense Rationality (R, MM). The objective or rational becomes the principal characteristic, to which the motive is subordinated.

4. Class of Motivity, and duplicate Spontaneity.

MSS. Curiosity. Spontaneous Desire (MS, S), or voluntary Motivity (M, SS). Motivity is the most prominent, impelling to the exertion of will for purely subjective gratification.

SMS. Forecast. Spontaneous Instinct (SM, S), or desiring Spontaneity (S, MS). Spontaneity being more prominent, capacitates for action tending to accomplish the ends of desire.

SSM. Attention. Motive Will (SS, M), or instinctive Spontaneity (S, SM). Spontaneity is instinctively attentive, and in the form of attention, the Will tends to specific action.

5. Class of Motivity, Spontaneity, and Rationality.

MSR. Purpose. Rational Desire (MS, R), or energetic Motivity (M, SR). Differing from Curiosity (MS, S) in being less purely subjective, and more objective or rational in its tendency.

MRS. Approval. Spontaneous Sentiment (MR, S), or judicious Motivity (M, RS). Motivity, instead of acting as in Purpose, subjectively for a rational end (SR), acts rationally or objectively for a subjective end (RS).

SMR. Constructiveness. Rational Instinct (SM, R), or sentimental Spontaneity (S,

MR). More spontaneous and less motive than Purpose, with Sentiment less prominent, and Spontaneity more prominent than in Approval.

SRM. Vivacity. Motive Energy (SR, M), or perceptive Spontaneity (S, RM). Differing from Constructiveness as Perception (RM) from Sentiment (MR). Differing from Purpose in the greater prominence of Energy and the subordination of Motivity.

RMS. Memory. Spontaneous Perception (RM, S), or desirous Rationality (R, MS). In Vivacity, Spontaneity has special activity for perceived ends. In Memory, Perception is active for a subjective end.

RSM. Discernment. Motive Judgment (RS, M), or instinctive Rationality (R, SM). More subjective and less prominently motive than Memory; more rational and less instinctive than Constructiveness.

6. Class of Motivity, and duplicate Rationality.

MRR. Respect. Rational Sentiment (MR, R), or understanding Motivity (M, RR). Differing from Approval (MRS), in the substitution of the objective reference for the subjective or spontaneous.

RMR. Intuition. Rational Perception (RM, R), or sentimental Rationality (R, MR). More rational than Respect, and only subordinately sentimental.

RRM. Conception. Motive Understanding (RR, M), or perceptive Rationality (R, RM). Resembling Respect, with Understanding made prominent, and Motivity subordinated. Resembling Intuition, with Rationality made prominent, and Perception subordinated.

7. Class of pure Spontaneity.

SSS. Direction. Will acting of its own accord, to guide towards any desired end.

8. Class of duplicate Spontaneity, and Rationality.

SSR. Resolution. Rational Will (SS, R), or energetic Spontaneity (S, SR). Differing from Constructiveness in the substitution of the spontaneous for the motive, or the energetic for the sentimental element.

SRS. Concentrativeness. Spontaneous Energy (SR, S), or judicious Spontaneity (S, RS). More purely energetic, and more objective or rational than simple Resolution.

RSS. Deliberation. Spontaneous Judgment (RS, S), or voluntary Rationality (R, SS). The objective or rational character becomes the most prominent, and Will operates only for determining the object sought. Judgment is more active and prominent than in Concentrativeness.

9. Class of Spontaneity, and duplicate Rationality.

SRR. Decision. Rational Energy (SR, R), or understanding Spontaneity (S, RR).

Resembling Resolution (SSR), but implying a rational or objective purpose for its secondary action.

RSR. Discursiveness. Rational Judgment (RS, R), or energetic Rationality (R, SR). The logical discursiveness implies the energetic exercise of Rationality, the executive Decision involves the rational exercise of Energy.

RRS. Abstraction. Spontaneous Understanding (RR, S), or judicious Rationality (R, RS). Abstraction differs from Decision, in implying the spontaneous exercise of Understanding, instead of the intelligent exercise of Spontaneity; from Discursiveness in the greater prominence of Rationality, and the subordination of Judgment.

10. Class of pure Rationality.

RRR. Comprehension. The highest exercise of reason, involves the separation from the object under consideration, of all that is accidental, foreign, or non-essential, and the determination of the essential or absolute.

123. In proceeding to assign names to the tertiary faculties (or the mental powers in the fourth order of the subdivisions of Consciousness), the distinctive characteristics become still more minute, and the difficulty of finding precise and definite terms is consequently greater. We will therefore content ourselves with a hypothetical nomenclature, without attempting to define the several faculties more precisely than by the symbolic designation of their meaning. In deciding upon the fitness of each name, the following questions should be asked.

1. Does this name generally express, or may it properly be used to express the precise relations indicated by the symbols that are attached to it?

2. Can those relations be expressed more satisfactorily by any other name?

124.

MMMM,	Vitativeness,	M-proclivous;	Propensity-propense;	Proclivity-M.
MMMS,	Combativeness,	M-appetent;	" -desirous;	" -S.
MMMR,	Amativeness,	M-attached;	" -sentimental;	" -R.
MMSM,	Alimentiveness,	M-selfish;	" -instinctive;	Appetence-M.
MMSS,	Acquisitiveness,	M-curious;	" -voluntary;	" -S.
MMSR,	Ambition,	M-purposing;	" -energetic;	" -R.
MMRM,	Self-Esteem,	M-enjoying;	" -perceptive;	Attachment-M.
MMRS,	Affection,	M-approving;	" -judicious;	" -S.
MMRR,	Adhesiveness,	M-respecting;	" -intelligent;	" -R.
MSMM,	Envy,	M-cautious;	Desire-propense;	Selfishness-M.
MSMS,	Cupidity,	M-forecasting;	" -desirous;	" -S.
MSMR,	Approbativeness,	M-constructive;	" -sentimental;	" -R.
MSSM,	Marvellousness,	M-attentive;	" -instinctive;	Curiosity-M.
MSSS,	Inquisitiveness,	M-directing;	" -voluntary;	" -S.
MSSR,	Eagerness,	M-resolute;	" -energetic;	" -R.

MSRM,	Confidence,	M-vivacious;	Desire-perceptive;	Purpose-M.
MSRS,	Zeal,	M-concentrative;	" -judicious;	" -S.
MSRR,	Emulation,	M-decisive;	" -intelligent;	" -R.
MRMM,	Content,	M-sensible;	Sentiment-propense;	Enjoyment-M.
MRMS,	Hope,	M-remembering;	" -desirous;	" -S.
MRMR,	Sympathy,	M-intuitive;	" -sentimental;	" -R.
MRSM,	Admiration,	M-discerning;	" -instinctive;	Approval-M.
MRSS,	Esteem,	M-deliberate;	" -voluntary;	" -S.
MRSR,	Taste,	M-discursive;	" -energetic;	" -R.
MRRM,	Generosity,	M-conceptive;	" -perceptive;	Respect-M.
MRRS,	Veneration,	M-abstractive;	" -judicious;	" -S.
MRRR,	Conscientiousness,	M-comprehensive;	" -intelligent;	" -R.
SMMM,	Solicitude,	S-proclivous;	Instinct-propense;	Cautiousness-M.
SMMS,	Vigilance,	S-appetent;	" -desirous;	" -S.
SMMR,	Circumspection,	S-attached;	" -sentimental;	" -R
SMSM,	Frugality,	S-selfish;	" -instinctive;	Forecast-M.
SMSS,	Providence,	S-curious;	" -voluntary;	" -S.
SMSR,	Self-Denial,	S-purposing;	" -energetic;	" -R.
SMRM,	Imitation,	S-enjoying;	" -perceptive;	Constructiveness-M.
SMRS,	Device,	S-approving;	" -judicious;	" -S.
SMRR,	Order,	S-respecting;	" -intelligent;	" -R.
SSMM,	Observation,	S-cautious;	Will-propense;	Attention-M.
SSMS,	Scrutiny,	S-forecasting;	" -desirous;	" -S.
SSMR,	Tact,	S-constructive;	" -sentimental;	" -R.
SSSM,	Activity,	S-attentive;	" -instinctive;	Direction-M.
SSSS,	Management,	S-directing;	" -voluntary;	" -S.
SSSR,	Positiveness,	S-resolute;	" -energetic;	" -R.
SSRM,	Intrepidity,	S-vivacious;	" -perceptive;	Resolution-M.
SSRS,	Pertinacity,	S-concentrative;	" -judicious;	" -S.
SSRR,	Self-Reliance,	S-decisive;	" -intelligent;	" -R.
SRMM,	Frankness,	S-sensible;	Energy-propense;	Vivacity-M.
SRMS,	Alacrity,	S-remembering;	" -desirous;	" -S.
SRMR,	Constancy,	S-intuitive;	" -sentimental;	" -R.
SRSM,	Patience,	S-discerning;	" -instinctive;	Concentrativeness-M.
SRSS,	Perseverance,	S-deliberate;	" -voluntary;	" -S.
SRSR,	Inflexibility,	S-discursive;	" -energetic;	" -R.
SRRM,	Dexterity,	S-conceptive;	" -perceptive;	Decision-M.
SRRS,	Courage,	S-abstractive;	" -judicious;	" -S.
SRRR,	Determination,	S-comprehensive;	" -intelligent;	" -R.
RMMM,	Sensation,	R-proclivous;	Perception-propense;	Sense-M.
RMMS,	Self-Consciousness,	R-appetent;	" -desirous;	" -S.
RMMR,	Apperception,	R-attached;	" -sentimental;	" R.
RMSM,	Suggestion,	R-selfish;	" -instinctive;	Memory-M.

RMSS,	Recollection,	R-curious;	Perception-voluntary;	Memory-S.
RMSR,	Retention,	R-purposing;	" -energetic;	" -R.
RMRM,	Penetration,	R-enjoying;	" -perceptive;	Intuition-M.
RMRS,	Ideality,	R-approving;	" -judicious;	" -S.
RMRR,	Affirmation,	R-respecting;	" -intelligent;	" -R.
RSMM,	Contemplation,	R-cautious;	Judgment-propense;	Discernment-M.
RSMS,	Reflection,	R-forecasting;	" -desirous;	" -S.
RSMR,	Imagination,	R-constructive;	" -sentimental;	" -R.
RSSM,	Meditation,	R-attentive;	" -instinctive;	Deliberation-M.
RSSS,	Comparison,	R-directing;	" -voluntary;	" -S.
RSSR,	Calculation,	R-resolute;	" -energetic;	" -R.
RSRM,	Discrimination,	R-vivacious;	" -perceptive;	Discursiveness-M.
RSRS,	Causality,	R-concentrative;	" -judicious;	" -S.
RSRR,	Elucidation,	R-decisive;	" -intelligent;	" -R.
RRMM,	Individuality,	R-sensible;	Understanding-propense;	Conception-M.
RRMS,	Cognition,	R-remembering;	" -desirous;	" -S.
RRMR,	Appreciation,	R-intuitive;	" -sentimental;	" -R.
RRSM,	Analysis,	R-discerning;	" -instinctive;	Abstraction-M.
RRSS,	Synthesis,	R-deliberate;	" -voluntary;	" -S.
RRSR,	Generalization,	R-discursive;	" -energetic;	" -R.
RRRM,	Insight,	R-conceptive;	" -perceptive;	Comprehension-M.
RRRS,	Sagacity,	R-abstractive;	" -judicious;	" -S.
RRRR,	Classification,	R-comprehensive;	" -intelligent;	" -R.

125. The subdivision could be carried still further if it were desirable, but enough has already been done to fully illustrate the principle of arrangement. If this first essay at arrangement has not been entirely satisfactory in all its minutest details, it may, perhaps, at least compare favorably with any previous one, and it should be remembered that facts of any kind that are "to be examined, ought not to be taken at random, but selected on a principle, and arranged in due order and dependence. But this requires no ordinary ability, and the distribution of things into their proper classes is one of the last and most difficult fruits of philosophy."* A slight, and sometimes hardly appreciable change, in the supposed relative ascendency of the partial characteristics, may remove a faculty from one of the primary subdivisions of Consciousness to another. But whatever doubt may be connected with our imperfect appreciation of the relations, the ideal relations themselves are positive, fixed, necessary, eternal, and the more fully we comprehend the value of all the symbols, both simple and complex, the greater precision will attend all our thoughts and investigations.

126. The accompanying diagram exhibits at a glance, the relations of the several sub-

* Hamilton, *Logic*, p. 399.

divisions of Consciousness. The fourth order of subdivision is omitted, as the nomenclature I have suggested is a wholly experimental one, requiring a long series of careful observations before it will be possible to determine whether it has any value. The faculties of the third order are marked with a note of interrogation, to show that farther study is desirable, to ascertain whether their relative assignment is the best that can be made. It is quite probable that some other order of classification may be more convenient for the lower faculties, but I have thought it would be best to show that the principle of trichotomy may be extended as far as the needs of science may require.

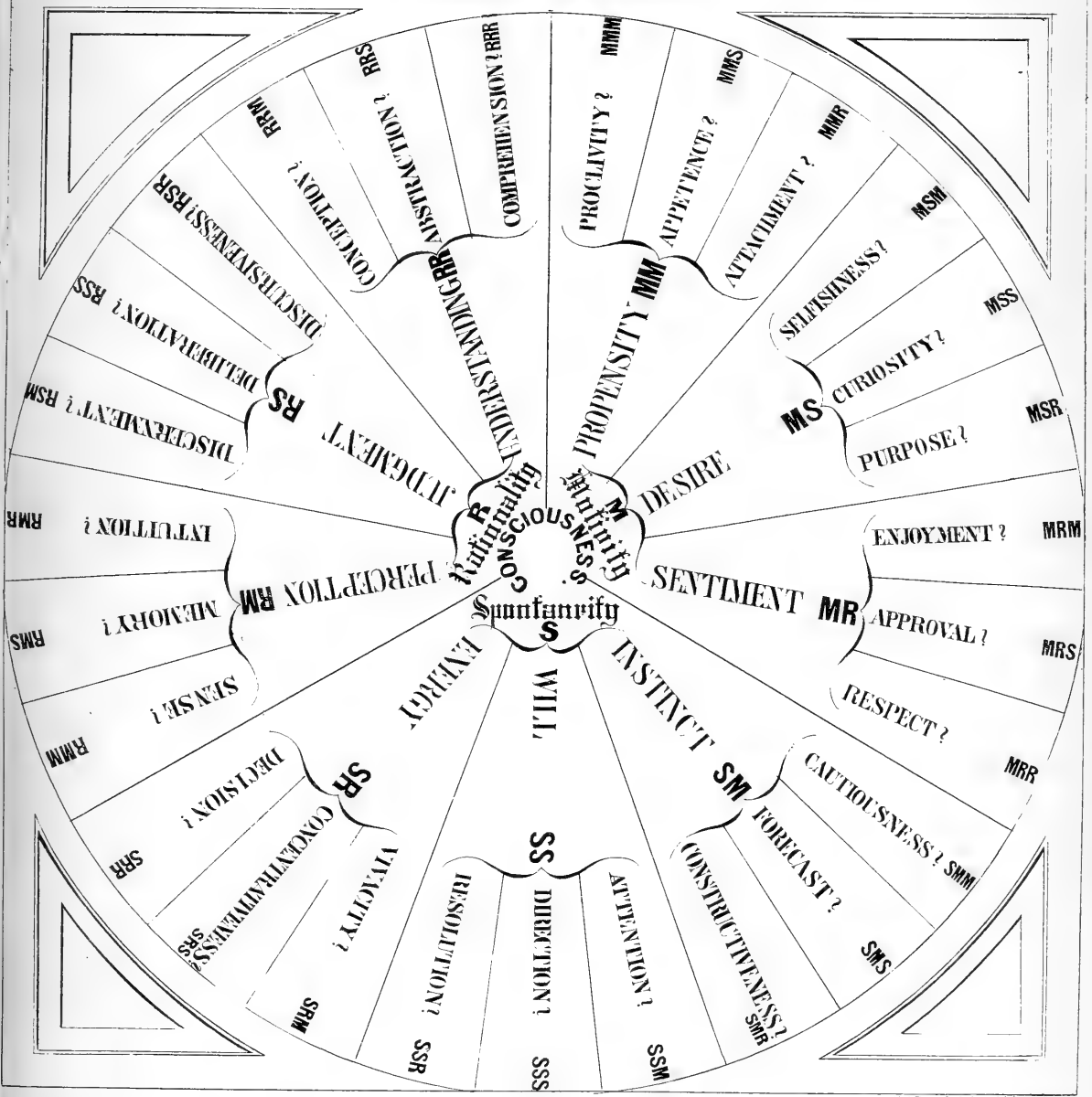
CHAPTER IV.

PHILOSOPHY OF CONSCIOUSNESS.

127. Every man feels that his personality does not consist in any peculiarity of form, feature, or complexion, any more than in the shape or texture of the clothes he wears. He finds his body with its limbs and organs of sense, a very convenient and important instrument for the execution of his plans, and he may take pride in the physical beauty, delicacy, or exquisite finish of that instrument, as he would in the symmetry of a horse, or the superior merit of anything else of which he claimed ownership. But the intelligent self,—the *Me*,—sits apart in such almost inaccessible majesty, that many have been accustomed to look upon it as a kind of mythical somewhat, whose very existence is exceedingly problematical,—a mere resultant, perhaps, of the material and physical organization. Such an opinion is of course based upon the assumption that the material is more patent and intelligible than the immaterial,—an assumption that it may be well to test by a brief inquiry into the character of our knowledge of the nature and qualities of mind.

128. Of the essential nature of mind or matter we know nothing. We can judge of them only by the effects they produce upon us by their properties or attributes. These attributes can be considered as belonging to them only in so far as they are *phenomenal*, that is to say, as they *appear* to our observation. What analogy or connection there may be between the phenomenal attributes and the substantial essence, it is impossible, for reasons that will appear in the course of our inquiry, for us to determine. It is, however, obvious that the phenomena of mind are more closely related to the observing mind, than the phenomena of matter. We ought therefore to know more of mind than of matter, and inasmuch as we know nothing of matter except the effects it produces upon our minds, Bishop Berkely and others have attempted with much force and plausibility of

ELEMENTARY FORMS ASSUMED BY CONSCIOUSNESS UNDER ITS VARIOUS RELATIONS.



T. S. Duval & Son. Lith. Philada.

argument, to prove that there is no real substantial existence, except of mind and its modifications.

129. In the connection of attributes with the objects of our investigations, we observe different degrees of intimacy, some appearing inseparable and essential, while others are more or less accidental. Thus it is impossible for us to think of matter as divested of the property of impenetrability, but inertia, divisibility, weight, and color, seem less closely connected with it,—being as it were the mere clothing of impenetrability,—and a demonstration of the existence of matter in some form without either of these secondary qualities would not greatly surprise us.

130. The phenomenal rests on the absolute, and the metaphysical fashion, which can be donned or doffed at pleasure, must be dependent on the purely metaphysical investigations of thinkers, whose magnetic vigor can polarize the world of mind. The philosophical triumvirate that has ruled the last half century,—Fichte,* Cousin, and Hamilton, differing as they do in many of the details of doctrine, and standing in clear individuality as legitimate representatives of the three great forms of modern civilized speech and thought,—all build upon the same foundation, and all agree in a profound rational Transcendentalism.† The pantheism of the German, the eclecticism of the French, and the practicalness of the English thinker, are but accidental appendages of their several systems,—cloaks that have indeed either set a local fashion, or been cut in a style already prevailing, but not the body or groundwork of their teachings. Each appeals for the confirmation of every truth, to a judge whose dicta are more authoritative than those of sensation or experience, and whether that judge be called The Life, Consciousness, or Common Sense, is a matter of small moment.

131. In the words of Fichte,‡ "We see, hear, feel, outward objects; and *along with* this seeing, &c., we also *think* those objects, and are conscious of them by means of our inward sense, just as we are conscious by the same inward sense, of our seeing, hearing, and feeling of those objects. . . . This inseparability of the outward, sensible *perception* and the inward thought or *conception*,—this *coexistence*, I say, and nothing more than this, lies in practical self-observation, or the fact of Consciousness. . . This fact of Consciousness does by no means contain any *relation* between . . the outward Sense and the inward

* I regard both Schelling and Hegel as disciples of Fichte's school.

† This term is often used by those who have a very vague idea of its meaning. The signification originally attached to it by the schoolmen, was modified by Kant, who called the necessary cognitions which are the foundation of experience *transcendental*. All philosophy which recognizes something higher than demonstration, as the source of all possible knowledge, may be called transcendentalism. See Hamilton's remarks on "TRANSCENDENTAL *truths, principles, cognitions, judgments*, &c.," in his edition of *Reid*, p. 762, and *Logic*, p. 140.

‡ Lecture on the difficulties arising from the common mode of thought. *Smith's Translation.*

Thought, . . as Cause and Effect, or as Essential and Accidental. If any such relation between the two be assumed, this is not done in consequence of practical self-observation, and it does not lie in the fact of Consciousness.

132. . . "Should such a relation be assumed upon some other ground than that of self-observation, . . then it appears at first sight, that the two elements, as coexistent and inseparable from each other, must be held to be of equal rank; and thus the inward thought may be as well regarded as the foundation, the essence of the outward perception, which in that case would be the superstructure, the accident, as the reverse; and in this way an insoluble doubt would necessarily arise between the two suppositions, which would forever prevent any final decision respecting the assumed relation. . . But should any one look deeper into the matter, . . inasmuch as the inward consciousness embraces even the outward sense itself; since we are conscious of the seeing, hearing, or feeling, but can by no means, on the other hand, see, hear, or feel our consciousness; and thus, even in the immediate fact, Consciousness assumes the higher place,—such an one, I say, would find it much more natural to make the internal Consciousness the chief thing, and the external Sense the subordinate thing; and to explain the latter by the former; to control and try the latter by the former;—and not the reverse."

133. Either Cousin or Hamilton might have thus discoursed, for each of them maintains the supremacy and efficiency of Consciousness,—the subordination of Sensation,—and the relation of the latter as the chronological, to the former as its logical antecedent. Each rejects the theory of Locke, that all our knowledge is derived from sensation and experience, and acknowledges the transcendency of ideas, which alone render sensation and experience possible.

134. There is much in a superficial acquaintance with metaphysical literature, that tends to discourage the ardent seeker after truth, and to strengthen the vulgar opinion that all philosophical research is foolish and unsatisfactory. The pages of an ordinary Encyclopædia will show that in the earliest historical times, the Brahminical sages taught many of the leading doctrines that characterize some of the most distinguished modern philosophical schools. A cursory perusal of the works of Plato and Aristotle reveals the origin of so much of the variety and profundity of thought that later writers would gladly claim as their own, that one is tempted to exclaim with Solomon, "there is nothing new under the sun," and to believe that in what poor, weak, deluded humanity regards as the most exalted sphere of investigation, it is destined to move in a continual circle, making no real progress, but constantly repeating the ideas and systems of earlier ages.

135. But if our metaphysical reading is more than superficial, much of this discouragement will vanish, giving place to a hope, if not to a full conviction, that the day will come when the science of all science will assume a clearness and a definiteness such as it merits.

Human nature has been the same in all ages, and it is therefore natural that the same questions should continually suggest themselves, and that they should receive the same answers, somewhat modified, perchance, by individual idiosyncrasies. The phenomena of mind are as patent to observation as those of matter, and prior to the days of Bacon, the former were more studied and better understood than the latter. It is true that in neither physical nor metaphysical science had much advance been made for many centuries, but in the entire absence of any system by which the acquirements of one age could be readily communicated to the next, how could any advance be anticipated? A life of investigation, however directed, should doubtless bring to light a mass of valuable truth, which might be recorded for the benefit of future investigators in the same field, but if the record shows no connecting thread of thought, which makes all the details parts of a consistent whole, it will be of little value.

136. The study of isolated facts is dry, dull, tedious, and unprofitable, and even if the facts are arranged according to a merely arbitrary system, though their acquisition may be somewhat facilitated, it will yield but little satisfaction. A lifetime might be devoted to learning a dictionary by rote, but the learner would probably be little more skilful in the expression of his thoughts after his task was ended, than he was at its commencement. And in like manner the student who delves for years in the fertile soil of Greek philosophy, will probably make no further progress than his predecessors, even if he accomplish as much as he would have done had he devoted himself to original and unassisted personal investigation. But let him bring to the study a natural system or plan, based upon eternal and unchangeable ideas,—a plan by which all prior observations may be classified, and every fact may be arranged in its proper place, as an illustration of the Divine Thought,—and it will be strange if he does not find much that had been mysterious, made suddenly intelligible, and difficulties that had seemed insurmountable, suddenly removed. The labors of modern metaphysicians have been principally valuable as tending to develop such a system.

137. [The question has often been discussed, whether the Mind ever loses its consciousness. Though the full consideration of this inquiry would involve an investigation into the substantive nature of mind, and its full solution by us is therefore absolutely impossible, it is worthy of some attention, even if it yields no other result than a determination of the true position and dignity of Consciousness.

138. In a sound, dreamless sleep, we give no external manifestation of intelligence or activity, and on awaking we have no recollection of any train of thought that has occupied our minds. But even in slumber the most profound, a loud noise, any application that causes physical pain, or a sudden change, whether of motion, temperature, position, or other external circumstances, gives manifest evidence that the internal watchman never

slumbers, but is at all times ready to receive any impressions that are sufficient to stimulate the wearied nerves into action.

139. Consciousness has been sometimes regarded as only one of many distinct faculties of Mind, and an attempt has been made to show that mental operations are often carried on without our knowledge.* It has been said, for instance, that when we are absorbed in a train of thought, we may hear a clock strike without being conscious of it,—or we may read long passages aloud without being conscious either of the matter or meaning of the author, or even of the exercise of our vocal organs. There are also authentic cases reported of soldiers marching, and of stenographers reporting evidence and debates while they were asleep, and therefore, it is said, in a state of entire unconsciousness.

140. Such instances, however, are evidences only of forgetfulness more or less entire, and they tend rather to prove that Consciousness is always active even during the greatest physical torpor, than to show that it is ever wholly absent. The mind may be so fully absorbed that we do not hear the striking of a clock, but if we do hear it, we must at the moment know that we hear it, though it may produce so slight an impression that we may forget immediately afterwards whether we heard it or not. So in reading or writing, we must know at the time that we recognize the form of every word, though the words themselves convey to us no idea of their meaning, and leave no trace upon our memory.]

141. As all scientific investigation should exclude from the field of its inquiry everything that is known to be beyond its reach, and everything that is merely speculative, we should, if possible, so limit the terms that we employ, as to confine our researches strictly to the territory that we may reasonably hope to explore. In accordance with this principle, the Natural Philosopher, because he cannot conceive of matter apart from impenetrability, inertia, and extension, defines matter as a substance impenetrable, inert, and extended. In like manner, as we cannot conceive of mind, either as possessed of any of the attributes of matter, or as devoid of consciousness, we may define it as *the form of immaterial substance, which is manifested in Consciousness.*†

142. The acquisition of isolated facts is the earliest, easiest, and simplest form of pro-

* For a good presentation of the argument in favor of this view, see Wayland, pp. 110–118. Rauch says, pp. 110, 115, "Yet Consciousness is not annihilated, but continued as dreams indicate, and as the possibility of awaking at a certain hour sufficiently proves. . . . . The mind sleeps; it is for a time in a state of unconsciousness, while at the same time it has not in the least lost its consciousness; this has only become latent, or is for a time veiled."

† "We not only feel, but we know that we feel; we not only act, but we know that we act; we not only think, but we know that we think. . . . . Consciousness is this interior light which illuminates everything that takes place in the soul; Consciousness is the accompaniment of all our faculties, and thus to speak, their echo." *Cousin: Hist. of Mod. Phil.*, Vol. I, p. 322.

gress in knowledge. These facts, as soon as they are appropriated, excite curiosity, or a desire to know more. This Curiosity is a stimulus to mental exertion.

143. Influenced by the awakened stimulus, the mind acts somewhat blindly and confusedly at first, yet sufficiently to show that it has in itself an inherent and independent power of action. In the simple exercise of his active powers, without any definite object or aim other than the gratification of a capricious will, the child finds an inexhaustible source of enjoyment.

144. As mental development proceeds, we become conscious of a higher power than that of mere activity,—the power of intelligence, which involves the comprehension of truths, relations, and laws.

145. Hence we are naturally led to the study of Consciousness under three distinct forms of manifestation:

1. As a stimulus to exertion, acted upon by external influences. To this form of Consciousness we have given the name of MOTIVITY.

2. As acting of its own accord, free from any extraneous impulse, and stimulated only by its own conscious Motivity. To this form of Consciousness we have given the name of SPONTANEITY.

3. As operating intelligently for the discovery of truth. This third and highest form of Consciousness, to which Motivity and Spontaneity should be both subservient, we have called RATIONALITY.

146. If this division is admitted as being founded in necessity, or even as being natural or appropriate, it is desirable that the respective limits of the three Conscious Forms should be clearly defined and understood, and that we should carefully avoid attributing to either, an influence which it does not properly possess.

147. We might for instance, naturally suppose that Motivity is subject to the direct supervision of Spontaneity and Rationality, and that therefore it may sometimes be subjective both in origin and tendency. Indeed, it may be asked, if our motives are not thus under our control, how is it possible to believe or imagine that we are in any way accountable for our actions?

148. In answer to this question it may be remarked, that we rarely attach any sense of responsibility to our motives, but only to the acts themselves, so far as they are spontaneous or voluntary. All our motives are good, if they are not allowed an undue authority, and it is a part of the province of Spontaneity, aided by Rationality, to determine the amount of influence that we will accord to each. The question of responsibility does not concern creatures of blind fate or necessity, and it can have no reference to man so long as he is irresistibly impelled by any external force, but so soon as he is able to withstand the impulse, and he begins to deliberate, he becomes accountable. In the majority of

cases we are urged by two or more motives acting simultaneously. We may for instance feel at the same moment, an inclination to physical exertion, a desire to employ that exertion in appropriating something to our own use, and a conscientious conviction that the appropriation would be wrong, because the article desired is already the property of another. No blame can be attached to us for either of these three motives, but if our Spontaneity decides to act in accordance with the inclination and desire, and in opposition to the conscientious conviction, we shall feel self-condemned, and responsible for the improper exercise of Spontaneity.

149. Motivity is blind, involuntary, impulsive,—Spontaneity should be always watchful, cautious, deliberate. Motivity is never subject to our control at the moment of action, or in other words, we can never dictate the character of the motives that shall suggest themselves to us on any given occasion. No man by any effort of will or reason, can make the influence of all his motives such as he would like, or such as according to his rational convictions, it ought to be. If we desire to correct our errors, to reform our habits, or to alter our character, the proper way to effect the change, is by exposing Motivity to such objective influences as will tend to strengthen or weaken its particular manifestations.

150. Spontaneity and Rationality can act on Motivity only indirectly. If Spontaneity is sufficiently strong or deliberate to resist in a single instance, a motive which from indulgence has acquired undue strength, the motive will be weakened, and each new successful resistance will diminish its influence in a greater degree, until finally it will cease to operate improperly. In like manner, a motive that is too feeble, may be made efficient by a strong or deliberate volition, and by habitual exercise, it may be strengthened to any desirable extent. In these cases, Spontaneity does not act on Motivity, but in its proper sphere of restraining our impetuosity, and calling upon Rationality to deliberate between our varying inclinations, it provides a way by which Motivity may receive the proper objective bias.

151. If Spontaneity is weak, so that under the influence of strong Motivity it becomes precipitate, virtuous sentiments and desires will still exist, however feeble, and Spontaneity may strengthen them,—increasing at the same time its own efficiency,—by forming the habit of deliberate circumspection, by avoiding temptation, and by seeking proper employment, suitable associates, and such other circumstantial aids as Rationality may suggest, or the sense of duty may indicate.

152. It is doubtful whether there is ever any action of Spontaneity without a motive. In most cases, indeed, in all cases that involve any question of moral right or wrong, a variety of motives are presented in connection. If they all incline to the same course of procedure, Spontaneity will act instantaneously. If there is a conflict among them,

Spontaneity has the power, and it should exercise the power, of waiting for deliberation. If proper deliberation is used, its final action will always be in accordance with the conscientious motive, and with the convictions of Rationality.

153. In these powers of Spontaneity consists our Freedom of Will. We may not be free to act without motives, or contrary to our motives, or even contrary to the strongest motive. But we have the power of discerning in all cases which *ought to be* the strongest motive,—the power in most cases, of deliberating between conflicting motives, and delaying the too violent (and therefore vicious), until the feebler virtuous motive can assert its supremacy, thus determining which *shall be* the strongest motive,—and the power of exposing ourselves to external influences that will operate on our Motivity for the formation of virtuous habits. For the proper exercise of these powers, we undoubtedly are, as we feel ourselves to be, responsible and accountable.

154. As upon a cursory view, the action of Motivity sometimes seems to have a subjective origin, so may the tendency of Spontaneity often appear objective. Indeed, most of our actions are upon objects,—the very brain that we use as the organ of thought, the nerves that convey our physical volitions, and the muscles that serve as the instruments of our will, being objective when considered in their relations to the mind.

155. But the tendency and end of Spontaneity considered in itself, is merely our personal gratification. Considered simply as active beings, we are conscious of nothing but our activity, which is purely subjective. Rationality alone can take note of any external objects, or declare that our exertions produce any objective effect, and it is only because of the intimate connection of Rationality and Spontaneity,—part of the province of the latter, in aiding its own determinations, being to call for the decisions of the former,—that we could ever suppose Spontaneity to be, like Rationality, subjective-objective.

156. We have said that Spontaneity should be deliberate. By this we mean that Spontaneity should call Rationality to its aid, on every occasion of conflicting motives. Deliberation is not one of the offices of Spontaneity, except inasmuch as it involves the faculty of attention, but under the influence of the conscientious motive that declares the duty of deliberation, Spontaneity may become attentive, and excite Rationality to deliberate. Rationality is the judicial, Spontaneity the executive power. The former expounds and interprets laws that are based upon eternal necessity, and revealed by Divine Benevolence,—the latter, when in the proper performance of its functions, governs all its operations by those laws.

157. Here again we have another apparent tendency inconsistent with our principles. If Rationality decides, and Spontaneity acts according to the decision, it may appear that Rationality tends to determine the exercise of Spontaneity, and is therefore subjective-subjective. But if we reflect, we shall perceive that Spontaneity has determined, before

appealing to the tribunal of Reason, to act in accordance with the motive which ought to be the strongest, according to the convictions of Rationality. Rationality makes its objective decision on the questions propounded to it by Spontaneity, and its office is then accomplished. Spontaneity makes use of the decision, and if its determination has not been changed in the meanwhile by a new intervention of Motivity, calling for a new exercise of its powers, it makes that the strongest, which might otherwise have been the weakest motive.

158. The immediate origin of Rational action sometimes appears objective. In perception through the senses, if we regard Perception as a rational faculty, it is not always easy to perceive any intermediate action of Motivity or Spontaneity, between the physical impression upon the nerves, and the intelligent perception. But if we examine closely, we shall probably find that in every instance, the spontaneous faculty of attention is aroused, before any perception can take place.* If the attention is wholly absorbed, pictures of passing objects may be painted upon the retina in the most glowing colors, the waves of sound from the most soul-thrilling melodies, may beat their tattoo on the drum of the ear, the pores of the sensitive skin may be closed by cold, or opened by sweltering heat, without exciting perception, the impression upon the consciousness being insufficient to divert the action of Spontaneity, so that Rationality may assign to the impression an objective validity. If amidst this absorption, we are suddenly startled,—as for instance, by a vivid flash of lightning, the near report of a cannon, or a violent blow,—we have first a confused consciousness of disturbance, to which succeed a motive desire to understand the cause of the disturbance, and a spontaneous act changing the direction of the faculty of attention, followed immediately by a rational objective perception.

159. In every instance of the recognition of a physical object, the process appears therefore to be,—first, an impression on the brain through the nerves,—second, if this impression is sufficiently strong, a simple and at first confused consciousness of that impression, exciting Spontaneity through the intervention of Motivity,—third, a rational perception of an object. Between the objective impression and the objective determination of Reason, an objective-subjective act must invariably and necessarily be interposed, otherwise the action would be merely objective-objective, and as such it would be entirely excluded from the sphere of Consciousness.

160. Because perception follows the impression on the sensitive nerves, without any apparent interval, it is not strange that we should think it impossible for any other mental

* St. Jerome, quoted by Sir William Hamilton, Reid's Works, p. 877, says: "Quod mens videat et mens audiat, et quod nec audire quidpiam nec videre possumus, nisi sensus in ea quæ cernimus *intentus*, vetus sententia."

Sir William Hamilton makes "an act of *Attention*, however remiss," the first condition of perception.

operation to intervene. But when we observe the rapid movement of the fingers in a skilful pianist, or the marvellous facility of computation in an experienced accountant, and reflect that each motion, and each addition, requires a distinct volition, we may readily conceive that Motivity and Spontaneity may have time to act between the consciousness of the sensible impression, and the perception of the object from which that impression originated. And if we watch the earliest developments of the perceptive powers in an infant, we can hardly fail to be convinced that a desire to interpret the unknown affection of Consciousness, precedes every distinct perception. If we find such a precedence in but a single instance, it will furnish a strong presumption that the order we have indicated is the natural one, and that it is only because it is habitual, that we fail to detect it in every case.

161. However philosophical the division of Consciousness into Motivity, Spontaneity, and Rationality may be, as a basis for the classification of the mental faculties, the division is one, as we have seen, that can never fall purely under our observation, but it is rather a rational determination *a priori* of necessary states, like our conception of matter, which is derived from the consideration of mixed and varying phenomena or qualities. Our ideas of the three Conscious-forms may however be made more distinct, definite, and adequate, than our ideas of matter or its primary attributes, and therefore the science of mind has a more impregnable foundation than that of matter. Whether upon that foundation a metaphysical superstructure will ever be erected, more beautiful and complete than our present congeries of physical sciences, is a question for the future to solve.

162. Consciousness is so far a rule to itself,—the mind is so multiform in its infinite variety of capability, that we might plausibly demand even more latitude in our attempts at defining and comprehending its divers characteristics, than we so readily allow to every student of the more precisely marked forms of less versatile material nature. We have however no occasion for any such demand, for the science of mind, at least in its foundation, is not only more precise and definite, but it is also more substantial than that of matter. We use the term substantial in its primitive meaning, as indicating an approximation to the perception of that which underlies the phenomenal or accidental. From the necessary relations of the subjective and objective, we have already deduced the three classes of mental activity, which correspond to Motivity, Spontaneity, and Rationality. Does this deduction fail in any respect, of being exactly and rigorously scientific? The distinction into the subjective and objective is real and definite,—the four classes which indicate the progress of activity from its origin to its termination, are exhaustive and positive,—the first of these four classes (the objective-objective), is of course excluded from any connection with the subjective, the three classes remaining are distinctly characterized, and harmonize wonderfully in their significance with the three modes of mental development. What more need we desire?

CHAPTER V.

KNOWLEDGE AND FAITH.

"Are those who would make man the measure of all things, sure that they have found man's true measure?"
The Patience of Hope: Boston ed., p. 84.

163. The object of every science is the discovery of truth.

164. In many investigations, as for instance in the propositions of Geometry, we arrive at results which it is impossible to doubt,—results which are recognized as necessary by every one who can understand the train of reasoning by which they were obtained. The argument which conveys this necessary and universal conviction, is called demonstration, and the sciences which are built upon demonstration are called exact sciences.

165. But in the inquiries which are of the most general interest, such as the character of our own being, our relation to our fellow-men and to the universe in which we are placed, our duties and the proper mode of determining them, conflicting opinions are held and zealously maintained. Demonstration of mental and of moral truth seems unattainable, and if we seek for illumination from the writings of metaphysical philosophers, we can hardly fail of being led into skepticism or universal doubt, and we may esteem ourselves fortunate, if we are able to pass over the abyss of doubt into settled conviction, or even into partial belief.

166. Two and two make four. The three angles of a triangle are equal to two right angles.

167. These two propositions are mathematical truths, the first being an axiom or self-evident proposition, the other a theorem or demonstrable proposition. Every intelligent person accepts them without hesitation, and without requiring a strict definition of all the terms employed. The meaning of two, three, and four, of angle, right angle, and triangle, is supposed to be sufficiently obvious, and such questions as "How do you know that two is always two?" "How do you know what an angle is?" would be generally regarded as indications of impertinence, or insanity.

168. Every effect must have a cause. God is. The soul is immortal.

169. These three propositions are all metaphysical. We may not perhaps be able to decide upon their truth or falsity, until we have obtained satisfactory answers to questions like the following. What is an effect? What is a cause? What is God? What is the soul? What is immortality? How do we know that an effect must have a cause,—that there is a God,—that the soul is immortal?

170. There is, then, a difference in the character of propositions that may be presented for our consideration. In what does this difference consist? Why do we require a greater amount of information, and a closer investigation in one instance than in another? What are the characteristics of truth, and on what authority can we rely as the arbiter of certainty? What is the nature of fundamental truth, and in what manner should we proceed to increase our knowledge, by the comparison of fundamental truths?

171. The most obvious knowledge is that which is purely sensual.

172. Whatever views we may hold with regard to our spiritual nature, or the object of our being, we cannot overlook our intimate connection with the material universe. That connection is maintained and recognized by the five senses, which we possess in common with many of the inferior animals. The evidence of the senses is purely personal. We neither require any higher authority than ourselves to decide whether we really see and feel, nor can we admit any right or possibility inherent in any superior being, to give validity to our sensations. If a ball is placed in my hand, I may question as to its nature, the nature and attributes of matter, the relation which exists between the ball and my perceptions, the mode in which a knowledge of its existence is conveyed to my brain, but I cannot doubt,—in other words, I know that I see and feel,—that there is a something, —call it matter, force, spirit, or whatever you will,—that produces sensations, the aggregate of which I define by the term sphere.

173. Among the most obvious ideas suggested to us by the senses of touch and sight, are those of form and proportion. The idea of proportion is also conveyed by the ear, since all harmony requires that a determinable mathematical relation shall exist between different vibrations. We have also other sensual ideas, such as those of light, color, heat, taste, smell, between which it is more difficult to discern any general connection. But even in some of these the laws of proportion are traceable, and if the undulatory theories of light and heat are correct, nearly all the impressions of our senses may be subjected to mathematical calculation.

174. Mathematics may be defined as "the science of form and proportion," proportion including the idea of number. Its demonstrations are obtained by observing the relations between certain axioms, or self-evident truths. The relations, as well as the axioms themselves, must be self-evident, and they are self-evident because all sensual perceptions are self-evident, there being no tribunal conceivable higher than ourselves to which they can be referred for decision.

175. It is true that most of the propositions of pure mathematics are abstract and general. There is therefore a mental effort superadded to the sensible impression. But this effort is made by ourselves, in our own right, and constitutes a part of the judgment from which no appeal is either possible or desirable. Thus the abstract idea of two, is

part of the impression conveyed to the mind by the sight of two objects, and we can employ that idea in any train of reasoning, with the same unhesitating confidence as we give to the simple original perception of two distinct objects.

176. From these considerations we may discover a sufficient reason for the implicit faith that we place in mathematical axioms. Without stopping for the present to inquire whence the power is derived, we know that there is a power inherent in our own nature, by which we perceive their truth. They constitute a part of our immediate perceptions, and each individual is necessarily the only judge of what he himself perceives.

177. It is often said that our senses deceive us. Is this assertion true, or is it our judgment that deceives us, and are we led into error by a hasty or improper exercise of our own powers?

178. Let us suppose the following question propounded to a person of sound faculties and mature judgment, but one who is entirely ignorant of chemistry, and of the results produced by the mixture of different ingredients.

"If I were to mix two quarts of one fluid, with two quarts of another fluid, how much would there be in the whole?"

The answer would probably be, "Four quarts."

"How do you know that there would be four quarts?"

"Because two and two always make four."

179. But it could be easily shown, by mixing two quarts of sulphuric acid and two quarts of water, that in consequence of the chemical affinity existing between the liquids, a condensation would take place, so that there would be less than four quarts of the mixture. Whence then did the error of opinion arise?

180. Certainly not from the mathematical axiom, for our confidence in its truth would still be unshaken, but from a hasty judgment, and from losing sight of the precise meaning and extent of the axiom.

181. Suppose again the following conversation with a man well versed in plane geometry, but entirely ignorant of the nature of spherical triangles.

"To what is the sum of the three angles of a triangle always equal?"

"To two right angles."

"Would it be possible to construct a triangle, in which the sum of the angles would be either greater or less than two right angles?"

"It would not?"

"Are you sure of this?"

"I am, as sure as I am that two and two make four."

"And yet, as I will show you upon this sphere, we may describe a triangle, in which

the sum of the angles shall be nothing, another in which it shall be equal to six right angles,* and others in which it shall be equal to any quantity we please, from 0° to 540°."

182. This conversation and experiment would not weaken the belief in the truth of the original proposition, as it had always been understood. It would merely show that the judgment had assumed too much, or that the definition of the term "triangle" was too limited, and that the proposition was true only of rectilinear plane triangles. It would also show that demonstrable truth may lead us into error, if it is not perfectly understood, and if its full extent and limits are not properly recognized. Hence the seeming paradox, that a thing may be proved true, though it is absolutely false.†

183. Of a similar character are the errors which we attribute to the senses. The nerves connected with each organ of sense are designed to convey certain appropriate

* This statement is true only in the sense in which the Calculus disregards differentials. In order that there may be an angle at the junction of any two sides of a spherical triangle, each of the three angles must be less than 180°, but it may differ from 180° by a quantity less than any assignable value, therefore it may virtually be regarded as equal to 180°. The algebraical fallacy in the following note, shows that it is not always safe to disregard differentials.

† The following algebraical demonstration that 1 is equal to 3 will illustrate my meaning.

$$\text{Let } x = a$$
$$\text{Then } x^2 - 2ax + a^2 = x^2 - 2a^2 + a^2 = x^2 - a^2$$
$$(x-a)(x-a) = (x-a)(x+a)$$
$$x - a = x + a$$
$$x = x + 2a = 3x$$
$$1 = 3$$

The error in this case consists in assuming that any factor which has no value, can be used as a factor in determining the numerical value of a quotient.

Peter Barlow (*Elementary Investigation of the Theory of Numbers*, London, 1811, Prop. IX), demonstrates that "the sum of any number of prime numbers in arithmetical proportion, is a composite number." He overlooked the arithmetical series 1, 2, 3, in which $1 + 2 = 3$, and $2 + 3 = 5$,—both 3 and 5 being prime numbers. With this exception, the demonstration is perfectly rigorous.

Prof. Pierce (*Mathematical Monthly*, October, 1858), gives a number of "Propositions on the Distribution of Points on a Line," all of which are rigorously true in their intended meaning; but in some of the cases, it is necessary either to suppose that the line is straight, or that the distances between the assumed points are measured *on the line*, and not in the direction of one point from the other.

Such instances in the "exact" sciences, teach the necessity of a precise understanding and exposition of the principles, as well as of all the relations involved in any train of reasoning. The very possibility of error is a proof both of liberty and of imperfection.

We can reason only about that which we can define, and we can define any proposition only as it is comprehensible to us. All contradictions and errors can probably be traced to errors of definition. It may often be seen by impartial observers, that two disputants are both right, and that they differ only because each does not see the phase of truth at which the other looks.

sensations to the brain. If I press upon the ball of my eye, the optic nerve will convey the impression of light to which it is adapted. If the bloodvessels of the head are unnaturally distended, so as to compress the auditory nerve, that nerve will also convey the only impression of which it is susceptible, that of sound. There can be no possible doubt of the reality of the impressions or sensations, but there may be a doubt as to the cause of those sensations. If the judgment is made hastily, and without due regard to all the circumstances which ought to be taken into consideration, it will probably be erroneous.

184. The healthy optic nerve not only perceives the rays of light, but also the direction in which they come. The mind perceives that distant objects are more indistinct than those that are nearer. Therefore, if anything is seen which subtends a small angle, but is very indistinct, we may naturally suppose that it is a large object; whereas, if it had been perfectly distinct and subtended the same angle, we should have judged it to be very small. Our judgments formed in this manner may be generally correct, but they will not be infallible, unless the cause of the indistinctness is perfectly understood.

185. If we could conceive that any object at which we were looking actually touched the eye, we should think it exceedingly diminutive. If we supposed it to be within the eye, at the intersecting point of the rays from the top and base, it would seem to be a mere point; and if we could possibly fancy that it was near the retina, we should believe that it was reversed.* There are, therefore, various ways in which a judgment, based either on the evidence of our senses, or on mathematical axioms, or on propositions demonstrably true, may be deceptive, but in every instance our error will be found to arise from a partial or improper use of some of our faculties.†

186. All deception is a virtual lie.

187. If I place in the hands of a pupil a book in which the words are so far perverted from their usual meaning that he cannot fail of receiving a false impression, and if, al-

* Prof. Liedenfrost's case of the young man who first received his sight when he reached his seventeenth year, and to whom all objects at first seemed inverted, can be easily explained on this principle. See *Wayland*, p. 76.

† A great deal of needless obscurity has been thrown by some writers about the subjects of erect and binocular vision. If we looked merely at the images on the retina, we could not fail of seeing two images, both inverted. But the simple hypothesis that we look at the objects themselves, and that the eye informs us correctly of the direction of the luminous rays that proceed from all parts of the object, is not only entirely consistent, but it removes all difficulty. Then, if our judgment fixes the relative position of the object accurately, its size, outline, and solidity will be determined with mathematical precision.

It would be well for philosophy to get rid of the idea of images, as entities distinct from the objects themselves. Whether the rays of light come to the eye from a reflecting, or through a refracting medium, they come from the object that is seen; and it is as proper for us to say that we see *ourselves* in a mirror, as to say that we see a star through a telescope, a stone under water, or a cloud in the air. In each case the rays of light are diverted from a direct course, and it is the office of judgment to determine the extent and cause of the diversion.

though conscious of that perversion at the time, I do nothing to correct the false impression, I deceive him,—I lie to him; and my guilt is as great as though I had communicated the falsehood to him verbally.

188. But if I merely give him a work written in a foreign language with which he is somewhat familiar, and if he falls into error through carelessness in consulting his lexicon, or in the use of a faulty grammatical construction, the error is no longer mine. I have been truthful, but he has been guilty of a mistake. The mistake has arisen from an improper use of his free agency.

189. We are all pupils in the school of the universe.

190. The Power that gave us being has created us with a certain physical organization and certain spiritual faculties, by means of which we are connected with the physical and spiritual world. If the natural and proper exercise of any one of the faculties leads us into error, the responsibility of that error rests with the Creator, but if we are deceived by an improper use of our powers, we alone are responsible.

191. All that is self-evident is, therefore, true. All truth is a revelation from God. Revelation is perfect and continual. It is not confined to mere words, times, or localities. It is uttered in a language that all can understand, at all times and in all places, where a Soul is found capable of receiving it. It comes in music to the ear, in beauty to the eye, in symmetry to the touch, in perfume to the smell, in pleasant savor to the taste, in truth to the mind. It is independent of human agency and human laws, its truthfulness depending on the highest conceivable authority, the word of the Almighty.*

* Some objection may perhaps be made to the use of the term Revelation in this broad sense, but I know of no other term that will so well express the "unveiling" of eternal and necessary truths. Since the days of George Fox, the belief has become general among different denominations of Christians, that our conscientious convictions of duty are immediately revealed to us by the Holy Spirit; and as it cannot be doubted that our fundamental beliefs are implanted in us by the Creator, I can see no impropriety in classing them with other and higher revelations from the same authority. He who most fully recognizes the indubitable character and Divine origin of the faith on which all his knowledge rests, will be best prepared to perceive that reason without faith is a delusive guide, and that the revealed records contained in the Holy Scriptures, appeal to a higher and more authoritative portion of our spiritual being than the logical faculties,—in other words, that Faith is higher than Reason.

St. Augustin and Luther speak of our primitive beliefs as acts of faith,—Reid, Stewart, Degerando, Jacobi, Cousin, and others, call them revelations or inspirations. See *Reid*, pp. 760–1.

"That philosophy is the only true, because in it alone *can* truth be realized, which does not revolt against the *authority* of our natural *beliefs*.

'The voice of Nature is the voice of God.'"

"Consciousness is to the philosopher, what the Bible is to the theologian. Both are professedly revelations of Divine truth." Hamilton, *Discussions*, pp. 69, 90.

"Let every good and true Christian understand that truth, wherever he finds it, belongs to *his* Lord. . . By

192. Imperfections of language, dulness of comprehension, hastiness of judgment, argue no defect in our powers of perception. In explaining to others a truth that we clearly perceive and know, we may inadvertently convey a wrong impression, in consequence of a want of precision in our words, but we do not thereby detract from the truth *as it is perceived in our own minds.* To take one of the examples already adduced: if I state the proposition that the three angles of a triangle are always equal to two right angles, my neighbor, from his confidence in my knowledge of the science of geometry, may believe my statement, and may erroneously suppose that the proposition is true of spherical triangles. The idea, however, as it exists in my own mind, being founded on self-evident relations between self-evident propositions, is incontrovertibly true, the error arising from the fact that my neighbor embraces spherical triangles in his definition of triangles, while I do not.

193. His error is one of mere belief, not of knowledge. He would hardly say that he *knows* the sum of the angles of a spherical triangle is equal to two right angles, and if he should say so, he could assign no better reason than his confidence in my assertion, an assertion that he misunderstood, and he would thus show that by the term knowledge, he merely meant confident belief.

194. All error is merely of belief. It is always based on truth, and in a certain sense, may be said to represent partial or possible truth. It would be adopted by every mind that reasoned from the same data, for it may be laid down as a law of our nature, that if a series of facts or arguments be presented in precisely the same order, under the same circumstances, and with the same degree of relative strength, to two different individuals, they will both deduce the same conclusions. But if one perceives any relations which are obscure to the view of the other, a difference of opinion will immediately arise.

195. Let us briefly recapitulate the postulates we have endeavored to establish.

196. All our faculties are implanted in us by the Creator. Every opinion that is formed necessarily and irresistibly, from the use of those faculties, must be true, and may be regarded as a revelation from God, with as much propriety as if He verbally assured us that it was true. Therefore every proposition that is self-evident, or that is traceable through a series of self-evident relations to one or more axioms is true, and constitutes a

whomsoever truth is said, it is said through His teaching, who is the truth." St. Augustin, quoted by Butler, Vol. II, pp. 43–4.

"The objections made to Faith are by no means an effect of knowledge, but proceed rather from ignorance of what knowledge is." Bishop Berkeley, quoted by Mansel.

"It is not improbable that the writings of Proclus were indebted to Christianity for a term that occurs with peculiar frequency in them,—the term πίστις, or faith, which Proclus regards as direct communion with the Infinite and Absolute, and the highest faculty of the human soul." Butler, Vol. II, p. 330.

portion of our absolute knowledge. But every proposition that is based either wholly or in part, on data that are not fully comprehended, or on ideas the necessary truth of which is not clearly evident to our own minds, may or may not be true; it can only form a portion of our belief, and our belief will be stronger or weaker, in proportion to the number of self-evident truths, or of mere probabilities, that enters into our chain of reasoning.

197. The revelation or immediate judgment is always necessary and infallible, but partial,—expressing a decision only on the premises that are laid before it. The ultimate judgment is more subject to our control by study and care. The man who has fully investigated all his premises, as well as all their relative bearings, will be less in *error* (so far as his positive knowledge is concerned), even though his conclusions may be *farther from the truth*, than those of another who decides hastily and without investigation, but rather from prejudice. This thorough investigation of all the details of our belief is impossible. We are necessarily and properly compelled to place great reliance on authority, and "we should have so much faith in authority, as shall induce us to repeatedly observe and attend to that which is said to be right, even though at present we may not feel it to be so."*

198. The perception of spiritual existence has generally been regarded as one of the characteristics that distinguish man from the lower animals.†

199. If this perception is in reality a distinctive mark of human nature, it should be possessed most highly by those who have the highest spiritual culture.

200. In each faculty of our merely animal nature, there are many of the lower animals which surpass us. Acuteness of vision, quickness of scent, readiness of hearing, are qualities that mark birds and beasts of prey, rather than man. But superior skill, judgment, the capability of indefinite mental development, intellectual and reasoning power, belong to man, if not exclusively, at least in a higher degree than to any other animal.

201. Every faculty, sensual or spiritual, is susceptible of culture. The trained hound will follow the scent of game more steadily than one that is wholly unused to the chase; the educated musician is more sensitively alive to the slightest discord, than the tiro; the thorough mathematician will immediately detect an error of demonstration that would escape the notice of an elementary student.

202. Which of our faculties are the most fully developed, the most diligently and thoroughly educated?

203. The senses and the perceptive faculties whose principal office is merely to take

* Ruskin; *Modern Painters.*

† Solly says (p. 8), "It is the essence of an intellectual nature, to be able to convey its results only to a similar intellectual nature." This is one of the many postulates that lead to the recognition of a Supreme Intelligence.

cognizance of the sensual ideas, are earliest called into action, and during the whole life they are incessantly employed. We see and feel and hear at all times, and nearly at all times our thoughts are engaged with what we see or feel or hear. With the mass of mankind, how small a portion of mental activity is devoted to the consideration of subjects not immediately connected with the daily routine of business. Even the professed student cannot divest himself of any portion of his corporeal nature;—he cannot often even feel that the spiritual maintains an ascendency over the physical.

204. The animal man therefore becomes fully developed by constant exercise; the spiritual man is developed only by a casual and interrupted education. Sensual or animal ideas are therefore the most familiar, and the most perfectly understood; spiritual ideas are but imperfectly comprehended, and are generally wrapped in obscurity and doubt.

205. This is an evident cause of difference in the character of simple propositions. Whatever is discerned by the senses, or by the perceptive faculties through the medium of the senses, is so familiar as to be self-evident, and as we readily see that we are the only possible judges of what we ourselves perceive, we never think of questioning physical axioms. But whatever is spiritually discerned, being somewhat obscure and strange, we are led to question not only the entire perception, but to scan every point that has any connection with it, and to seek for some authority out of ourselves, for that which hardly seems to be a part of ourselves. That authority, as we have already seen, is our Creator, but we can appeal to His authority only for that which becomes to us individually self-evident. Spiritual knowledge, therefore, can only be possessed by those whose spiritual culture approximates nearly to the ordinary physical culture of mankind, but spiritual belief or faith may be cultivated by every one.*

206. It is evident to every student of mathematics, that the theorems and axioms bear such a relation to each other, that if the theorems be assumed true the axioms can be demonstrated. We might readily conceive that beings with a higher order of intelligence than our own, would view the most abstruse propositions of geometry as simple axioms, and we might possibly imagine a mind so constituted that our ordinary theorems would be self-evident, while our ordinary axioms would require demonstration.

207. These supposable cases we find actualized in the study of mind. So different is the constitution of different individuals, that a spiritual truth may be self-evident to one

* "The moral sense indicates that which is above itself, and beyond itself; therefore, if it be our rule to follow always the course of thought, we must now go forward at this suggestion, and it leads us directly to the conception, however vague, of AN AUTHORITY to which we are related. This conception, under all imaginable distortions, has accompanied human nature,—invariably it is the instinctive belief of man. . . . The idea of AUTHORITY, or of a relationship between two beings, each endowed with intelligence and moral feeling, supposes that the *will* of the one who is the more powerful of the two has been in some way declared." *Taylor: World of Mind*, p. 94.

that seems doubtful to another, while other truths may be clearly perceived by the second that are very obscure to the first. For this difference of perception there seems to be no remedy, and hence it is impossible to frame any system of mental science that shall commend itself equally to all.

208. But if each individual would study carefully the workings of his own mind, he would probably find that the same extent of truth is attainable in metaphysics as in mathematics, and that all the great problems of our spiritual nature, and of spiritual existence in general, are as indubitable as the simplest propositions of geometry, provided we pursue our investigations with the requisite diligence.*

209. To one man it may be self-evident that there can be no effect without a cause, and it may also be self-evident that intelligence is the highest possible cause. If he compares these two axioms, he will demonstrate to himself, from their self-evident relation, the existence of an intelligent God, and the demonstration will be entirely and mathematically rigorous.

210. To another man the existence of an intelligent Deity may be demonstrable by the comparison of other truths, which are his axioms, while to a third, the Divine existence may itself be axiomatic. But it can hardly be expected that the train of reasoning adopted by either of the three, will be satisfactory or conclusive to the others, for that is self-evident to one, and therefore incapable of proof, for which the mental constitution of another requires demonstration.

211. The investigation of spiritual truth is therefore full of intricacy. The best spiritual guides are but imperfectly acquainted with the way in which they would lead us, and we must consequently learn to place dependence on ourselves, or rather on the revelations that may be made to us. Self-evidence, as we have seen, is the only test of knowledge, and whenever any truth, simple or complex, becomes self-evident, or is the self-evident result of various self-evident relations, we shall feel that no one can deny it. If any profess to disbelieve it, we shall know that they do not comprehend it, and if any chance to assert that they know it is false, we shall know that they do not understand our meaning.

* Cousin gives the following as instances of metaphysical axioms. "Quality supposes a subject, succession supposes time, body supposes space, the finite supposes the infinite, variety supposes unity, phenomenon supposes substance and being." *Hist. of Mod. Phil.*, Vol. II, p. 283.

CHAPTER VI.

CHARACTER AND LIMITS OF BELIEF AND CERTAINTY.

212. We must be careful to distinguish between *knowledge* and *belief*, for whatever we *know* can never be denied by any one else, but our *belief* may be modified by errors that have been inadvertently admitted. Knowledge is uniform,—belief is manifestly various; the knowledge of one age can neither be falsified nor weakened by the discoveries of a subsequent age, but systems of belief have their rise and fall, and are constantly undergoing modification.

213. Is such knowledge as I include in my definition possible? Are there any facts which we can assert with absolute certainty,—without reference to our own constitution, or the constitution of things around us,—truths independent of all accidental circumstances, independent even of the power of Omnipotence, necessary, indubitable, incontrovertible? Most assuredly there are. We know that we have an existence, a personal being,—that we have certain sensations, thoughts, impulses,—that there is an existence exterior to ourselves, exerting an influence upon us, and capable of being influenced to some extent by us. If we are asked *how* we know all this, we can only answer that we know it,—that we have a faculty given to us by our Creator, which can perceive truth, and know it to be truth. Could that faculty receive any greater authority than it already has? We feel that it could not. We know that it could not. We may prove that it could not. Even without paying any regard to the source of its authority, we see that if any higher tribunal should attempt to strengthen our conviction, it must do so by appealing to this very faculty. In order to have any confidence in the teacher, we must *know* that he is authorized to teach; the final appeal is therefore necessarily to ourselves,—to our own power of knowing.

214. We are apt to confound certainty with demonstrability,—to think that some doubt attaches to all that cannot be proved. We hear much said, and deservedly said, in favor of mathematical science, and the rigorous exactness of mathematical reasoning.* We

* On the other hand, many writers have disparaged the study of mathematics. Hamilton says (*Discussions*, pp. 267–312), "If we consult reason, experience, and the common testimony of ancient and modern times, none of our intellectual studies tend to cultivate *a smaller number of the faculties, in a more partial or feeble manner than mathematics*. . . . The first authority is that of *Bernhardi*, one of the most intelligent and experienced authorities on education to be found in Prussia.

"'It is asked, *Do mathematics awaken the judgment, the reasoning faculty, and the understanding in general*

even meet with those, who claim for mathematics the honor of being the only branch of human knowledge that deserves the name of a science, and we may learn in history, that eminent philosophers have attempted to establish their systems on a mathematical basis,—systems of faith,—systems of religion,—systems of ethics,—systems of jurisprudence. We may even ourselves, have sometimes regretted that subjects which seemed to us of the most vital importance, should be veiled in obscurity, and we must therefore rest our confidence in them, solely on the authority of others. We may have longed for more light,—for a more confident belief,—for certainty, or at least an approximation to certainty.

215. But notwithstanding this longing,—this earnest cry of all humanity for more positive knowledge,—the world still believes that the relations of form and proportion, are the only ones that are susceptible of a rigorous and satisfactory analysis. Whatever its origin, this idea is certainly a mistaken one.

216. Even in mathematics, all things are not proved. The very idea of proof is merely the idea of some new truth, deduced as a necessary inference from the relations existing between other truths which had been previously recognized. If we were obliged to prove everything, we could prove nothing, for we could never have a starting-point. We must therefore recognize certain truths as self-evident; we have already discovered that there are such truths, truths that form the substratum of all our knowledge, and of all our belief,—the axioms of science. These axioms are not confined to mathematics, neither have mathematical axioms any greater certainty than any other self-evident truths. The axioms of our own existence, and of the existence of something independent of ourselves, have no mathematical characteristics, and yet they are as indubitable as the axiom that the whole is greater than a part. Every necessary conviction of the mind, every proposition that we receive unhesitatingly as true the moment we comprehend it, in other words, every self-evident truth, is incontrovertible, and every science that can be built upon such truths, and upon a correct perception of the relations that subsist between them, is a true science, and constitutes a portion of the absolute knowledge to which we are all capable of attaining.

217. There is, then, in the nature of things, no reason why we may not have metaphysical sciences, as well as physical sciences,—sciences of mind, of morals, and of law, as

to an all-sided activity? We are compelled to answer, *No;* for they do this only in relation to a knowledge of *quantity,* neglecting altogether that of *quality.* Further, *is this mathematical evidence, is this coincidence of theory and practice actually found to hold in the other branches of our knowledge?* The slightest survey of the sciences proves *the very reverse;* and teaches us that mathematics tend necessarily to induce that numb rigidity into our intellectual life, which pressing obstinately straight onward to the end in view, takes no heed or account of the means by which, in different subjects, it must be differently attained.'" Von Weiller, Klumpp, Goethe, D'Alembert, Descartes, Du Hamel, Arnauld, and others, are quoted in further illustration of our author's views.

well as sciences of number, of matter, and of form. We may, with as much reason, hope to discover valuable truths by observation and experiment in one case as in another; in the study of any subject that has never been investigated, as in following the beaten track of investigation. But where shall we seek for these truths, and how shall we build upon them after we have laid our foundation?

218. Our earliest knowledge, and, in the opinion of a certain school of philosophers, our entire knowledge is obtained, either directly or indirectly, through the medium of the senses. Long before we are able to express our thoughts, even before we know what it is to think, these busy observers are at work examining the objects around us, and storing our minds with the results of their examination. We are required by our very nature to place confidence in the information that they convey, and that confidence is never materially weakened by the experience of life, or by the arguments of theorists, who tell us we should not depend on the testimony of the senses, because they so often deceive us. Before we reflect at all on the distinctions of truth and falsehood, the sensual impressions have become indelible; they constitute, in fact, a part of our very being,—a reality that we can no more deny than we can deny our own existence. It is evident, therefore, that we can have no assurance with regard to any portion of our experience or belief without relying implicitly on these early impressions.

219. That implicit reliance we all have; it is necessary, irresistible. No arguments ever have been adduced, and we may be assured that none ever can be adduced, to weaken it. We know that the testimony of our senses is true. We know that there is something without us that is capable of exciting certain impressions within us,—that there are real existences, certain qualities of which are cognizable by the sight, the feeling, the hearing, the smell, the taste. What is the nature of external objects, we have no means of knowing, and with our present faculties we shall probably never be able to ascertain. Much as we may dispute with regard to real essences, greatly as we may obscure and confuse our ideas by the attempt to prove that mind is but the result of organized matter, or that matter is but a mode of universal mind, we never in reality doubt that the external world has a real existence. The senses, therefore, are capable of furnishing us with positive knowledge.

220. Prior, in all probability, to the reception of any external impression, there is an internal consciousness of being. It would seem almost necessary that the infant should know something of itself before it begins to perceive anything exterior to itself,—at least the power of perceiving must have an existence (and how can it exist without being known) before perception can take place. But waiving the question of priority as of comparatively little consequence, there are certainly facts of consciousness entirely independent of sensation.

221. We have appetites, passions, desires, sentiments, clearly defined and readily distinguishable from each other. In examining them, we feel that we are examining ourselves; that they are portions of ourselves,—different phases, as it were, of the same indivisible being. Do we ever doubt their reality? Do we ever feel that we may be mistaken in believing that we love or hate, that we fear or venerate, that we hope or despair? You answer, No, emphatically and without hesitation. We know that our own consciousness can never deceive us, and in that, at least, if nowhere else, may we find a sufficient refutation of the skeptical belief that we can be sure of nothing. We know that circumstances cannot affect the reality of our perceptions, that they neither weaken them nor exert any control over them. We find, then, in self-consciousness, a second source of positive knowledge.

222. There is still a third source in the apperceptions of reason. We have a faculty that furnishes us with abstract ideas,—ideas neither of sense nor of consciousness, although they may be first suggested in connection with other truths as the necessary condition of those truths. For example, from sense we derive the idea of body, and in connection with the idea of body, reason at once suggests the necessary and absolute idea of space. Sense discovers the finite, reason mounts to the infinite. Sense perceives the succession of phenomena, reason teaches the relation of cause and effect.

223. These ideas are all essentially distinct, and cannot be confounded with each other. We know that body could not exist without space; the finite without the infinite; the phenomenon without a cause; but we can easily conceive of space without body; of the infinite without any finite existence; of an efficient cause which has the power in itself of either manifesting its efficiency in action, or of remaining entirely at rest.

224. We know, also, that rational ideas cannot be derived from sense or from self-consciousness. We can neither see, nor hear, nor feel, nor smell, nor taste space or infinity or cause; nor can we conceive of them as parts of ourselves. And yet we feel and know that such ideas are types of actual and necessary existence,—that they represent important truths.

225. Besides the power of teaching abstract truth, and the kindred power of generalization, reason perceives the necessary relations of different truths, and is capable of leading us from the simple to the intricate,—from the clear to the more obscure. These relations, when they are plainly perceived, are seen to be unalterable, and founded in the necessity of things. Whatever may be the subject of our consideration, we proceed irresistibly from one conclusion to another, and we feel that from the same data every other rational being would have drawn the same inferences. The propositions of Geometry furnish the most evident proof of this fact, though the proof may be also found in every in-

stance in which one truth is perceived as necessarily resulting from the relation of two or more truths which were previously known.

226. Behold the three guides to knowledge,—the only three that we can possibly employ,—the three within whose province lies the whole territory of conceivable or possible truth. Sense, the guide to a knowledge of the outward world; Self-consciousness, the observer of the inward workings of our own minds; Reason, the teacher of abstract and general truth, and the judge to whose tribunal is our ultimate appeal in all questions of doubt. Distinct, and yet working in entire harmony with each other, they have each a separate and equally important office; the decisions of each in its appropriate sphere are equally reliable. We have seen that this is true in the few instances which have been adduced; and if we extend our inquiries faithfully and cautiously, we shall find that it is always so, and that even the errors to which we are all confessedly subject in no wise weaken the confidence that we naturally repose in each of our faculties.*

227. We are now able to answer our original question: What are the limits and characteristics of positive knowledge? We are necessarily limited to such simple and self-evident propositions as we may be able to discover, and such additional, but more obscure truths as we may logically deduce from a comparison of those elementary propositions. We find in ourselves a tribunal capable of judging in all cases, and if its decisions are pronounced without any hesitation, if they are clearly perceived and understood, and if we feel that they are such as cannot be doubted, we know them to be true.

228. Many of the propositions that receive our full belief are not such as the reason decides upon at once, but their validity is found to rest upon the validity of certain other discoverable data. In examining them, we are obliged to reverse the process by which they were originally acquired, pausing at every step to discover whether Reason gives us her full and unqualified approval. If we can proceed in this manner until we arrive at simple, self-evident propositions, we know that the original propositions are true. Thus, both by deduction from simple truths, and by a critical examination of credible asser-

* In this exposition of the sources of positive knowledge, I have followed pretty closely the teachings of Cousin and Hamilton, introducing such modifications as would give greater prominence to the triple movement of Intelligence under relation. Mahan traces all knowledge to Sense, Consciousness, and Reason, but his definitions appear to limit Consciousness to the sphere of Hamilton's Self-consciousness, and Reason to the sphere of simple Intuition. Self-consciousness is evidently possible only in and through Memory, and if the discussion were merely about the faculties, instead of their modes of action, it would have been more appropriate to have regarded as the three guides to knowledge, the rational faculties through which the first incomes of knowledge are received,—RMM, RMS, RMR. As the symbolism approaches perfection, and its various applications are more fully understood, it will perhaps be easy to define acts and processes with as great precision as we can now define faculties, but for the present, we must content ourselves with such approximations to accuracy as are within our reach.

tions which constitute a portion of our own faith or of the general faith of our race, we are able to enlarge our sphere of knowledge, to replace probability by certainty, and determine the truth or falsehood of much that is involved in doubt.

229. Entire assurance, then, is attainable upon many points, but it can only be attained as the result of patient labor properly directed. We accordingly find a great difference in the precision of ideas, the amount of knowledge, and the degree of confidence in points of belief in different persons. This difference is discernible even in the axioms of different periods, different nations, different individuals, and even of the same individual at different stages of his life.

230. We know that even the axioms of mathematics were not all recognized at once, but they embody the results of long ages of patient investigation. We find that some tribes of men are so wholly unaccustomed to mental discipline, that they will not admit some of the simplest and most evident truths, because they do not understand them; and, finally, in our own experience, we find that as our mind enlarges, not only does our sphere of knowledge enlarge, but we are constantly discovering new simple elementary truths; and even the simpler propositions that once required proof in order to entitle them to our confidence become gradually axiomatic.

231. But with all our progress, whatever may be the character of the age in which we live, or of the circumstances by which we are surrounded, the test of certainty remains the same. We still feel that it rests with us to decide what we know, and what is still unknown, and without inquiring whence we derive the authority to make that decision, we know that we can appeal to none higher or more infallible.

232. "That we cannot show forth *how* the mind is capable of knowing something different from self, is no reason to doubt *that* it is so capable. Every *how* (διότι) rests ultimately on a *that* (ὅτι); every demonstration is deduced from something *given* and *indemonstrable;* all that is comprehensible hangs from some *revealed fact* which we *must believe as actual*, but cannot construe to the reflective *intellect in its possibility.**

233. "The truths known by intuition are the original premises from which all others are inferred. Our assent to the conclusion being grounded upon the truth of the premises, we never could arrive at any knowledge by reasoning, unless something could be known antecedently to all reasoning."†

234. "When men are asked, if any one questions them skilfully, they say all things of themselves, although if they had not an internal knowledge and true reason, they could not do so."‡

* Hamilton, *Discussions*, p. 68. See also Aristotle, Ἀναλυτικῶν ὑστέρων, B. 1, chap. 2, 3.

† J. S. Mill, p. 3.

‡ Plato, *Phædo*, 73 a.

235. Cudworth says: "No man ever was or can be deceived in taking that for a truth which he clearly and distinctly apprehends, but only in assenting to things not clearly apprehended by him." The *probability* of truth may, therefore, reasonably be supposed to be in proportion to the clearness and distinctness of apprehension.

236. Knowledge can extend only so far as our ideas are *clear* and *distinct*.* Faith also embraces truths dimly perceived.† The dim perceptions of Faith, in which are included all the mysteries of religion, cannot be made the groundwork or the fit subject of reasoning.‡ In our reverent approaches towards the highest mysteries of Being, in our endeavors to ascertain our relations to the Infinite Loving Father, it soon becomes evident that there are truths far above our mortal ken,§ and we are compelled to satisfy our longing with such dim glimpses and partial disclosures as may be vouchsafed to us individually, or as we may find recorded in the undoubted chronicles of Divine Revelation. The authenticity of a professed revelation is a proper subject for investigation, but after the authenticity is admitted, Reason can deny the teachings of Faith only by abdicating her own throne, which is upheld by other teachings of the same Faith.

237. No one is ever disposed to question the implicit reliance of the child on the instructions of the parent or teacher in whom he has all confidence. Why should we deny

* For some excellent historical and critical remarks on clear, distinct, and confused concepts, see *Hamilton's Logic*, Lect. IX, X.

† "The evidence of things not seen."

‡ We may, it is true, properly speak of a "rational faith," not, however, to imply that its tenets can be either proved or disproved by reason, but merely to indicate that we have sufficient reason for holding the faith. For example, reason may be satisfied that the Bible is the infallible record of Divine Revelation, and belief in the teachings of the Bible then becomes rational faith. But after admitting the plenary inspiration of the Scriptures, reason has no right to sit in judgment over any of their teachings.

"If there is sufficient evidence on other grounds, to show that the Scripture, in which [any] doctrine is contained, is a revelation from God, the doctrine itself must be unconditionally received, not as reasonable, nor as unreasonable, but as scriptural. If there is not such evidence, the doctrine itself will lack its proper support; but the reason which rejects it, is utterly incompetent to substitute any other representation in its place." *Mansel*, p. 168.

§ "We are thus taught the salutary lesson, that the capacity of thought is not to be constituted into the measure of existence; and are warned from recognizing the domain of our knowledge as necessarily coextensive with the horizon of our faith. And by a wonderful revelation we are thus, in the very consciousness of our inability to conceive aught above the relative and finite, inspired with a belief in the existence of something unconditioned beyond the sphere of all comprehensible reality. . . True, therefore, are the declarations of a pious philosophy: A God understood would be no God at all;'—'To think that God is, as we can think Him to be, is blasphemy.' The Divinity, in a certain sense, is revealed; in a certain sense is concealed: He is at once known and unknown." *Hamilton, Discussions*, p. 22. "Canst thou by searching find out God? canst thou find out the Almighty unto perfection?" *Job* 11 : 7.

to the older child the privilege of a like reliance on spiritual guides, who, by greater purity of life, quicker perception of religious truth, consciences more sensitive to the pointings of duty, and continual aspirations for a "closer walk with God," have obtained a degree of religious experience that the mass of mankind, absorbed in the struggles of daily care and toil, could never hope to reach?

238. If I cannot follow all the steps of a Laplace or a Leverrier, I may at least be allowed to rejoice in the faith that the glorious results of their calculations have opened new fields for knowledge and for future investigation. If I cannot understand all the teachings of Paul and John, I have a right to assume, on sufficient evidence, that their lives were purer and their spiritual insight keener than my own; and discarding all hope of attaining to their clearness of vision, I may feel thankful even for the dim perceptions of heavenly glory for which I am indebted to their guidance.

239. The true philosopher should guard carefully against everything like conceit and dogmatism. And especially should those who claim a charitable indulgence for their own conscientious convictions be ever ready to extend a like charity to others.

240. Every one will admit that truth, whether intuitive or demonstrative, revealed or discovered, is always consistent and harmonious, but fancied inconsistency and the consequent fancied fallacy will often prove to be merely imaginary. Because a man's belief, *as I understand it*, appears to be at variance with some fundamental principles of truth, I have no right to pronounce it false as it is held in his own mind. On the contrary, my sense of the entire consistency of all my own personal views should teach me that, although his sphere of vision may be either broader or narrower than my own, he may be compensated by a clearer perception of some points that are shrouded from my eyes in an impenetrable mystery, for his oversight of other points that are to me self-evident. If I charge him with absurdity or folly for professing to believe what is contrary to reason, the charge may recoil on my own head, for it may prove that the folly is mine in assuming my version of his creed to be the correct one. That I should misunderstand him is neither remarkable nor improbable, for even the record of a Divine Revelation, that is worded with all the precision of which human speech is capable, is variously interpreted according to the educational prejudices or mental temperaments of its different readers.

241. The realms of faith and reason, though both harmonious,* are both distinct, and must ever remain so, while we remain less than perfect, and mere learners in the Book of the Universe. If at any future period, during the infinite cycles of eternity, our minds become so thoroughly enlightened that we can blend the two, it must be in the light of a

* Hamilton, *Discussions*, pp. 69, 91, has some very clever remarks on the harmony of truth.

still higher FAITH, that needs none of the slow, hesitating, successive steps of demonstration, but discerns all truth with immediate and intuitive certainty.

242. Reason can only assure us that if the Faith be true on which our premises rest, the conclusion must also be true, but of the probability or certainty of the primary beliefs which constitute the materials of our reasoning, Faith itself is the only judge.* We may, however, safely rest in the assurance that the merciful Providence of an All-wise Creator will always vouchsafe to each of his intelligent creatures all the revelations that are essential to his continual needs; and that if we act at each moment in accordance with the light that is given us, we shall not only perform the duty of the moment, but we shall also make continual spiritual progress,—attaining to a clearer understanding of truths that we have already learned, and gradually extending the sphere of our belief until it embraces every vital doctrine of revelation.

CHAPTER VII.

RATIONAL ANTINOMIES.

243. WHILE apparent antagonisms of Faith are, therefore, perfectly legitimate, there can be no legitimate antagonisms of Reason, either real or apparent.

244. It is true that the ancient philosophers often puzzled and amused themselves with paradoxes, dilemmas, and paralogisms or sophisms, but even when they were unable to detect the fallacy, they always felt that it must arise from some unwarranted use of terms. No one appears to have taught that Reason could be rightfully involved in necessary and irreconcilable opposition, until Kant propounded his celebrated Antinomies.

245. He says: "If we apply our Reason, not merely for the use of the principles of the understanding to objects of experience, but venture to extend such out beyond the limits of the latter,† sophistical theorems thence arise, which neither need look for confirmation in experience, nor fear opposition, and each of which is not only in itself without contradiction, but in fact finds, in the nature of reason, conditions of its necessity, only that, un-

* "The whole province of faith belongs *objectively* to reason too; for if faith made us believe what is unreasonable *in itself*, it would be an unreasonable, and therefore a false faith, and one we should be better without. Faith is but the advanced guard, marching onward through the territory really belonging to Reason, though not actually occupied by it; and the broader the base of operations covered by Reason, the farther may Faith itself advance, without danger of stumbling upon the outposts of error." *Solly*, p. 16.

† In other words, if we try to reason upon subjects that are beyond our power of comprehension.

fortunately, the contrary has equally as valid, and as necessary grounds of affirmation on its side."*

246. All legitimate reasoning, as we have seen, requires that the premises, as well as their relations, should be clearly apprehended. If we transcend the limits of possible experience, clear apprehension becomes impossible, and as we have no means of fixing and defining our ideas, we are easily led into confusion and equivocation.

247. The four Kantian antinomies furnish admirable illustrations of this truth. They all relate to different ideas of the ABSOLUTE: 1. The Absolute completeness of the composition of the given whole of all phenomena; 2. The Absolute completeness of the division of a given whole in the phenomenon; 3. The Absolute completeness of the arising of a phenomenon in general; 4. The Absolute completeness of the dependency of the existence of the changeable in the phenomenon.†

248. At the very outset, we are confused by the vagueness of the term Absolute. It "is of a twofold (if not threefold) ambiguity, corresponding to the double (or treble) signification of the word in Latin.

"1. *Absolutum* means what is *freed* or *loosed*, in which sense the Absolute will be what is aloof from relation, comparison, limitation, condition, dependence, &c., and thus is tantamount to τὸ ἀπόλυτον of the lower Greeks. In this meaning the Absolute is not opposed to the Infinite.

"2. *Absolutum* means *finished*, *perfected*, *completed;* in which sense the Absolute will be what is out of relation, &c., as finished, perfect, complete, total, and thus corresponds to τὸ ὅλον and τὸ τέλειον of Aristotle. In this acceptation,—and it is that in which for myself I exclusively use it,—the Absolute is diametrically opposed to, is contradictory of, the Infinite.

"Besides these two meanings, there is to be noticed the use of the word, for the most part in its adverbial form;—*absolutely* (*absolute*) in the sense of *simply*, *simpliciter* (ἁπλῶς), that is, considered in and for itself,—considered not in relation."‡

249. The philosophical Absolute is nearly always,—perhaps always,—considered as unlimited, but there is a great difference of opinion as to what constitutes a limit. Some regard any affirmation or negation as a limit,—others regard that as finite which has any qualities or attributes, and they approach the absolute by excluding all attributes. The highest form of simple attribution, is generally admitted to be that of Existence or Being. If from Being we suppose the attribute of Being to be excluded, we may call the supposed resultant the Absolute. But if this Absolute is anything that we can think about,—inas-

* P. 299.

† Kant, p. 295.

‡ Hamilton, *Discussions*, p. 21.

much as thought implies attribution,—we must still exclude the attribute of Absoluteness, which brings us to the Zero, or Pure Nothing of Hegel and Oken.*

250. It seems strange that any one should ever have attempted to reason about an idea that is so vague, indefinite, and indefinable, and yet on such groundless reasoning have been mooted some of the most profound problems of metaphysics. The arguments, of course, are all drawn from that which is supposed to be known,—from the finite and relative,—and as it is easy to find opposing and contradictory relations, we may easily obtain contradictory conclusions, provided we take the first false step of admitting that relation, or the consequences of relation, can be predicated of that which is devoid of all relation.

251. Kant disposes of the Antinomies properly enough, by what he terms the *Skeptical method*, that is to say, by inquiring whether the object of dispute "may not, perhaps, be a mere delusion, at which each catches in vain, and whereby he can gain nothing, although he were not at all to be opposed."† In some cases, however (*e. g.*, in the mathematical fallacies, pp. 506–7), the skeptical method would not be applicable, not, as Kant states, because "its use would be absurd,"† but because every false, absurd, or contradictory conclusion results from the employment of equivocal premises, and the philosophical investigator should endeavor to trace the equivocation to its lurking-place.

252. "THE ANTINOMY OF PURE REASON.‡

"*First Contradiction of Transcendental Ideas.*

"THESIS.	"ANTITHESIS.
"The world has a beginning in time, and is also inclosed as to space, in limits.	"The world has no beginning, and no limits in space, but is, as well in respect of time as of space, infinite.
"*Proof.*	"*Proof.*
"For, if we admit that the world has no commencement as to time, an eternity, then, has elapsed up to each given point of time, and consequently, an infinite series of states of things, following upon one another in the world, has passed away. But now the infinity of a series consists in this very thing,—that it can never be completed by successive synthesis. Consequently	"Let it then be supposed that it has a beginning. As the Beginning is an existence which a time preceded, wherein the thing is not; a time must have gone before, wherein the world was not, that is, a void time. But now, in a void time, no origin of anything is possible, because no part of such a time has in itself, prior to another, any distinctive condition of ex-

* "The Intuition of God = the Absolute = the Nothing, we [also] find asserted by the lower Platonists, by the Buddhists, and by Jacob Boehme." Hamilton, *Discussions*, p. 28.

† P. 301.

‡ Kant, pp. 303–307.

an infinite elapsed cosmological series is impossible, therefore a beginning of the world is a necessary condition of its existence, which first was to be shown.

"In respect to the second point, if we again maintain the contrary, the world will thus be an infinite given whole of contemporaneously existing things. Now we cannot think the magnitude of a Quantum,* which is not given within certain limits of every intuition, in any other way than through the synthesis of the parts, and the totality of such a Quantum, only through the completed synthesis, or through repeated addition of unity to itself.† Hence, in order to think the world, which fills all space as a Whole, the successive synthesis of the parts of an infinite world must be looked upon as completed, that is, an infinite time must be looked upon as elapsed in the enumeration of all coexistent things; which is impossible. Consequently, an infinite aggregate of real things, cannot be looked upon as a given whole, and therefore not as given *contemporaneously*. Thus a world is *not* in respect of its extension in space *infinite*, but inclosed in its limits; which was the second point.

* "We can envisage an undetermined Quantum as a whole, if it is inclosed in limits, without requiring to construct the totality thereof by measurement, that is, the successive synthesis of its parts. For the limits determine already the completeness, since they cut off all moreness.

† "The conception of totality is, in this case, nothing else but the representation of the completed synthesis of its parts, since as we cannot deduce the conception from the intuition of the whole (which in this case is impossible), we can only comprehend this whole by means of the synthesis of the parts, up to the completion of the infinite, at least in idea.

istence rather than of non-existence (whether we admit that this condition arises of itself, or through another cause). Several series of things can, therefore, indeed begin in the world, but the world itself can have no beginning, and therefore, is in respect of elapsed time, infinite.

"As to what concerns the second point, let us first take the contrary, that is to say, that the world in respect of space, is finite and limited; it finds itself, in this way, in a void space, which is not limited. There would, therefore, be met with, not only a relationship of things in *space*, but also of things *to space*. Now as the world is an absolute Whole, without of which no object of intuition, and consequently no correlative of the World is found, wherewith the same stands in relationship, the relationship of the World to void space would thus be a relationship thereof to *no object*. But such a relationship, and therefore, the limitation of the World by void space is nothing; consequently, the World in respect of Space is not at all limited, that is to say, in regard to extension it is infinite.*

* "Space is merely the form of the external intuition (formal intuition), but no real object that externally can be envisaged. Space before all things which determine it (fill or limit), or rather which afford an *empirical intuition* according to its form, is under the name of absolute space, nothing else but the mere possibility of external phenomena, so far as they either exist of themselves, or can yet be added to given phenomena. The empirical intuition is, therefore, not composed of phenomena and space (perception and void intuition). One is not correlative of the synthesis of the other, but only conjoined in one and the same empirical intuition, as matter and form thereof. If we will place one of these two points out of the other (space out of all phenomena), there arises thence all kind of void determinations of the external intuition, which still are not possible perceptions. For example, motion or rest of the world in infinite void space, a determination of the relationship of the two with one another, which never can be perceived, and is, therefore, likewise the predicate of a mere ideal thing.

"OBSERVATION UPON THE FIRST ANTINOMY.

"1. *Upon the Thesis.*

"I have not sought after deceptions in these mutually contradictory arguments in order, for instance (as it is termed), to advance an advocate's proof, who avails himself of the imprudence of his opponent for his own advantage, and willingly sanctions his appeal to a misunderstood law in order to establish his own unjust pretensions upon the refutation of it. Each of these proofs is deduced from the nature of things, and the advantage set aside which the erroneous conclusions of Dogmatists could afford us on both parts.

"I might, likewise, have been able to demonstrate according to appearance the Thesis, by reason of this, that I premised, agreeably to the custom of the Dogmatists, an erroneous conception as to the infinity of a given quantity. A quantity is infinite, beyond which no greater (that is, beyond the therein contained multiplicity of a given unity) is possible. Now, no multiplicity is the greatest, inasmuch as always one or more unities can still be added thereto. Consequently an infinite given quantity,—consequently, also (in respect of the elapsed series as well as of extension), an infinite world is impossible. It is, therefore, in both ways limited. I might, in such a way, have adduced my proof; but this conception does not accord with that which we understand by an infinite whole. It is not, thereby, represented so great as it is; consequently, also, its conception is not the conception of a *maximum*, but only, thereby, its relationship to an arbitrarily to be adopted unity is thought, in respect of which this relationship is greater than all number. Now, accordingly as unity is admitted greater or less, the infinite would be greater or less; but infinity, as it consists merely in the relationship to this given unity, would remain ever the same, although certainly the absolute quantity of the whole thereby would not be at all known—but as to which it is not here the question.

"The true (transcendental) conception of infinity is that the successive synthesis of unity in the measure-

"OBSERVATION.

"2. *Upon the Antithesis.*

"The proof of the infinity of the given cosmological series, and of the cosmological Whole, rests upon this: that in the opposite case a void time as well as a void space must constitute the limits of the world. Now, I am not ignorant that against this consequence excuses are sought for, inasmuch as it is pretended that there is a limit of the world in respect of time and space quite possible, without its being even requisite to admit an absolute time before the beginning of the world, or an absolute extended space out of the real world, which is impossible. I am entirely satisfied with the last part of this opinion of the philosophers of the Leibnitzian school. Space is merely the form of the external intuition, but no real object which can be envisaged externally, and no correlative of phenomena, but the form of phenomena themselves. Space, therefore, cannot absolutely (of itself alone) occur as something determining in the existence of things, since it is no object at all, but only the form of possible objects. Things, therefore, as phenomena, certainly determine space; that is, under all possible predicates thereof (quantity and relationship), they so operate that these or those belong to reality; but conversely, space, as something which subsists of itself, cannot determine the reality of things in respect of the quantity or form, because in itself it is nothing real. Consequently, a space (whether full or void)* may very well be limited by phenomena, but phenomena can never be *limited* by *means of a void space* external to them. The same is also valid as to time. But all this being granted, it is still, nevertheless, indubitable that we must absolutely admit two nonentities, void space out of the world, and void time before

* "It is easy to be observed, that hereby it is intended to say, that *void space so far as it is limited by phenomena*—consequently that such *within the world* does not, at least, contradict the transcendental principles, and may, therefore, be admitted in respect of the same (although its probability is not, on that account, directly maintained).

ment of a Quantum can never be completed.* Hence, it follows quite certainly that an eternity of real states following upon one another can never have elapsed up to a given (the present) point of time,—consequently, the world must have a beginning.

"In regard to the second part of the thesis, the difficulty certainly disappears of an infinite and yet elapsed series, for the diversity of an infinite world, as to extension, is given *coexistently*. But in order to think the Totality of such a multiplicity, since we cannot appeal to limits which constitute the totality in itself in the intuition, we must render an account of our conception, which, in such a case, cannot go from the whole to the determined multiplicity of the parts, but must show the possibility of a whole by means of the successive synthesis of the parts. And as this synthesis must form a never to be completed series, we cannot thus think a totality prior to it (*the synthesis*), and consequently, also, not through it. For this conception of totality itself is, in this case, the representation of a completed synthesis of parts, and this completion, and consequently the conception thereof, is impossible."

* "This (the Quantum) thereby contains a multiplicity (of given unity), which is greater than all number, which is the mathematical conception of the infinite."

the world, provided we admit a limit to the world whether in respect of space or time.

"For as to what regards the subterfuge whereby we strive to avoid the consequence, agreeably to which we say that if the world (according to time and space) has limits, the infinite void must determine the existence of real things in respect of their quantity; it consists thus only in this, that we think to ourselves instead of a *sensible world*, some sort of an intellectual world, and instead of a first beginning (an existence previous to which a time of non-being precedes), an existence generally is imagined, which *presupposes no other condition* in the world, and instead of boundaries of extension, limits are conceived of the universe, and thereby avoidance is made of time and space. But here the question is only as to *mundus phœnomenon* and its quantity, in respect of which we can, by no means, make abstraction of the stated conditions of sensibility without annihilating the being of it. The sensible world, if it be limited, lies necessarily in the infinite void. If we will omit this, and consequently space in general as condition of the possibility of phenomena *à priori*, the whole sensible world then disappears. In our problem this alone is given us. The *mundus intelligibilis* is nothing but the universal conception of a world in general, in which conception we make abstraction of all conditions of the intuition of this world, and in respect of this conception, no synthetic proposition, either affirmative or negative, is possible."

CHAPTER VIII.

EXAMINATION OF ANTINOMIES.

253. The first ambiguity that presents itself in the foregoing antinomy, is in the meaning of the term "world." Kant says, "The ideas with which we now concern ourselves I have before termed Cosmological ideas, partly on this account, because under world the complex of all phenomena is understood, and our ideas also are only directed to the un-

conditioned amongst phenomena;* partly, likewise, because the word world, in a transcendental sense, signifies the absolute totality of the complex of existing things, and we direct our attention alone to the completeness of the synthesis (although only strictly in the regressus to the conditions)."† The arguments of the Thesis are mainly based on ideas derived from the first of these definitions, and they have a quasi validity to show that the aggregate of phenomena (if the cause of the phenomena is excluded from consideration) may have had a beginning in time and a limit in space. The Antithesis can only be valid for the second definition to show that "the absolute totality of the complex of existing things" (including the Creative First Cause together with every possible and actual manifestation of His existence and power) must be, "as well in respect of time as of space, infinite."

254. The second ambiguity is in the use of the word "infinite." In the sense in which some philosophers have employed the terms infinite and finite, they are mutually contradictory, and it is as absurd to speak of their correlation as it would be to talk of the four sides and six angles of a square triangle. In one sense, the mere formation of an idea is limiting, inasmuch as it assigns bounds which distinguish the idea from all others, but according to customary usage, we have a right to call that infinite which is unlimited in one or more of its attributes.‡ We have no right, however, to assume that what is true of one infinite is true of another, as is repeatedly done in each of the Kantian antinomies.

255. In the celebrated sophism of Achilles and the tortoise,§ there is a similar equivocal use of the ideas of infinity. "The fallacy, as Hobbes hinted, lies in the tacit assumption that whatever is infinitely divisible is infinite. . . . The 'forever' in the conclusion means for any length of time that can be supposed; but in the premises 'ever' does not mean any *length* of time; it means any *number of subdivisions* of time. It means that we may divide a thousand feet by ten, and that quotient again by ten, and so on as

* But an unconditioned phenomenon is an impossibility.

† P. 298.

‡ Werenfels, *De Finibus Mundi Dialogus* (quoted by Mansel, p. 253), ingeniously attempts to demonstrate that the idea of infinite extension involves necessary contradictions. But the whole argument is based on the unwarranted assumption that all relative infinites are equal. It is important, even in discoursing on ordinary topics, that all the conditions of the several points at issue should be kept in view, and this precaution is still more essential in reasoning upon a subject so obscure as infinity.

§ "Let Achilles run ten times as fast as the tortoise, yet if the tortoise has the start, Achilles will never overtake him. For suppose them to be at first separated by an interval of a thousand feet, when Achilles has run these thousand feet, the tortoise will have got on a hundred; when Achilles has run those hundred the tortoise will have run ten, and so on forever; therefore, Achilles may run forever without overtaking the tortoise." See *Mill's Logic*, p. 508, and Aristotle, *φυσικῆς ἀκροάσεως*, B. vi, chap. 9, p. 549.

often as we please; that there never needs be an end to the subdivisions of the distance, nor, consequently, to those of the time in which it is performed. But an unlimited number of subdivisions may be made of that which is itself limited. The argument proves no other infinity of duration than may be embraced within five minutes. As long as the five minutes are not expired, what remains of them may be divided by ten, and again by ten, as often as we like, which is perfectly compatible with their being only five minutes altogether. It proves, in short, that to pass through this finite space requires a time which is infinitely divisible, but not an infinite time."*

256. Kant's definition, that "the Infinity of a series consists in this very thing, that it can never be completed by successive synthesis," should be qualified by adding,—*unless the succession is infinite.* Every finite quantity, being infinitely divisible, is the completion or sum of an infinite number of infinite series; every *now* is the termination of one infinity, and the commencement of another infinity of successive moments. It is quite true, as Kant remarks in his Observation upon the Thesis, "that an eternity of real states following upon one another, can never have elapsed up to a given (the present) point of time," provided we mean by eternity, duration that has neither beginning nor end, but our Thesis and Antithesis refer merely to the beginning, and it is quite certain that a terminated "succession of real states," infinite in regard to its commencement, must have elapsed at every given point of time.

257. A third ambiguity arises from the equivocal meaning of *space* and *time.* In a portion of the reasoning, they are regarded as mere forms of thought; in another portion, as real entities. If space is included in the phenomena of the world, being itself infinite, the world must also be infinite. But if space is a mere form of thought, and in no sense phenomenal, we may easily imagine "not only a relationship of things in *space*, but also of things *to space*," and the world may, therefore, be conceived as "inclosed as to space, in limits."

258. This brief discussion is, perhaps, sufficient to show that the Antinomies do not necessarily result from the legitimate use of Reason, but that they are pure fallacies, and that, like other fallacies, they will be self-detected, provided all the terms are clearly and unequivocally defined.

259. The following are the remaining Kantian Antinomies:†

* Mill, *Logic*, p. 508. Mill disclaims the invention of this solution, but does not mention the author. I thought it was from Hamilton, but I have not been able to turn to it.

† Kant, pp. 308, 314, 319.

"Thesis.	II.	"Antithesis.
"Every compound substance in the world consists of simple parts, and there exists everywhere nothing but the simple, or that which is compounded from it.		"No compound thing in the world consists of simple parts, and there exists nothing anywhere therein simple.
	III.	
"Causality, according to the laws of nature, is not the only one from which all the phenomena of the world can be derived. There is, besides, a Causality through liberty, necessary to be admitted for the explanation of the same.		"There is no liberty, but everything in the world occurs only according to laws of nature.
	IV.	
"Something belongs to the sensible world, which either as its part, or its cause, is an absolutely necessary being."		"There exists nowhere any absolutely necessary being, neither in the world nor out of the world, as its cause."

260. The principal ambiguities in these several Antinomies are the following:

II. A compound may be either chemical, of things differing in sensible qualities,—mathematical, of things differing in position,—or immaterial, of things differing in ideal relations.

III. Absolute or unlimited liberty is inconceivable, but a liberty within certain limits may be subject to laws of its own, of which the laws of nature may be considered either as inclusive, or as exclusive.*

IV. The necessary First Cause may either be considered separately from the aggregate of phenomena, or it may be regarded as a portion of "the absolute totality of the complex of existing things."

261. Hamilton gives some "contradictions proving the psychological theory of the conditioned,"† which look strangely out of place in a work by a disciple of the Scotch school, but which result necessarily from his questionable qualifications of the theory, "that all

* I cannot imagine any more concise and satisfactory solution of Kant's third Antinomy (provided we assume that the unconditioned is a fit subject for reasoning), than the one given by Solly (p. 24–5). "Now the unconditioned cause is necessarily free; for were it not so, it would be subject to a condition, a supposition which is excluded by the hypothesis. The conditioned cause, on the other hand, is necessarily not free, for otherwise it would not be limited by a condition, which is equally excluded by the hypothesis. If, however, we take the whole of nature, and seek for its cause, inasmuch as it comprises all conditioned causes within itself, the cause in question must clearly be unconditioned and free. While therefore the causality *in* nature is conditioned, the cause *of* nature itself is unconditioned." [Should we not rather say, the cause of nature is only self-conditioned?]

† *Metaphysics*, p. 682. See also pp. 527-31.

that is conceivable in thought, lies between two extremes, which, as contradictory of each other, cannot both be true, but of which, as mutual contradictories, one must." The most important of these supposed contradictions deserve a passing notice.

"1. Finite cannot comprehend, contain the Infinite.—Yet an inch or minute, say, are finites, and are divisible *ad infinitum*, that is, their terminated division is incogitable.

"2. Infinite cannot be terminated or begun.—Yet eternity *ab ante* ends *now*; and eternity *a post* begins *now*. So apply to Space.

"3. There cannot be two infinite maxima.—Yet eternity *ab ante* and *a post* are two infinite maxima of time.

"4. Infinite maximum if cut into two, the halves cannot each be infinite, for nothing can be greater than infinite, and thus they could not be parts; nor finite, for thus two finite halves would make an infinite whole.

"5. What contains infinite quantities, cannot be passed through,—come to an end. An inch, a minute, a degree contains these; *ergo*, etc. Take a minute; this contains an infinitude of protended quantities, which must follow one after another; but an infinite series of successive protensions can, *ex termino*, never be ended; *ergo*, etc.

"6. An infinite maximum cannot but be all inclusive. Time *ab ante* and *a post* infinite and exclusive of each other; *ergo*.

"7. An infinite number of quantities must make up either an infinite or a finite whole. I. The former.—But an inch, a minute, a degree, contain each an infinite number of quantities; therefore, an inch, a minute, a degree, are each infinite wholes; which is absurd. II. The latter.—An infinite number of quantities would thus make up a finite quantity; which is equally absurd.

"8. If we take a finite quantity (as an inch, a minute, a degree), it would appear equally that there are, and that there are not, an equal number of quantities between these and a greatest, and between these and a least. . . .

"13. A quantity, say a foot, has an infinity of parts. Any part of this quantity, say an inch, has also an infinity. But one infinity is not larger than another; therefore an inch is equal to a foot."*

262. The ambiguity that runs through all these propositions, is the same that has already been noticed. In each proposition, the term infinite is used with two or more meanings, and the different properties of different relative infinites, are contrasted with the supposed properties of a supposed absolute infinite. Hamilton himself points out this

* This fallacy resembles the algebraical demonstration already given, that $1 = 3$. If one infinity is not larger than another, then $\frac{1}{0} = \frac{n}{0}$, and $1 = n$. In reality, 0 and ∞ may each have an infinite number of values, and any reasoning that is based either upon the infinitely great or the infinitely small, may lead us into error, unless we keep all the conditions in view,—those which are limiting, as well as those which are infinite.

ambiguity in his letter to Mr. Henry Calderwood, in which he remarks, "that there is a fundamental difference between *The Infinite* (τὸ ἓν καὶ πᾶν), and a relation to which we may apply the term *infinite*."* We can reason correctly about the relatively infinite, but not about the absolutely infinite, which is devoid of all relation, even of the relations of unity, reality, and conceivability.†

263. Hamilton evidently uses the term conceivable in a narrower sense than many other philosophical writers, and I am inclined to believe that if his meaning were made perfectly clear, the truth of his Law of the Conditioned, "that the conceivable is in every relation bounded by the inconceivable," would be generally admitted. In the letter which has just been quoted, he says, "What I have said as to the infinite being (subjectively) inconceivable, does not at all derogate from our belief of its (objective) reality. In fact, the main scope of my speculation is to show articulately that we *must believe* as actual, much that we are unable (positively) *to conceive*, as even possible."‡ But when he says that "though space must be admitted to be necessarily either finite or infinite, we are able to conceive the possibility neither of its finitude, nor of its infinity,"§ he seems to be struggling with a perplexity that might have been avoided, if his ideas had been more clearly defined.

* *Metaphysics*, p. 685. See also Kant's Observations on the First Antinomy.

† In designating unity, reality, and conceivability as relations, I do not refer to the category of relation, but to the idea of relativity which underlies all human thought, and which Hamilton regarded as conditioning every object of thought. Thus, in what seems a petitio principii, he says (*Discussions*, p. 21), "Thought is only of the conditioned; because as we have said, to think is simply to condition. The *absolute* is conceived merely by a negation of conceivability, and all that we know, is only known as

——'won from the void and formless *infinite*.'

"How, indeed, it could ever be doubted that thought is only of the conditioned, may well be deemed a matter of the profoundest admiration. Thought cannot transcend consciousness; consciousness is only possible under the antithesis of a subject and object of thought, known only in correlation, and mutually limiting each other; while, independently of this, all that we know either of subject or object, either of mind or matter, is only a knowledge in each of the particular, of the plural, of the different, of the modified, of the phenomenal."

How will these remarks apply when the subject and object are one,—the subject thinking of itself? We certainly can think *of* the unconditioned, the absolute, the infinite, even if we are obliged to condition them in our endeavors to understand them. All relative infinites are certainly included in absolute infinites, and in some sense as parts of the absolute. Can the effort to abstract all relativity, and thus arrive at an Absolute or Unconditioned, result in anything else than the Hegelian o, or Hamilton's *Nihil purum?* Can anything exist except in relations, either internal or external? Is there a Unity that embraces Infinite Space, Eternity, Matter, Mind, Possibility, Relation, and Truth, but is yet neither of these, and in no relation to either? Such is certainly not the teaching of revelation, or of any intelligible philosophy. [For some excellent remarks on the relations of the Infinite, see Catherwood, pp. 103 *et seq.*]

‡ *Metaphysics*, p. 687. By a "positive conception," Hamilton evidently means a complete or *adequate* notion.

§ Ibid. p. 527.

264. Mill, in his Chapter on Fallacies of Simple Inspection, very properly controverts the proposition, that whatever is inconceivable must be false. Some of his reasoning, however, is not very conclusive. Take, for example, the following passages.

265. "Rather more than a century and a half ago, it was a philosophical maxim, disputed by no one, and which no one deemed to require any proof, that 'a thing cannot act where it is not.' With this weapon the Cartesians waged a formidable war against the theory of gravitation, which, according to them, involving so obvious an absurdity, must be rejected *in limine;* the sun could not possibly act upon the earth, not being there. It was not surprising that the adherents of the old systems of astronomy should urge this objection against the new; but the false assumption imposed equally upon Newton himself, who in order to turn the edge of the objection, imagined a subtle ether which filled up the space between the sun and the earth, and by its intermediate agency was the proximate cause of the phenomena of gravitation. . . .

266. "No one now feels any difficulty in conceiving gravity to be, as much as any other property is, 'innate, inherent, and essential to matter,' nor finds the comprehension of it facilitated in the smallest degree by the supposition of an ether; nor thinks it at all incredible that the celestial bodies can and do act where they, in actual bodily presence, are not. To us it is not more wonderful that bodies should act upon one another, 'without mutual contact,' than that they should do so when in contact; we are familiar with both these facts, and we find them equally inexplicable, but equally easy to believe. . . .

267. "It is strange that any one, after such a warning, should rely implicitly upon the evidence, *à priori*, of such propositions as these, that matter cannot think; that space, or extension, is infinite; that nothing can be made out of nothing (*ex nihilo nihil fit*). Whether these propositions are true or no, this is not the place to determine, nor even whether the questions are soluble by the human faculties. But such doctrines are no more self-evident truths than the ancient maxim that a thing cannot act where it is not, which probably is not now believed by any educated person in Europe."*

268. This whole course of argument rests so evidently on ambiguity of definition, that it furnishes an admirable exemplification of the origin of all antinomies. No one ever questioned the statement that force can be transmitted from one point to another, and the fact of such transmission does not prove that a thing can act where it is not. In machinery that is worked by steam, the steam acts "where it is," on the piston of the engine, but its force may be conveyed through a series of mechanical means, and finally used at a point very remote from the boiler. An electro-magnetic battery acts "where it is," on the wire at a telegraph-station, but the force that it communicates may be conducted thou-

* Mill's Logic, pp. 461, 462.

sands of miles before it reaches its destination. The earth falls towards the sun in consequence of the attractive force that acts upon the earth "where it is." The belief is almost universal that the force is transmitted from the sun to the earth in some unknown way.

269. There are many reasons for supposing that all the imponderable agents, light, heat, electricity, attraction, are different modifications of FORCE, all acting in similar ways and subject to similar laws, but differing in their effects on account of the different circumstances attending their action. There are no greater difficulties connected with Newton's hypothesis of a subtle ether through which gravitation may be transmitted, than with the hypothesis of a similar ether to sustain the undulatory theory of light. The general reception of the undulatory theory proves that every "educated person in Europe" and elsewhere still feels the necessity of endeavoring to account for all transmission of force, and still believes that "a thing cannot act where it is not" in the sense in which Newton probably believed the maxim, though it is doubtful whether any one ever believed it in the sense that Mill disputes.

270. In like manner the remaining propositions about matter, space, and creation can, undoubtedly, be so defined that their *à priori* self-evidence may be doubted or even denied. But, in what I regard as the common acceptation of the terms, I cannot but think that I have a right positively to assert "that matter cannot think; that space, or extension, is infinite; that nothing can be made out of nothing." Of these several assertions, the last seems the most questionable, but in order that anything may be made, there must at least be a maker who has the power of making. The power of doing anything implies the exertion of force, and whatever is produced by the maker, exerting the force that is in his power, cannot, in every possible sense, be said to be "made out of nothing."

271. If the instances that have been adduced by profound students of philosophy to prove that reason is sometimes entangled in an inexplicable dilemma, are divested of difficulty when all the terms are used with a clear and intelligible meaning, there can be little risk in repeating the assertion that there can be no legitimate antagonisms of Reason either real or apparent. Whenever any line of argument appears to lead to a paradox, it may safely be inferred that Reason has either left her own province or that she has become confused by some hidden equivocation. Every honest critic, therefore, should make due allowance for the imperfections of language and the consequent danger of misapprehension, and if he can discover in the propositions that he is considering any truthful meaning, he should regard that meaning as the one that the author intended to convey.

CHAPTER IX.

BASIS OF ONTOLOGY.

272. In extending our inquiries beyond the mind and its capacities, to the unthinking objective, our conclusions must rest entirely upon faith. We know what takes place in our own minds, and we know how we are affected by external bodies, but what is the condition of those bodies, or how truly that condition is represented by our conceptions, it is impossible for us to know.

273. If the subjective is limited to the sphere of human consciousness, we can judge of the objective-objective relation, or of the objective sides of the objective-subjective and the subjective-objective relations, only by an assumed analogy between our cognition of phenomena and their supposed cause.

274. Our faith in such an analogy may be strengthened by the rational conviction that the highest unity, in which both the knowing and the knowable are joined, must be a Supreme Intelligence;* that the source of all things is therefore an Infinite Omniscient Subjective,—and that, so far as our finite subjective resembles the Infinite, our subjective views of the objective will resemble the higher subjective reality of the objective, as it is perceived by the Infinite Intelligence.

275. Since the days of Wolff, the term Ontology has generally been applied to the science of Being,†—the science of the purely objective. Inasmuch as the realm of Ontology lies entirely outside of all possible experience, its data, like the primary cognitions that furnish the conditions of experience and of reason, transcend the sphere of reason, and, therefore, belong to what has been called, since the days of Kant, Transcendental Philosophy.

276. The reasons that have been given for adopting a trichotomy in the investigation of mental phenomena, are equally valid for a primary fundamental analysis of the objective, that is based upon mental analogy. The whole sphere of Being, above Consciousness, can hardly be well studied in any other way than in its relations to the triform Consciousness; but after reaching the level of Consciousness, the subsequent divisions are within the possible relations of experience, and "the same subject may admit, and even

* "Matter does not move matter otherwise than as a medium, but Mind does move it." *Taylor: World of Mind*, p. 35.

† See Fleming, p. 162.

require, various divisions, according to the different points of view from which we contemplate it; nor does it follow that because one division is good, therefore another is naught."*

277. It may, perhaps, be granted that the ternary division, founded as it is on necessary and immutable relations, would be the most purely philosophical for all Science,—the empirical as well as the transcendental. But it is impossible, as yet, to do more than to lay the broad basis for generalization, and to make an experimental essay with some of the fundamental branches of knowledge.

278. When this essay has been thoroughly tested and fully approved, another step may be taken, and gradual approaches may thus be made to a grand schedule of the knowable, which will furnish, by its symbolism, a universal language that will be as easily read and understood as the symbolic language of Arithmetic and Algebra. Meanwhile, each investigator, pursuing his own specialty in his own way, will be accumulating materials for some department of Universal Science, to be fitly and permanently arranged at some future day, if the dreams of philosophy are ever realized.

279. Even the founder of the modern school of "Positive Philosophy" adopts the trinal basis, but without recognizing the source of the fundamental law that he assumes from observation. He says:

280. "From the study of the development of human intelligence in all directions and through all times, the discovery arises of a great fundamental law to which it is necessarily subject, and which has a solid foundation of proof, both in the facts of our organization and in our historical experience. The law is this: that each of our leading conceptions—each branch of our knowledge—passes successively through three different theoretical conditions: the Theological, or fictitious; the Metaphysical, or abstract; and the Scientific, or positive. . . . Hence arise three philosophies, or general systems of conceptions on the aggregate of phenomena, each of which excludes the others. The first is the necessary point of departure of the human understanding, and the third is its fixed and definite state. The second is merely a state of transition."†

281. It is difficult to understand how any branch of knowledge, that is in its first stage fictitious, can subsequently become abstract and finally positive. If we modify the conditional formula so as to read,—1, the Theological or credible, resting on faith in the irresistible beliefs implanted in us by the Creator; 2, the Metaphysical or abstract, examining the validity of reason in its deductions from faith; 3, the Scientific or positive, embracing all the legitimate teachings of faith and reason;—the gradation will, perhaps,

* Reid, p. 688

† Comte, pp. 25, 26.

be more natural and more logical, as well as in strict accordance with the successive Motive, Spontaneous, and Rational development of Consciousness.

282. Aristotle's division of fundamental science recognizes the supreme importance of theology:

"Physical science is about those things which have in themselves the principle of motion; but mathematical science is contemplative, and about permanent but inseparable things. Therefore, about separable and immovable being, if there is any such being, there is another science besides these two. I say separable and immovable, which we will endeavor to show; and if there is any such nature in beings, there also would be the divine; and this would be the first and supreme principle. It is evident, therefore, that there are three kinds of contemplative sciences, PHYSICAL, MATHEMATICAL, THEOLOGICAL. The class of contemplative sciences is, therefore, the best; and of these, the one last mentioned, for it is about the most honorable of beings."*

283. A Positive Philosophy is possible to those, and only to those, who have a positive faith. In all reasoning, it is necessary to inquire, not only whether the argument is logical, but also whether the premises are true. The theological condition of knowledge is not only the first, but it is the most continuous and the most authoritative.

284. "We do not see a man, if by Man is meant that which lives, moves, perceives, and thinks as we do; but only such a certain collection of ideas as directs us to think there is a distinct principle of thought and motion like to ourselves, accompanying and represented by it. And after the same manner we see GOD; all the difference is that whereas some one finite and narrow assemblage of ideas denotes a particular human mind, whithersoever we direct our view, we do at all times and in all places perceive manifest tokens of the Divinity; everything we see, hear, feel, or anywise perceive by sense, being a sign or effect of the power of GOD; as is our perception of those very motions which are produced by man."†

285. "If mind have no original or existence but with us, by what means or way do we men come to be possessed of it? Our principle of intelligence, or soul, which has dominion over our body, is no more visible to us than the principle of the universe."‡

* Aristotle,—*τῶν μετὰ τὰ φυσικά*, B. xi, chap. 7, vol. 2, p. 1381. See also B. vi, chap. 1, p. 1308.

† Berkeley: *Treatise concerning the Principles of Human Knowledge*, § 148. Compare Solly, p. 239. "The only alternative, as it appears to me, which saves any form of life and freedom in the external world, anything that should account for and justify the profound sense of awe we experience in viewing the glories of the universe, without making it the very God Himself, and thus rushing at once into the very grossest form of pantheism, is this,—that we should give up the idea of its self-subsistence and conceive it as a maintained manifestation of the Divine energy."

‡ Socrates; quoted by Anderson, p. 158.

286. God, the revealer, in the objective-subjective or theological relation,—Man, the observer, the finite-subjective, the metaphysician,—and Truth, the revealed, in the subjective-objective or scientific relation, are the sole objects of philosophical inquiry. All observation should start from the observer, as the centre to which everything is referred. That which is nearest to the observer may be most closely and carefully scrutinized, and the scrutiny will furnish base lines for extending the survey to that which is more remote.

287. Man finds in himself not only the triform Intelligence, but also an analogous threefold nature,—Intelligence, Force, and a passive material frame, which is controlled by Intelligence through the instrumentality of Force. Of these three coexistences, Intelligence occupies the highest rank, and Matter the lowest, while Force is intermediate, acting and reacting between the other two.

288. This evident action and reaction has given rise to two opposite schools of philosophy: the material, which maintains that mind is a product of physical organization, and the spiritual, which, starting from the indubitable truth that we know nothing of matter except the ideas that are formed of it in our own minds, denies all material existence, and recognizes in the universe only mind and its ideas. Although the spiritual school is undoubtedly the most reasonable, a true philosophy must either recognize in the differing qualities of thought and extension sufficient grounds for admitting the substantial existence of both mind and matter, or it must satisfactorily demonstrate that all those qualities can be deduced from the admitted properties of a single form of substance.

289. The human intelligence is undoubtedly affected by material influences and associations, but that it is not a resultant of the material organization is evident from the fact that the cultivation of the material frame (beyond the mere requisites of physical health) tends rather to weaken than to increase man's power over the intellectual world,—while the cultivation of the intellect always increases his power over the material universe.

290. With whatever reason man may assign to his intelligence the highest rank in his own organization, he cannot deny that it is, in its turn, subject to a still higher external power.

291. In investigating the external world he finds, as in his own microcosm, passive matter and forces, over which his own Intelligence can exert some control, and which are more fully controlled and directed by some invisible Agency. The mode in which the Agency guides Force is called Law. The human mind can, to a limited extent, frame laws of its own, analogous, though infinitely inferior, to those of the Supreme Agency. Human Intelligence can, moreover, investigate, comprehend, and in some cases predict the laws which govern the Universe.

292. The Supreme Agency, or Ruler of the Universe, acts, therefore, in ways which

are partially comprehensible by finite human intelligence, the comprehension being fuller in proportion as that intelligence is more highly developed,—in such ways as an Infinite Intelligence would act. And as we can conceive of no other agency than Intelligence that would be able to assign laws to force, the conclusion is irresistible that Intelligence is the highest or ruling power of the Universe. An infinite Intelligence could control an infinite Universe, but no other conceivable form of Existence would be capable of such control.

293. Many have imagined that they could conceive in some fancied necessity or fate a cause superior to Intelligence. But a rigid analysis would probably prove that the supposed necessity was only a characteristic of the Infinite Intelligence, in which the mass of mankind have always believed. For what is necessity but an attribute of rational determination? What other ground can be given for the predication of necessity than that reason declares that it must be so? What our finite reason discovers as infinitely and eternally necessary, the Infinite Reason must have declared from all eternity. Necessity, as apprehended by us, is purely ideal,—perhaps the highest of all mere ideas,—and yet the idea is doubtless the perfect transcript of the reality. Our idea could have no existence except in intelligence, and the reality is not conceivable as having any existence independent of an Infinite Intelligence.*

294. Others have supposed that Law is supreme, even Intelligence and Will being the results of organization, and therefore subject to the organic law. But what is this organic law, and what possible conception can be formed of any law, independent of a lawgiver?

295. The vital movements are almost wholly involuntary, and are generally under the control of the law of vitality, which is another name for the organic law. This law, like Will, acts for a special purpose, and its action may often be modified, and to some extent controlled, by the counteraction of the human will.

296. The same agencies (light, heat, electricity, &c.) that govern the universe in accordance with fixed laws for fixed purposes, are also used by man to accomplish his purposes in the exercise of his will.

297. The man to whom we become attached is the spiritual, not the physical man. This spiritual man controls the motions of the limbs, the organs of speech, and all the voluntary muscles, by his individual will. The will is, therefore, their law. The law, or

* If the Supreme were not intelligent and rational, it would be impossible to predict any result, or to trace out any antecedent cause. The perception of necessity is not the perception of any blind chance or fate, but the perception of a rational conclusion or law, which could only have been originally made and eternally sustained by a Rational Lawgiver.

governing power, is higher than the thing governed, and cannot, therefore, be its creature or resultant.

298. "My lawful will, simply as such, in and through itself, must have consequences, certain and without exception. . . . The idea of *Law* expresses generally nothing else but the fixed, immovable reliance of Reason on a proposition, and the impossibility of supposing the contrary.

299. "I assume such a law of a spiritual world which my own will did not enact, nor the will of any finite being, nor the will of all finite beings together; but to which my will and the will of all finite beings is subject. . . .

300. "Agreeably to what has been advanced, the law of the supersensuous world should be a *Will*.

301. "A Will which acts purely and simply as will, by its own agency, entirely without any instrument or sensuous medium of its efficacy; which is absolutely, in itself, at once action and result; which wills and it is done, which commands and it stands fast; in which, accordingly, the demand of reason, to be absolutely free and self-active, is represented. A Will, which is law in itself; which determines itself, not according to humor and caprice, nor after previous deliberation, vacillation and doubt, but which is forever and unchangeably determined, and upon which we may reckon with infallible security; as the mortal reckons securely on the laws of his world. A Will in which the lawful will of finite beings has inevitable consequences, but only their will, which is immovable to everything else, and for which everything else is as though it were not."*

302. "Now, the great complex of all this universe, in all time and all eternity, is made up of nothing more than the will of the Creator and the wills of his creatures. What is all this solid frame of sun, earth, and stars, as far as we can know anything of it, but the projection of the will of God upon the mind of man? What is all history but the action of the will of man within the limits imposed by the will of God? Will, in some form, either Divine or human, is the first principle of all existing things."†

303. "All laws, considered in the origin of their power, are despotic. *Sic volo sic jubeo.* Laws of the will are not laws which the will receives, but laws which the will gives. . . How should a law be able to produce a will?"‡

304. Necessity and Law are, therefore, subordinate to Will and Intelligence, and the analogies of Ontology, as well as the postulated Unity of Reason and the teachings of Faith, lead irresistibly to a Supreme Active Intelligence.

* Fichte.

† Solly, p. 11.

‡ Jacobi. See the third Antinomy; Kant, pp. 314–18.

CHAPTER X.

ONTOLOGICAL VIEWS.

305. BEFORE proceeding to essay a preliminary ontological analysis, it may be well to group together a few of the observations of prominent philosophers who have been led, experimentally, to conclusions analogous to those which flow necessarily from the theoretical relations of the subjective and objective.*

306. "Being and thought are therefore identical, with Parmenides. This pure thought, directed to the pure being, he declares is the only true and undeceptive knowledge, in opposition to the deceptive notions concerning the manifoldness and mutability of the phenomenal." *Schwegler*, p. 29.

307. "But my thinking, my reason is not something specially belonging to me, but something common to every rational being; something universal, and in so far as I am a rational and thinking being, is my subjectivity a universal one. But every thinking individual has the consciousness that what he holds as right, as duty, as good or evil, does not appear as such to him alone, but to every rational being, and that consequently his thinking has the character of universality, of universal validity, in a word,—of objectivity, . . . and therefore with him [Socrates] the philosophy of objective thought begins." *Id.*, p. 51, 52.

308. "Some of the ancients say that Plato was the first to unite in one whole the scattered philosophical elements of the earlier sages, and so to obtain for philosophy the three parts, logic, physics, and ethics. The more accurate statement is given by *Sextus Empiricus*, that Plato has laid the foundation for this threefold division of philosophy, but that it was expressly recognized and affirmed by his scholars, Xenocrates and Aristotle." *Id.*, p. 82.

309. "Plato distinguishes two components of the soul,—the Divine and the mortal,—the rational and the irrational. These two are united by an intermediate link which Plato calls θυμός, or spirit, and which, though allied to reason, is not reason itself, since it is often exhibited in children and also in brutes, and since even men are often carried away by it without reflection. This threefoldness, here exhibited psychologically, is found, in different applications, through all the last general period of Plato's literary life. Based upon the

* The selections in this chapter are taken from the works of German philosophical historians, because Kant and his successors of the modern German school have recognized a prevailing triplicity, to which they have been empirically led through the radical duality of the subjective and objective.

anthropological triplicate of reason, soul, and body, it corresponds also to the division of theoretical knowledge into science (or thinking), current opinions (or sense-perception), and ignorance; to the triple ladder of eroticism in the symposium and the mythological representation connected with this of Poros, Eros, and Penia; to the metaphysical triplicates of the ideal world, mathematical relations and the sensible world." *Id.*, p. 99.

310. Aristotle calls the soul in plants, nutritive,—in animals, sensitive; "lastly, the human soul is at the same time nutritive, sensitive, and cognitive." *Id.*, p. 129.

311. According to Aristotle, "It is by three things, therefore, nature, habit, and reason, that man becomes good." *Id.*, p. 132.

312. "To the two cosmical principles already received, viz., the world-soul and the world-reason, a third and higher one was added by the New Platonists. For if the reason apprehends the true by means of thinking, and not within itself alone; if, in order to grasp the absolute and behold the divine, it must lose its own self-consciousness, and go out beyond itself, then reason cannot be the highest principle, but there stands above it that primal essence, with which it must be united if it will behold the true. To this primal essence, Plotinus gives different names, as 'the First,' 'the One,' 'the Good,' and 'that which stands above being.' . . . In all these names, Plotinus does not profess to have satisfactorily expressed the essence of this primal One, but only to have given a representation of it. In characterizing it still further, he denies it all thinking and willing, because it needs nothing and can desire nothing; it is not energy, but above energy; life does not belong to it; neither being nor essence, nor any of the most general categories of being can be ascribed to it; in short, it is that which can neither be expressed nor thought." *Id.*, p. 155.

313. "The system of Spinoza rests upon three fundamental conceptions, from which all the rest may be derived with mathematical necessity. These conceptions are that of substance, of attribute, and of mode." *Id.*, p. 185.

314. According to Locke, "the complex ideas may be referred to three classes, viz., the ideas of mode, of substance, and of relation. . . . Our idea of substance is distinguished from all other complex ideas, in the fact that it is an idea which has its archetype distinct from ourselves, and possesses objective reality, while other complex ideas are formed by the mind at pleasure, and have no reality corresponding to them external to the mind. We do not know what is the archetype of substance, and of substance itself we are acquainted only with its attributes. A relation arises when the understanding has connected two things with each other in such a way, that in considering them, it passes over from the one to the other." *Id.*, p. 196.

315. "God gives us ideas; but as it would be contradictory to assert that a being could give us what it does not possess, so ideas exist *in God*, and we derive them from

Him. Those ideas in God may be called archetypes, and those in us ectypes. In consequence of this view, says Berkeley, we do not deny an independent reality of things; we only deny that they can exist elsewhere than in an understanding." *Id.*, pp. 221–2.

316. "Resting on the perception that there are within the soul two faculties, one of knowing and one of willing, Wolff divides philosophy into two great parts,—theoretical philosophy (an expression, however, which first appears among his followers), or metaphysics, and practical philosophy. Logic precedes both, as a preliminary training for philosophical study. Metaphysics are still farther divided by Wolff into ontology, cosmology, psychology, and natural theology; practical philosophy he divides into ethics, whose object is man as man; economics, whose object is man as a member of the family; and politics, whose object is man as a citizen of the state." *Id.*, p. 224.

317. [Kant.] "All the faculties of the soul, he says, may be referred to three, which are incapable of any farther reduction; knowing, feeling, and desire. The first faculty contains the principles, the governing laws for all the three. So far as the faculty of knowledge contains the principles of knowledge itself, is it theoretical reason, and so far as it contains the principles of desire and action, is it practical reason, while, so far as it contains the principles which regulate the feelings of pleasure and pain, is it a faculty of judgment. Thus the Kantian philosophy (on its critical side) divides itself into three criticks; (1) Critick of pure, *i. e.* theoretical reason; (2) Critick of practical reason; (3) Critick of the judgment." *Id.*, pp. 237–8.

318. "The faculty of judgment is the middle link between the understanding as the faculty of conceptions, and the reason as the faculty of principles. . . . The object of the faculty of judgment is, therefore, the conception of *design* in nature; for the evidence of this points to that supersensible unity which contains the ground for the actuality of an object. And since all design and every actualization of an end is connected with pleasure, we may farther explain the faculty of judgment by saying, that it contains the laws for the feeling of pleasure and pain." *Id.*, p. 262.

319. "The positive philosophic views which Jacobi exhibits in this treatise ['On the Doctrine of Spinoza, in letters to Moses Mendelssohn'], can be reduced to the following three principles: (1) Spinozism is fatalism and atheism. (2) Every path of philosophic demonstration leads to fatalism and atheism. (3) In order that we may not fall into these, we must set a limit to demonstrating, and recognize faith as the element of all metaphysic knowledge." *Id.*, p. 272.

320. "A theory of science must posit some supreme principle, from which every other must be derived. This supreme principle must be absolutely, and through itself, certain. . . . . Its test and demonstration can only thus be gained, viz., if we find a principle to which all science may be referred, then is this shown to be a fundamental principle. But

besides the first fundamental principle, there are yet two others to be considered, the first of which is unconditioned as to its content, but as to its form, conditioned through and derived from the first fundamental principle; the other the reverse. The relation of these three principles to each other is, in fine, this, viz., that the second stands opposed to the first, while the third is the product of the two. Hence, according to this plan, the first absolute principle starts from the Ego, the second opposes to the Ego a thing, or a Non-Ego, and the third brings forward the Ego again in reaction against the thing, or the Non-Ego. This method of Fichte (thesis,—antithesis,—synthesis), is the same as Hegel subsequently adopted and applied to the whole system of philosophy, a union of the synthetical and analytical methods." *Id.*, p. 285.

321. "Schelling thus distinguishes the two sides of philosophy. All knowledge rests upon the harmony of a subject with an object. That which is simply objective is natural, and that which is simply subjective is the Ego or intelligence. There are two possible ways of uniting these two sides: we may either make nature first, and inquire how it is that intelligence is associated with it (natural philosophy), or we may make the subject first, and inquire how do objects proceed from the subject (transcendental philosophy). The end of all philosophy must be to make either an intelligence out of nature, or a nature out of intelligence. . . Both, however, are only the two poles of one and the same knowledge, which reciprocally attract each other; hence, if we start from either pole, we are necessarily drawn towards the other." *Id.*, p. 318.

322. [Hegel.] "Mind is at first theoretical mind, or intelligence, and then practical mind, or will. It is theoretical in that it has to do with the rational as something given, and now posits it as its own; it is practical in that it immediately wills the subjective content (truth), which it has as its own, to be freed from its one-sided subjective form, and transformed into an objective. The practical mind is, so far, the truth of the theoretical. The theoretical mind, in its way to the practical, passes through the stages of intuition, representation, and thought, and the will on its side forms itself into a free will through impulse, desire, and inclination. . . .

323. "This stand-point [of moral reflection] has three elements: (1) the element of resolution (*vorsatz*), where we consider the inner determination of the acting subject, that which allows an act to be ascribed only to me, and the blame of it to rest only on my will (imputation); (2) the element of purpose, where the completed act is regarded not according to its consequences, but according to its relative worth in reference to myself. The resolution was still internal; but now the act is completed, and I must suffer myself to judge according to the constituents of the act, because I must have known the circumstances under which I acted; (3) the element of the good, where the act is judged according to its universal worth. The good is peculiarly the reconciliation of the particular

subjective will with the universal will, or with the conception of the will; in other words, to will the rational is good." *Id.*, pp. 358, 360.

324. "We regard, indeed, generally the three ideas, God, freedom, and immortality, as the chief subject-matter, or content of philosophy." *Chalybäus*, p. 4.

325. [Kant.] "These three ideas (soul, world, deity), would thus furnish the principles of the three divisions of metaphysics, namely, rational psychology, cosmology, and theology. . . .

"Since then, it has been made out, as a conseqence of the Critick of Pure Reason, that the proper objects of metaphysics, namely, God, universe, and mind (freedom, subjective being), are wholly inaccessible to our cognition, and lie beyond the limit of all philosophical *knowledge*, . . we cannot indulge the least hope of ever learning, by the help of speculation, whether or not there are transcendent beings that correspond to these ideas." *Id.*, pp. 34, 48.

326. "While with Hegel, in his logic, nature-philosophy and philosophy of mind, we everywhere encounter a tripartite system, bound together by a single, formal, and real principle, and conditionated by one decisive method, which repeats itself in a rhythmic and symmetrical manner throughout; so also in Herbart's system we find, it is true, such a threefold division,—but one which, apart from many other considerations, differs wholly from that of Hegel's system in this, that the three cardinal divisions, or the Logic, Metaphysics, and Æsthetics, are neither bound together by a common, real, or formal principle, nor do they acknowledge, as presiding over them, any general and fundamental doctrine, which might contain and determine such a fundamental principle." *Id.*, p. 83.

327. "According to Herbart, we can think of the change as taking place in a threefold manner, either as proceeding from external causes, or by self-determination, or finally as absolute origination or becoming." *Id.*, p. 100.

328. "So far as philosophy busies itself with the forms of thought as such, it is logic; so far as it penetrates in thought the content that is given us, thus cognizes the being and elevates it to knowledge, it is metaphysics, which is the fundamental science of philosophy. Schleiermacher, however, includes the two parts of it, the metaphysical division of the general doctrine of cognition, and the special logical, together under the name of *Dialectick*. Under this general division comes in due order everything that is conceivable, consisting upon the one hand, of nature, upon the other, of the sphere of conscious action, consequently of physics and ethics, so that on the whole, the ancient division of philosophy into dialectick, physics, and ethics is re-established." *Id.*, pp. 191–2.

329. [Schelling.] "In this freedom [of the ideal] it was said that we encounter the last potentializing act, whereby the whole of nature became transfigured into sensation, intelligence, and finally into will. In the last and highest instance, there is no other

being whatever than volition. Volition is primordial being, and with this alone all its predicates of groundlessness, independence of time, and self-affirmation conform." *Id.*, p. 265.

330. [Hegel.] "Universality, speciality, and individuality, are accordingly the three momenta of the idea, and are present in it as an unity. . .

"We are consequently suddenly withdrawn from the sphere of the subjective logic, and transported into the region of objectivity, or into the '*doctrine of the object*,' which resolves itself into 'mechanism, chemism, and teleology.'" *Id.*, pp. 335, 338.

331. "The Hegelian fundamental schema,—Being, Naught,* Origination,—does not correspond to the schema of objective teleology,—principle, means, and effect; but the origination or process, *i. e.* the means, is interposed as an eternal self-mediation in the place of the purpose." *Id.*, p. 381.

332. "We have in the present work traversed but a comparatively small, although rich, division of the whole development of Philosophy,—in short, its last or modern phase only; and have seen in this that the chief business of human thought is and must be to discover principle, means, and end, both in the singular and in the whole. All three moments ought to be one or united; but they must also be distinguished, and each in its own place must necessarily be that to which, by this place, it is entitled or justified." *Id.*, p. 385.

333. In all the foregoing quotations, it is easy and interesting to trace the influence of the great idea of relativity, and in nearly every instance the idea is plainly developed under the forms of direction to, in, or from some assumed subjective or objective centre, although, in consequence of the experimental nature of the development, the boundaries of the several forms are not as clearly marked as they would have been, if the theoretical limitation had been thoroughly understood, and constantly kept in view.

CHAPTER XI.

DEDUCTION OF THE KANTIAN CATEGORIES.

334. In attempting to reach the *summa genera* of the knowable, we may start either from the objects of thought, or from thought itself. The results of the two processes will

* All our reasoning about the Absolute must be, as Mansel well observes (p. 85), not about "the nature of the Absolute in itself, but only our own conception of that nature. The distortions of the image reflected may arise only from the inequalities of the mirror reflecting it." If we imagine the Absolute to be not only independent of relation, but absolutely devoid of relation, our conception of it, like Hegel's, must be simply Naught.

naturally differ, but the difference should not be irreconcilable, and philosophy can never make much progress until a reconciliation is effected. "Aristotle attempted a synthesis of things in their multiplicity,—a classification of objects real, but in relation to thought; —Kant, an analysis of mind in its unity,—a dissection of thought, pure, but in relation to its objects. The predicaments of Aristotle are thus objective, of things as understood; those of Kant subjective, of the mind as understanding. The former are results *a posteriori*,—the creations of abstraction and generalization; the latter, anticipations *a priori*,—the conditions of those acts themselves."*

335. The method of Aristotle was nearly perfected by its author, and for more than two thousand years, his disciples have endeavored in vain to extend or improve his system. The method of Kant was merely initial, and the revival of philosophy during the past century has shown that it was productive. It has the advantage of starting from that which is best known, the subjective, in its endeavors to learn the unknown, while Aristotle started from the objective, of which he was obliged to assume a reality for which he had only subjective evidence.

336. Without attempting to harmonize the objective and subjective categories,—without even endeavoring to give the best philosophical explanation of the basis on which either of them rests,—it may reasonably be expected that a subjective symbolism should at least show a possible mode, if not the best mode, of accounting for Kant's empirical arrangement of the subjective categories. Let us see with what success we can deduce them from the relations of the primitive forms of Consciousness.

337. All analysis proceeds from the general to the particular that is embraced under it. Our highest general idea of the mind, is the idea of Consciousness, and the first question that suggests itself for our analysis is, How does Consciousness regard the objects of its cognition, or in what different modes can it consider them? The answer will naturally be sought in accordance with the conditions of Motivity, Spontaneity, and Rationality.

338. Motivity, although it refers to objects exterior to ourselves, cannot immediately give us those objects. It relates only to phenomena, and to the influence of those phenomena on our own minds. If, for example, I receive a sensation of solidity, or heat, or color, the *sensation* is entirely subjective; it belongs exclusively to myself, and not to the body, to which Motivity refers as its cause. I cannot, therefore, merely as receptive, assert the reality of anything objective; the most I can do is to admit its Possibility.

339. Spontaneity, being exclusively subjective in its action as well as its reference, is entirely valid in all its determinations. I know absolutely all that I feel, wish, do, or think, and hence I derive a consciousness superior to the mere possibility of the Motivity,—

* Hamilton: *Discussions*, p. 32.

a consciousness of Reality. My own reality is more evident than that of any being out of myself, and the highest reality to which I can attain is, therefore, that of a Spontaneous Intelligence.

340. Rationality decides not only with unvarying uniformity from the data that are given it, but it does so with the full conviction that it would be impossible for any intelligent being to decide otherwise from the same data. In viewing the possibility of Motivity, it decides that there must necessarily be an external objective cause of all our external impressions; it seeks in the reality of the subjective Spontaneity a necessary object for its consideration; and it conjoins the idea of necessity with all its determinations, thus completing the circle of our modes of thought.

341. Consciousness, therefore, in the three conditions of intelligence, gives us the three categories of Modality,—Possibility, Reality, and Necessity, all of which refer to General Science.

342. Subjecting the several mental states in turn to the same kind of analysis, our next inquiries must be: How do Motivity, Spontaneity, Rationality regard the objects of their cognition? We will seek the answers by the same clue that we adopted in the case of Consciousness.

343. A passive and comparatively quiet state of mind is the earliest, the easiest, and perhaps the most common at all periods of life. The facts of Motivity are therefore the most evident, the most generally admitted, and the most readily understood. Motivity is emphatically the faculty of childhood or pupilage; and all its teachings are received with the implicit faith of the child and pupil.

344. All our impressions are susceptible of increase or diminution. Hence through Motivity we readily obtain the idea of Quantity.

345. All the impressions of mere Motivity are single and momentary. Merely as receptive beings, we neither distinguish parts of objects nor unite different impressions together. If we feel, our sensation is a unit,—merely a feeling, and nothing more; if we see, we see an object as a unit, and so with every impression on the senses. It is merely the impression that is cognized through Motivity, and the category of Motivity, cognizing its own impressions, is, therefore, Unity.

346. Spontaneity unites several determinations in its own consciousness. It embraces the faculty of attention, and applying itself to the determinations of Motivity, it can attend successively to all the parts of an object or of an impression, and derive the idea of plurality from unity. The category of Spontaneity, cognizing the impressions of Motivity, is, therefore, Plurality.

347. The office of Rationality is, as we have seen, to cognize and compare the representations of the other intellectual conditions. Applying itself to the determinations of

Motivity, it will therefore recognize both the receptive unity and the spontaneous plurality, and from their relation will derive the category of Totality, in which Unity and Plurality are both combined.

348. Motivity, therefore, in the three conditions of intelligence, gives us the three categories of Quantity,—Unity, Plurality, and Totality, all of which refer, through the motive category of Modality, to the Science of the Possible, and particularly to Mathematical Science.

349. Next in order of prominence as well as of acquisition, are the determinations of Spontaneity. The subject cannot regard itself otherwise than as object, and there is therefore more difficulty attending the study of the purely subjective, than we have found in the objective, as manifested through Motivity.

350. Spontaneity is the active, laboring state of the mind, corresponding to the vigor of youth and early manhood. In investigating its laws, one of the first inquiries is, What influence do we have by our voluntary action over the objects of our cognition, or what quality do we communicate to them?

351. All impressions of Spontaneity on Motivity, are real or affirmative. We have, indeed, no power of limitation or of negation, as mere receptive beings, but we assert fully and positively, every impression that we receive. Thus, we can never admit that the senses deceive us, for the senses are merely media for conveying impressions. We exercise our attention or spontaneity, together with our senses or motive-rationality, and an impression follows, the reality of which is undoubted. A further effort of spontaneity is required to interpret the meaning of that impression, and if that secondary effort is insufficient, we are led into error. The category of Motivity, cognizing the impressions of Spontaneity, is therefore Affirmation.

352. The peculiar office of Spontaneity, particularly when concerned with its own actions, or with Reality, of which its actions are the representatives, is to define, limit, and give precision to our ideas.

353. We have seen that what are called delusions of the senses, are properly errors of spontaneity. I have, for example, the impression of an object on the optic nerve. Of the reality of the impression there can be no doubt, but great care may be necessary to give it its proper interpretation. I must first inquire whether the impression is occasioned by a disease of the nerve, or by the normal stimulus of an external object. If I am satisfied that it proceeds from an outward object, I must then attend to the angles of vision which determine the outline, the modulations of light and shade that indicate the form, the distinctness or indistinctness that mark its relative nearness or distance, and enable me to judge of its size, the clearness or haziness of the atmosphere, sharpness or obscurity of vision, and any other circumstances that may affect my decision. A failure of proper at-

tention in any of these limiting particulars, may be the source of error. The category of Spontaneity, cognizing its own action, is therefore Limitation.

354. Rationality, comparing the receptive affirmation and the spontaneous limitation, can alone set impassable limits, and give us the category of Negation. The child, in beginning to gratify his desire for knowledge, accepts everything that is told him with implicit faith. It is only after Rationality has acquired considerable development, that he begins to doubt or deny.

355. Spontaneity, therefore, in the three conditions of intelligence, gives us the three categories of Quality,—Affirmation, Limitation, and Negation; all of which refer, through the spontaneous category of Modality, to the science of Reality, or Existence, and particularly to Natural Science.

356. Rationality is not only the highest of our faculties, but it is the latest developed, and the most rarely found in full development. It holds the same rank in the human mind that man himself occupies in the created world, and as reasoning beings are superior to beings of impulse and instinct, so is the reasoning man, the man who seeks and loves the true and perfect, superior to the man of appetite and passion.

357. A thorough investigation of Rationality is therefore, as we might naturally suppose, and as we shall find in the pursuit of our inquiries, attended with greater difficulties than the study of Motivity or Spontaneity. Some of these difficulties are indeed insurmountable by finite and progressive beings, for from its very nature, reason requires the perfect and infinite for its full satisfaction. So long, therefore, as there is any leaven of imperfection in us, we can only approximate nearer and nearer to its ends, without ever attaining them.

358. The first step in our progress, the investigation of the rational categories, is, however, comparatively easy, guided as we may be by the results we have already obtained. We need only inquire (since the objective becomes ideally represented to us only through Relation), What are Motivity, Spontaneity, and Rationality, and what relations do they severally indicate?

359. Motivity, as we have seen, refers merely to phenomena, from which we obtain ideas of the accidental qualities of bodies. Rationality asserts the necessity of some reality in which those qualities inhere. The category of Motivity in Rationality is, therefore, that of Inherence and Subsistence, or Substance and Accident.

360. Spontaneity is the faculty of action. Rationality assigns the negative limit to action, which is reaction. The relation of the two gives us the category of Spontaneity in Rationality, which is that of Action and Reaction.

361. Rationality, as will be more evident hereafter, is the faculty of Cause. The correlative of cause is effect. The same relation is easily discovered by comparing the two

preceding categories. The category of Rationality in Rationality is, therefore, that of Cause and Effect.

362. Rationality, therefore, in the three conditions of intelligence, gives us the three categories of Relation: Substance and Accident, Action and Reaction, and Cause and Effect, all of which refer, through the rational category of Modality, to the science of the Necessary, and particularly to Metaphysical Science.

363. The twelve categories thus deduced, correspond with the categories of Kant, except in the arrangement of the subdivisions of Quality and Relation. Kant could discover no reason for his arrangement, or for the precise number of categories that he propounded,* but his mind was eminently analytical, and proceeding in strict accordance with the necessary laws of analysis, his researches were crowned with a success nearly as complete, as if he had fully perceived the dependence of the result upon those laws. Perhaps in no portion of his great works is his genius more evident, than in his development of the laws of perceptive unity, with no other guides than his own discernment, and the meagre clue afforded by the categories of Aristotle.†

364. So far as the categories are the representatives of ideas that we have received, they belong to our Motivity, and therefore have an objective reference as to their origin. If we apply them to the subject through Spontaneity, or to general judgments through Rationality, they undergo a formal modification that can be readily discerned.

365. If we represent the judgment forms by means of symbols, their mutual relation and deduction will be more evident, and the defects of our nomenclature, whatever they may be, will disappear in the symbolic formula. In the following table, X is the symbol of the categorical or rational forms; Y of the subjective or spontaneous; Z of the condi-

* "But respecting the property of our understanding, to effect unity of apperception *à priori*, only by means of the categories, and precisely only in this manner and the number thereof, no more motive can be adduced than why we have exactly these, and no other functions of judgment, or why time and space are the only forms of our possible intuition." Kant, pp. 96–7.

† Aristotle's categories were, Being, οὐσίαν; Quantity, ποσὸν; Quality, ποιὸν; Comparison or Relation, πρός τι; Where, πόθι; When, ποτὲ; Posture, κεῖσθαι; Having, ἔχειν; Action, ποιεῖν; Passion, πάσχειν. Vol. I, p. 20. Hamilton arranges these categories as follows: "*Being by itself* corresponds to the first category of Aristotle, equivalent to substance;—*Being by accident* is viewed either as absolute or as relative. As absolute, it flows either from the matter, or from the form of things. If from the matter, it is *Quantity*, Aristotle's second category; if from the form, it is *Quality*, Aristotle's third category. As relative, it corresponds to Aristotle's fourth category, *Relation;* and to Relation all the other six may be reduced." *Logic*, p. 141.

There are six simple ideas, "according to the most accredited opinion, in the school of the Nyaya [founded by Gotama]. These are substance, quality, action, the common (the general, genus), property (species, the individual), and relation. Some authors add a seventh element,—privation or negation; others add two more still,—power and resemblance." *Cousin: Hist. of Mod. Phil.*, Vol. I, p. 382.

tional or motive. The modification of the several forms under their relation to the general Consciousness, is denoted by C; M symbolizes the relation to Motivity; S, to Spontaneity; R, to Rationality.

366. With the interpretation of the categorical forms, we are already familiar. If we were to interpret the others in a similar manner, the entire table would be nearly as follows:

X, Categorical.	*Y, Subjective.*	*Z, Conditional.*
XM, Quantity.	YM, Quantity.	ZM, Quantity.
XMM, Unity.	YMM, Complexity.	ZMM, Universal.
XMS, Plurality.	YMS, Simplicity.	ZMS, Particular.
XMR, Totality.	YMR, Aggregation.	ZMR, Individual.
XS, Quality.	YS, Quality.	ZS, Quality.
XSM, Affirmation.	YSM, Admission.	ZSM, Affirmative.
XSS, Limitation.	YSS, Qualification.	ZSS, Qualitative.
XSR, Negation.	YSR, Enclosure.	ZSR, Infinite.
XR, Relation.	YR, Relation.	ZR, Relation.
XRM, Substance and Accident.	YRM, Intelligence and Manifestation.	ZRM, Subject and Predicate.
XRS, Action and Reaction.	YRS, Restraint and Resistance.	ZRS, Condition and Conditioned.
XRR, Cause and Effect.	YRR, Design and End.	ZRR, Foundation and Consequence.
XC, Modality.	YC, Modality.	ZC, Modality.
XCM, Possibility or Impossibility.	YCM, Hypothesis.	ZCM, Problematical.
XCS, Reality or Non-Entity.	YCS, Faith.	ZCS, Assertive.
XCR, Necessity or Contingence.	YCR, Knowledge.	ZCR, Axiomatic.

367. The number of possible categories, like the number of possible faculties, is infinite. The extent to which the subdivision should be carried, must depend entirely on the purposes we wish to serve.

CHAPTER XII.

APPLICATION OF CATEGORIES,—SPACE, TIME, AND POSITION.

368. HAVING now indicated the groundwork of science, and having shown that upon this groundwork a superstructure may be erected of infinite detail, we shall confine ourselves principally in the farther execution of our plan, to a partial development of the categories of Relation and Modality, as applied to objects of cognition.

369. Knowledge may be either modally absolute, real, or problematical.* Of absolute knowledge, we have an example in pure mathematics, and in every axiom, or proposition which carries with itself the perception of its necessity and universal validity. Real knowledge embraces every fact which we are compelled to believe by the constitution of our minds, but of which we do not perceive the entire necessity. Problematical knowledge, or belief, covers everything which we believe to be true, but the truth of which depends on circumstances which it is impossible for us to determine with certainty.

370. Science, properly so called, is concerned principally with the absolute or necessary, and the real. General science is based upon, and includes all the necessity that is discerned by the intelligence in its several conditions.

371. Our cognitions in their reference, as we have seen, are either objective, subjective, or ideal. The objects of our cognition, or the things cognized, may be viewed in three states, analogous to the three conditions of consciousness. We may regard them either as passive, active, or sustaining.†

372. There can be no possibility, except in accordance with reality and necessity. If objects can have a passive, an active, or a sustaining existence, there must be some reality that renders their existence possible. In attempting to ascertain the forms of that reality, by analyzing the objective, we enter on a task both delicate and fruitless, unless that Greatest, Wisest, and Best, toward which all philosophy aspires as the necessary goal of its inquiries, is pure Intelligence, and therefore purely subjective, and what is objective to our finite intelligence, is in reality only a form or product of a higher subjective.‡ We

* The term knowledge has been confined by some writers to absolute truth. But we speak of the acquisition of knowledge, including what we learn from books and from testimony, and the more extended definition here recognized therefore corresponds with the common acceptation of the term.

† Every cognition must be either of the *not-me*, or objective,—of the *me*, or subjective,—or of the ideal, which embraces every logical antecedent of either objective or subjective manifestations. The mind, as motive, is nearly passive; as spontaneous, active; as rational, sustaining or authoritative,—every effort of rationality being an effort to approximate to the underlying, upholding, substantial, or necessary.

‡ "Every cogitative faculty, though it is not the sole cause of its own immediate (apparent) object, yet has a share in making it: thus the eye or visive faculty hath a share in making the colors which it is said to see; the ear or auditive power, a share in producing sounds, which yet it is said to hear; the imagination has a part in making the images stored in it; and there is the same reason for the understanding, that it should have a like share in forming the primitive notions under which it takes in and receives objects; in sum, the immediate objects of cogitation as it is exercised by men, are *entia cogitationis*, all phenomena; appearances that do no more exist without our faculties in the things themselves, than the images that are seen in water or behind a glass, do really exist in those places where they seem to be." *Essay upon Reason and the Nature of Spirits*, by Richard Burthogge, M.D., quoted by Solly, p. 285.

If we could fully comprehend the share of the Will in making its own motives, we could doubtless better understand the extent and limits of free will.

have already discovered good reasons for believing that such is the case, and we shall find, if we investigate thoroughly, that on any other hypothesis, all pretended philosophy,—as well as all supposed science, whether it be self-styled positive, or speculative,—is an idle dream.

373. As the objective mode of Existence embraces everything as it is in itself, independent of any (finite) subjective relations or modifications, it corresponds to the *essentia* of Cicero, and it may, therefore, perhaps be best designated by the term ESSENCE.

374. The Necessary modification of Essence, which renders all other manifestations possible, we will call FORM, inasmuch as it determines the qualities or characteristics that must attend every conceivable form of essential being.

375. To Reality in Essence, we may apply the name of SUBSTANCE, in accordance with the general usage of philosophers, though some, like Xenophanes, Descartes, and Spinoza, so limit the meaning of substance, that the term is nearly synonymous with Absoluteness, or Self-Existence, and is therefore only applicable to the Deity.

376. The Possible in Essence, as the source of all the modifications of which it is susceptible, we will call CONDITION.

377. In extending this analysis, in order to determine in the first place the subdivisions of Form, the analogy that we have followed hitherto, justifies the use of such assistance as we can derive from the primary forms of Consciousness.

378. Through the mediation of Motivity, we obtain ideas of difference, externality, extension, and of Space, in which extension is alone possible, and in which is also included the possibility of passive existence.

379. Through Spontaneity, we obtain ideas of intelligent action, succession, duration,—and of Time, which renders them all possible.

380. Through Rationality, as the faculty of precise determination, we obtain ideas of relation, cause, fundamental being,—and of that which renders them all possible, which we will call Position.*

381. Position bears the same relation to Space and Time, as the Rational holds in all cases to the Motive and the Spontaneous. It embraces not merely place and date, but also limit, relation, diversity, multiplicity, law, and all the determinations which fix the boundaries of any conceivable form of being,† in Space or Time.

* There is a curious etymological connection, that deserves a passing notice, between *lay, law, p-lac-e, λεγ-, λογ-, lec-, loc-*.

† "I must tell you at once that human reason, in whatever manner it is developed, however occupied, whether it stop at the observation of this nature which surrounds us, or whether it dart into the depths of the interior world, conceives all things only under the condition of two ideas. Does it examine numbers and quantity? it then sees nothing but unity or multiplicity. . . . Does it occupy itself with space? it can consider it only under two

382. Space and Time are in themselves infinite, and forms or manifestations or attributes of the Absolute Infinite. In them the indefinite and the infinite are as nearly equivalent as it is possible to suppose them, and our indefinite conceptions are so nearly adequate, that we need hardly desire them to be more complete. But without Position, both Space and Time would be empty voids,—not only void of reality, but also void of conceivability.

383. When Hamilton says that Time and Space are only the images or intuitions or concepts "of a certain correlation of existences,—of existence, therefore, *pro tanto*, *as conditioned*,"* he appears to have his mind fixed on Position, rather than on the Infinites that make Position possible. Time is the absolute (of Cousin) which renders possible "the image or concept of a certain correlation of existences," which is *date*, and not time. Space is the parallel absolute which renders possible *place*, or conditioned Space.

384. In Position, the finite and infinite are harmoniously blended. Each single or conditioned position is finite, but position regarded as unconditioned, or in its entire possibility, is as infinite as Space and Time. By means of position, we obtain the ideas of relative infinites which constitute our indefinite concepts of absolute infinites. In all infinites, it is possible, through position, to distinguish semi-infinites,—infinite at one extremity, and finite at the other.

385. It should always be borne in mind, that in every cognition, the three forms of Consciousness co-operate, and it is impossible for us to assign the precise limit of each. How far Space, Time, and Position, are objective, subjective, or rational, it is not necessary for us to determine; if we perceive their reality under each phase of cognition, it is sufficient for the purposes of our analysis.†

points of view: it conceives a space determinate and limited, or the space of all particular spaces, absolute space. . . . Does it consider things under this single relation, that they exist? it can conceive only the idea of absolute existence, or of relative existence. . . . In the moral world, does it perceive anything beautiful or good? it then irresistibly transports this same category of the finite and the infinite, which becomes the imperfect and the perfect, the ideal beauty, and the real beauty, virtue with the miseries of reality, or holiness in its exaltation, and in its unsullied purity." *Cousin: Hist. of Mod. Phil.*, Vol. I, p. 76–7.

* *Discussions*, pp. 35, 36.

† I was led to infer the necessary reality of a third form, from the three necessary relations of the subjective. After I had decided upon the name Position, I found that Mansel had also fixed upon three "laws or formal conditions of experience." He says (p. 184), "Of these conditions, I have in a former lecture enumerated three,—Time, Space, and Personality; the first as the condition of human consciousness in general; the second and third as the conditions of the same consciousness in relation to the phenomena of matter and of mind respectively." Personality appears to be a modification of Position, that supposes some mental manifestation; but in entire independence of all manifestation, Time, Space, and Position have a necessary existence. Mahan (p. 218), enumerates as logical antecedents of phenomena, "the ideas of time, space, substance, personal identity, and cause." The last three of these ideas may all be ranked under Position.

386. Space and Time have been considered by some writers as mere forms of thought, having no existence in themselves independent of our own minds. So far as they relate to our cognitions and render them possible, this view is correct; but so far as they relate to the objects of our cognitions, and render them possible, their objective reality must be as entire, as that of the objects which they embrace.* If they were indeed mere subjective forms, their existence would of itself be sufficient evidence of the Eternal and Infinite existence of an Intelligent Being, and in the difficulty that many of the most profound investigators find, in assigning to them any other than a subjective existence, we have another evidence of the fundamentally subjective nature of all Being.

387. Kant, in consequence of the subjective character of his whole system of philosophy, attended mainly to the subjective phase of Space and Time, and because their ideas, as they exist in the mind, are adequate,—or in other words, because objective space and time have precisely those properties which are fully embraced in our subjective ideas, and no others,—he may, perhaps, have sometimes been led to doubt their objective reality. His language, at least, is such as to afford a plausible justification to those of his successors who have denied such reality, and thus involved themselves in endless confusion and mystification. As Kant is often quoted, in defence of reasoning which is capable of such perversion, it may be well to quote somewhat largely from his remarks on Space, in order to ascertain, as nearly as possible, what his views really were.

388. "By means of the external sense (a property of our mind), we represent to ourselves objects as external to us, and these all in space. . . The internal sense, by means of which the mind envisages itself or its internal state, gives indeed no intuition of the soul itself as an object; but there is still a determinate form, under which the intuition of its internal state alone is possible, so that all which belongs to the internal determinations is represented in relationships of Time. Externally, Time can be viewed as little as Space, as something in us. Now what are Time and Space? Are they real beings? Are they in fact only determinations, or likewise relations of things, but still such as would belong to these things in themselves, though they should not be envisaged; or are they such, that they cleave only to the form of the intuition, and consequently to the subjective property of our mind, without which these predicates could not be attributed even to anything. . . .

389. "1st. Space is no empirical conception which has been derived from external ex-

* Even Hamilton says (*Discussions*, p. 572), "It is one merit of the philosophy of the Conditioned, that it proves space to be only a law of thought, and not a law of things." Is this true? Is not space a law of things material? Although the soul acts in space, we do not necessarily think of it as occupying any definite place. If space is a law of thought, it is so far a law of mind, and it would seem to be still more a law of such forms of reality as can exist only in space.

periences. For in order that certain sensations may be referred to something external to me (that is, to something in another part of space to that in which I am), and likewise in order that I may be able to represent them as without of and near to each other, consequently not merely different, but as in different places, the representation of space* for this purpose must already lie at the foundation. The representation of space cannot therefore be borrowed from the relations of the external phenomenon by experience, but this external experience is itself first only possible by the stated representation.

390. "2d. Space is a necessary representation *à priori*, which lies at the foundation of all external intuitions. We can never make to ourselves a representation of this,—that there is no space,—although we may very readily think that no objects therein are to be met with. It is therefore regarded as the condition of the possibility of phenomena, and not as a determination depending upon them, and it is a representation *à priori*, which necessarily lies at the foundation of all external phenomena.†

391. "3d. Space is no discursive, or as we may say, universal conception of the relationships of things in general, but a pure intuition. For in the first place, one can only figure to oneself, one space, and when we speak of several spaces, we then understand by this only parts of one and the same single space. These parts too, could not precede the sole all-embracing space, as if constituent parts of the same (whence its aggregate is possible), but only in it can they be thought. It is essentially one,—the diversity in it, consequently also the universal conception of spaces in general rests solely upon limitations. Hence it follows, that in respect of it, an intuition *à priori* (which is not empirical), lies at the foundation of all conceptions of it. And thus all geometrical propositions, for example this: 'That in a triangle, two sides together are greater than the third,' never could be deduced from the general conceptions of line and triangle,‡ but from intuition, and certainly *à priori*, with apodictical certainty.

392. "4th. Space is represented as an infinite given quantity. We must, indeed, think each conception as a representation which is contained in an endless multitude of different possible representations (as their common sign); consequently it contains these in itself; but no conception as such can be so thought, as if it contained an infinite§ multitude of

* Observe that Kant does not say space itself, but merely "the representation of space."

† I am unable to reconcile this second clause with any belief which does not recognize an objective reality of space. Kant speaks of the *representation* of space as something subjective, and a representation seems necessarily to imply a thing represented. The admission that we can make no representation of the non-being of space, places its existence among the fundamental self-evident faiths that cannot be rejected without annihilating all certainty. Every one who admits both an objective and a subjective phase of phenomena, must also admit an objective as well as a subjective Space, "as the condition of the possibility of phenomena."

‡ The author's meaning is here somewhat obscure and questionable.

§ The ambiguity of the word *infinite*, invalidates this whole argument.

representations in itself. Nevertheless, space is so thought (for all parts of space are infinitely coexistent); consequently, the original representation of space is *Intuition à priori*, and not *Conception*. . . . .

393. "Now, how can an external intuition dwell in the mind, which precedes the objects themselves, and in which intuition the conception of these last may be determined, *à priori?* Evidently not otherwise than so far as it (*intuition*) has its seat merely in the subject, as the formal property of this (*subject*) being affected by objects, and thereby of receiving *immediate representation* of them; that is, *Intuition*, consequently, only as form of the external *sense* in general. . . .

"*Conclusions from the above Conceptions.*

394. "1st. SPACE represents no property at all of any things in themselves, nor does it represent them in their relationship to each other; that is, it represents no determination of them which attaches to the objects themselves, and which remains if we also make abstraction of all the subjective conditions of intuition. For neither absolute nor relative determinations can be envisaged before the existence of the things to which they belong, nor consequently *à priori.**

395. "2d. Space is nothing else but the form only of all phenomena of the external senses,—that is, the subjective condition of sensibility, under which alone external intuition is possible to us. Now, since the receptivity of the subject to be affected by objects necessarily precedes all intuitions of these objects, it may be understood how the form of all phenomena can be given in the mind previous to all real perceptions, consequently *à priori;* and how this, as a pure intuition, in which all objects must be determined, can contain principles of their relationships prior to all experience.

396. "We can, therefore, only from the point of view as men, speak of Space, Extended Beings, &c. If we depart from the subjective condition under which we alone can receive external intuition, that is to say, the way we may be affected by objects, the representation of space then means nothing. This predicate is only so far applied to things as they appear to us,—that is, as they are objects of sensibility. The constant form of this receptivity, which we name sensibility, is a necessary condition of all relationships wherein objects are envisaged as external to us, and if we make abstraction of these objects, it is a pure intuition which bears the name of Space. As we cannot make the particular conditions of sensibility into the conditions of the possibility of things, but only of their phenomena, we may very well say that space comprehends all things that may appear to us externally, but not all things in themselves,—whether they can or

* This is a *petitio principii*, as Kant himself admits with regard to *subjective* space.

cannot be envisaged,—or by whatever subject we choose. . . . If I join in this case the condition of the conception, and say 'all things as external phenomena are coexistent in space,' this rule is valid universally and without restriction. Our exposition, consequently, teaches the *Reality* (that is the objective validity) of space in reference to all that externally as object can be presented to us, but at the same time the *Ideality* of space, in reference to things, if they are considered in themselves by means of reason,—that is, without regard to the nature of our sensibility. We maintain, therefore, the *empirical reality* of Space (in respect to all possible external experience), although, indeed, we acknowledge the *transcendental ideality* of the same,—that is, that it is nothing,—so soon as we omit the condition of the possibility of all experience, and assume space as something which lies at the foundation of things in themselves.

397. "But in fact independent of space, there is no other representation, subjective and referring to something external, which could be termed objective *à priori*. For we cannot deduce from any of them synthetical propositions *à priori*, in the same way as from intuitions in space. (3.) Consequently, to speak strictly, no ideality belongs to them, although they accord in this respect with the representation of space, that they belong merely to the subjective property of a mode of sense, as for example, seeing, hearing, feeling, by means of the sensations of colors, sounds, and heat, but which, since they are simply sensations and not intuitions, do not give any object to be known in itself, at least *à priori*.

398. "The object of this observation only goes as far as this,—to prevent us from thinking to explain the asserted ideality of space from extremely insufficient examples: since, namely, perhaps colors, taste, &c., with propriety may be considered not as the property of things, but merely as change of our subject, which may be different even in different men. For in such a case, that which itself originally is only phenomenon, as for example a rose, is held to be valid in the empirical sense, as a thing in itself, which, nevertheless, to each eye, in respect of the color, may appear different. On the contrary, the transcendental conception of phenomena in space is a critical reminding, that nothing generally which is envisaged in space is a thing in itself,—that space is not a form of things which perhaps was proper to them in themselves; but that objects in themselves are not at all known to us, and that what we term external objects, are nothing else but mere representations of our sensibility, whose form is space, but whose true correlative, that is to say, the thing in itself, is not thereby known, and cannot be, but in respect of which also neither is inquiry ever made in experience."*

399. Kant expressly admits "the empirical reality" of both space and time, or their

* Kant, p. 23 *et seq.*

"objective validity in respect of all objects that may ever be offered to our senses. And as our intuition is always sensible, an object can never thus be given to us in experience, which could not stand under the condition of time. On the other hand, we deny to time [and space] all claim to *absolute Reality*, that is to say, that without regard to the form of our sensible intuition, it absolutely inheres in things as condition or property. Such properties as belong to things in themselves, can never be given to us by the senses."*

400. Space and Time are thus merely excluded, like all else of which we take cognizance by our senses or other faculties, from the realm of "absolute reality," while it is admitted that they have the same relative or "empirical reality" as all other objects of which we can acquire any experience or knowledge. If there is no absolute [independent] reality in space and time, there can be no such thing as motion or change. Kant concedes this, "but," he says, "if I could envisage myself, or if any other being could envisage me, without this condition of sensibility, the self-same determinations which we represent to ourselves now, as changes, would then afford us a cognition, in which the representation of time, and consequently also of change, would not at all occur."†

401. It is undoubtedly true, that we do not fully comprehend all the properties, and consequently, all the reality of most of the objects that fall under our cognizance. Intelligent beings might perhaps be differently constituted, so as to "envisage" things under other conditions, and thus to discern a different set of properties, which would convey an idea of reality either more or less adequate than our own. But so vague a hypothesis furnishes no grounds for philosophizing.

402. Everything that has properties either inherent or relative, is a real thing. If the properties are such as belong exclusively to Intelligence, the reality is subjective,—if they belong either wholly or in part to anything else, the reality is objective. Every objective property has, indeed, two sides, one objective, as it exists in the object cognized, and one subjective, as it affects the cognizing mind, and it is in many cases impossible for us to determine the degree of resemblance between the two, or the adequacy of our ideas. But this fact, instead of weakening our belief in objective reality, should rather tend to strengthen the conviction, that every subjective impression is evidence of an objective impress, and that every "empirical reality" that we discover is a representation and evidence, more or less complete, of the true reality.

403. Under this conviction, we may readily assent to Kant's lemma, that "the simple but empirically determined consciousness of my own existence, proves the existence of objects in space out of me," and we may agree with him in rejecting both "the proble-

* Kant, p. 33.

† Kant, p. 34.

matical idealism of Descartes," and "the dogmatical idealism of Berkeley,"* as exclusive systems of philosophy.

404. The following remarks of Derodon† present the objective view of space, very concisely and very happily, although the definitions are naturally, as objective, mostly negative.

"1. Space is not pure nothing, for nothing has no capacity; but *space* has the capacity of receiving body.

"2. It is not an *ens rationis*, for it was occupied by heaven and earth before the birth of man.

"3. It is not an accident inhering in a subject, *i. e.*, body, for body changes its place, but *space* is not moved with it.

"4. It is not the superficies of one body surrounding another, because superficies is an accident; and as superficies is a quantity, it should occupy *space;* but *space* cannot occupy *space.* Besides, the remotest heaven occupies *space*, and has no superficies surrounding it.

"5. It is not the relation or order with reference to certain fixed points, as east, west, north, and south. For if the whole world were round, bodies would change place, and not their order, or they may change their order and not their place, if the sky, with the fixed points, were moved by itself.

"6 and 7. It is not body, nor spirit.

"8. It may be said with probability, that *space* cannot be distinguished from the divine immensity, and therefore from God. It is infinite and eternal, which God only is. He is the place of all being, for no being is out of Him. And although different beings are in different places externally, they are all virtually in the divine immensity."

405. In our examination of the Kantian antinomies, an allusion was incidentally made to Hamilton's belief, that we cannot conceive the possibility either of the finitude or of the infinity of space or time. He says, "We are altogether unable to conceive space as bounded,—as finite; that is, as a whole beyond which there is no further space. Every one is conscious that this is impossible. It contradicts also the supposition of space as a necessary notion; for if we could imagine space as a terminated sphere, and that sphere not itself inclosed in a surrounding space, we should not be obliged to think everything in space; and on the contrary, if we did imagine this terminated sphere as itself in space, in that case we should not have actually conceived all space as a bounded whole. The

* Kant, p. 133–4. Kant's views of space, time, and motion, appear to be nearly the same as those of the Eleatic school. See Anderson, Part III, § 1, and Aristotle, φυσικῆς ἀκροάσεως, Book VI, chap. 9.

† Quoted by *Fleming;* Article, SPACE.

one contradictory is thus found inconceivable; we cannot conceive space as positively limited.

406. "On the other hand, we are equally powerless to realize in thought the possibility of the opposite contradictory; we cannot conceive space as infinite, as without limits. You may launch out in thought beyond the solar walk, you may transcend in fancy even the universe of matter, and rise from sphere to sphere in the region of empty space, until imagination sinks exhausted;—with all this, what have you done? You have never gone beyond the finite, you have attained at best only to the indefinite, and the indefinite, however expanded, is still always the finite. . . . Now then, both contradictories are equally inconceivable, and could we limit our attention to one alone, we should deem it at once impossible and absurd, and suppose its unknown opposite as necessarily true. But as we not only can, but are constrained to consider both, we find that both are equally incomprehensible; and yet, though unable to view either as possible, we are forced by a higher law to admit that one, but one only, is necessary. . . .

407. "If we attempt to comprehend time, either in whole or in part, we find that thought is hedged in between two incomprehensibles. . . We are altogether unable to conceive time as commencing; we can easily represent to ourselves time under any relative limitation of commencement and termination, but we are conscious to ourselves of nothing more clearly, than that it would be equally possible to think without thought, as to construe to the mind an absolute commencement, or an absolute termination of time, that is, a beginning and an end, beyond which time is conceived as non-existent. . . We cannot conceive the infinite regress of time; for such a notion could only be realized by the infinite addition in thought of finite times, and such an addition would itself require an eternity for its accomplishment. . . The negation of a commencement of time involves, likewise, the affirmation, that an infinite time has, at every moment, already run; that is, it implies the contradiction, that an infinite has been completed. For the same reasons, we are unable to conceive an infinite progress of time; while the infinite regress and the infinite progress taken together, involve the triple contradiction of an infinite concluded, of an infinite commencing, and of two infinites, not exclusive of each other."*

408. The fundamental difficulty in the foregoing arguments, appears to arise from the ambiguity of the terms *conceive* and *infinite*. If by conception is meant a complete and adequate realization in thought, of infinite space and time, they are undoubtedly inconceivable. But if we use the word only to denote such a degree of knowledge as will enable us positively to assert that space has no bounds, and that eternity has neither beginning nor end, the conception is certainly possible. The "triple contradiction of an

* Hamilton: *Metaphysics*, pp. 527–9.

infinite concluded, of an infinite commencing, and of two infinites, not exclusive of each other," is no contradiction, if we consider that each of the infinites is relative, and that if due regard is paid to their relations, they are in no respect antagonistic or contradictory.

409. No one can set up his own conceptions as an infallible standard for others, but each may contribute to the common treasury of knowledge, his own perceptions of truth. Among the clearest of those perceptions in my mind,—as evident as the simplest axioms of mathematics,—are the infinite extent of space in all possible directions, the infinite duration of eternity, without beginning and without end, and the infinite possibility of position, both in space and time. No truth, no necessary idea has ever been adduced to contradict these conceptions, but the contrary suppositions,—that space is bounded, that duration is transitory, and that position is limited,—lead to countless contradictions and absurdities.

410. We will, therefore, assume as sufficiently established, the three great necessary and infinite FORMS,—forms of things, as well as forms of thought,—that correspond to our three forms of Intelligence, and are therefore the only necessary realities of which we can frame any conception. We might, perhaps, imagine a universe, in which there should have been no Being, either material or spiritual, but even in such a universe, in Eternal Silence, Space, Time, and Position would still remain, stern and immovable, ready to be cognized if there were only an intelligence to perceive them.

411. "Space, as containing all things, was by Philo and others, identified with the Infinite. And the text (Acts xvii, 28), which says that 'in God we live, and move, and have our being,' was interpreted to mean that space is an affection or property of the Deity. Sir Isaac Newton maintained that God by existing constitutes time and space. . .

412. "As space is a necessary conception of the human mind, as it is conceived of as infinite, and as an infinite quality, Dr. Clarke thought that from these views, we may argue the existence of an infinite substance, to which this quality belongs." He "maintained that space is an attribute or property of the Infinite Deity."* These opinions, as well as similar views with regard to time and position, find a weighty support in the apparently identical character of the objective properties and our subjective ideas of the three essential forms. If that identity is so marked in our finite intelligence, as to lead many to deny them any other than a subjective reality, it seems probable that the Infinite Intelligence may perceive them merely as attributes of His own Infinite and Eternal Being. Our perception of the necessary existence of the attributes, would then be an evidence of the equally necessary existence of the Being to whom the attributes belong.

* Fleming, p. 481.

CHAPTER XIII.

OBJECTIVE ANALYSIS.

413. In commencing the objective analysis with Essential Necessity, or Form, and proceeding to Essential Reality and Possibility, the method that was pursued in the primary analysis of Consciousness is reversed, and it is therefore well to observe the difference between the chronological order, and the logical order of cognition.

414. "Two ideas being given, we may inquire whether the one does not *suppose* the other; whether the one being admitted, we must not admit the other likewise. This is the *logical* order of ideas. . .

415. "There is still another, that of anterior, or posterior, the order of the relative development of ideas in time,—their *chronological* order. . . Now the idea of space, we have just seen, is clearly the *logical* condition of all sensible experience. Is it also the *chronological* condition of all experience, and of the idea of body? I believe no such thing. . . . Indeed, it is so little true, that the idea of space chronologically supposes the idea of body, that in fact, if you had not the idea of body, you would never have the idea of space."*

416. We have already seen that the ideas of Motivity are obtained the earliest, and those of Rationality the latest. In the order of time, therefore, we proceed from Motivity to Spontaneity, and from Spontaneity to Rationality.

417. But as all truth is based on the absolute or necessary, in the investigation of truth, or the logical order, we descend from Rationality to Spontaneity and Motivity. The chronological order must be first pursued to determine the rational basis, and the logical order subsequently adopted, to erect the superstructure.

418. Substance, in the objective phase of the subjective-objective relation, is the substantial reality that corresponds with the formal reality of space,—or Matter. The intrinsic attributes of Matter, are extension, impenetrability, and shape, all of which are possible only in and through space.

419. Substance in the objective-objective relation, can evidently only be known through analogy. But, inasmuch as various philosophers have been led by various paths, to pronounce primary existence identical with thought or volition, and as it appeared evident at the very outset of our inquiries, that the highest unity, in which the subjective and objective were both united and reconciled, must be a self-cognizing intelligence, we can find

* Cousin: *El. of Psychology*, pp. 85–8.

no representative for this relation but MIND, thus diametrically opposing to Consciousness (the purely subjective upon its own plane of being), that unknown somewhat in which it resides, Mind (the purely objective on its plane of being). The intrinsic attribute of Mind is variety of thought, which is rendered possible only in and through the formal reality of time.

420. Substance in the objective phase of the objective-subjective relation, is the substantial reality that corresponds with the formal reality of position, or FORCE. The intrinsic attributes of Force, are precise limitation, control, direction, all of which are possible only in and through the formal reality of position.

421. Essential Possibility, or Condition, in the objective phase of the subjective-objective relation, is limited, at least so far as we could be able to cognize it, to those displays of being which are in harmony with the formal reality of space, and the substantial reality of matter. Such displays are called phenomenal,—and the primary, most obvious phase of Condition, is therefore PHENOMENON.

422. Condition in the objective-objective relation, embraces those displays of essential being which harmonize with the formal reality of time, and the substantial reality of mind. Mind becomes active and conscious, through relation; relation can be cognized only through difference and succession, in time. The central phase of Condition may therefore be called RELATION.

423. Condition, in the objective phase of the objective-subjective relation, is the Essential Possibility which has a relative harmony with formal position and substantive force. In defining Position, I took occasion to point out the etymological affinity of *place* and *law*. A somewhat similar ideal affinity exists between *force* and *law*, and I therefore designate Condition under its outgoing relation, by the term LAW.*

424. The analysis of Essence is now completed, through the first and second planes of its subdivisions. But Essence itself, is only one of the modes of Existence,—the central and most objective mode, and therefore the one best fitted for testing the possibility of an objective analysis. Taking the analogy of its own primary subdivision, Essence may be regarded as central and quasi-substantial Existence,† toward which flows an incoming Being, analogous to Form,—and from which proceeds an outgoing Being, analogous to Condition. For Existence under the former, or subjective-objective relation, I propose the name of PRINCIPLE,—for objective-subjective Existence, the name of IDEA.

425. Principle, Essence, and Idea, are therefore the three primary classes of Existence, —embracing all things that are the proper objects of finite cognition,—all things that are

* "Laws are the necessary relations which spring from the nature of things." Cousin: *Hist. of Mod. Phil.*, Vol. I, p. 72.

† The Hegelian "Naught."

by their nature placed in relation to our finite intelligence,—all things that are included in the field of objective human philosophy. Whether cognition is possible under other relations, by beings differently constituted from ourselves, we have no means of determining; we may, however, safely assert, that there are no relations inconsistent with those that have been pointed out, and that there can be nothing real or possible, which some necessity does not underlie, and which is not dependent on that necessity for its existence.

426. In Principle, Essence, and Idea (the subjective-objective, objective-objective, and objective-subjective), the answers must be sought to the three great philosophical questions, How?—What?—Why? That which is logically first, is chronologically last, so that though the objective order of creation and dependence may commence with Principle, the subjective order of investigation would proceed from Idea, through Essence, to Principle. Principle and Idea are used synonymously by many writers, but as they are made to include existence under both subjective-objective and objective-subjective relations, it is desirable that the difference of relations should be indicated by different names.

427. If we adopt as objective symbols, P for Principle, E for Essence, and I for Idea, the subdivisions of the next lower plane may be thus represented:

PP, Capacity.	EP, Form.	IP, Quantity.
PE, Subsistence.	EE, Substance.	IE, Quality.
PI, Predication.	EI, Condition.	II, Modality.

428. The relations that are represented by the symbols, are unchangeable, but the names are merely proposed for consideration. If a careful study of the several relations, and a precise determination of their boundaries, shall lead to the suggestion of more fitting terms, they can readily be adopted. The same remarks may be made with regard to the following schedule of the third order of subdivisions:

PPP, Mutability.	PPE, Tendency.	PPI, Consequence.
PEP, Ordination.	PEE, Efficiency.	PEI, Dependence.
PIP, Accident.	PIE, Species.	PII, Genus.
EPP, Space.	EPE, Time.	EPI, Position.
EEP, Matter.	EEE, Mind.	EEI, Force.
EIP, Phenomenon.	EIE, Relation.	EII, Law.
IPP, Unity.	IPE, Plurality.	IPI, Totality.
IEP, Negation.	IEE, Limitation.	IEI, Affirmation.
IIP, Necessity.	IIE, Reality.	III, Possibility.

429. The following classification, in accordance with symbolic resemblances, will perhaps render the meaning of the several terms clearer and more definite.

1. Class of pure Principle.

PPP, Mutability.

2. Class of duplicate Principle, and Essence.

PPE, Tendency.	Essential Capacity (PP, E); subsistent Principle (P, PE).
PEP, Ordination.	Principal Subsistence (PE, P); formal Principle (P, EP).
EPP, Space.	Principal Form (EP, P); capable Essence (E, PP).

3. Class of duplicate Principle, and Idea.

PPI, Consequence.	Ideal Capacity (PP, I); predicative Principle (P, PI).
PIP, Accident.	Principal Predication (PI, P); quantitative Principle (P, IP).
IPP, Unity.	Principal Quantity (IP, P); capable Idea (I, PP).

4. Class of Principle, and duplicate Essence.

PEE, Efficiency.	Essential Subsistence (PE, E); substantial Principle (P, EE).
EPE, Time.	Essential Form (EP, E); subsistent Essence (E, PE).
EEP, Matter.	Principal Substance (EE, P); formal Essence (E, EP).

5. Class of Principle, Essence, and Idea.

PEI, Dependence.	Ideal Subsistence (PE, I); conditional Principle (P, EI).
PIE, Species.	Essential Predication (PI, E); qualitative Principle (P, IE).
EPI, Position.	Ideal Form (EP, I); predicative Essence (E, PI).
EIP, Phenomenon.	Principal Condition (EI, P); quantitative Essence (E, IP).
IPE, Plurality.	Essential Quantity (IP, E); subsistent Idea (I, PE).
IEP, Negation.	Principal Quality (IE, P); formal Idea (I, EP).

6. Class of Principle, and duplicate Idea.

PII, Genus.	Ideal Predication (PI, I); modal Principle (P, II).
IPI, Totality.	Ideal Quantity (IP, I); predicative Idea (I, PI).
IIP, Necessity.	Principal Modality (II, P); quantitative Idea (I, IP).

7. Class of pure Essence.

EEE, Mind.

8. Class of duplicate Essence, and Idea.

EEI, Force.	Ideal Substance (EE, I); conditional Essence (E, EI)
EIE, Relation.	Essential Condition (EI, E); qualitative Essence (E, IE).
IEE, Limitation.	Essential Quality (IE, E); substantive Idea (I, EE).

9. Class of Essence, and duplicate Idea.

EII, Law.	Ideal Condition (EI, I); modal Essence (E, II).
IEI, Affirmation.	Ideal Quality (IE, I); conditional Idea (I, EI).
IIE, Reality.	Essential Modality (II, E); qualitative Idea (I, IE).

10. Class of pure Idea.

III, Possibility.

430. This schedule of the objective has been ideally or subjectively determined, and the objective validity of the determination may perhaps still be doubted. Because all our knowledge is obtained through finite ideal representations of real objects, we are apt to think that such is the order of nature, and to regard the ideal as necessarily and universally dependent upon the real.

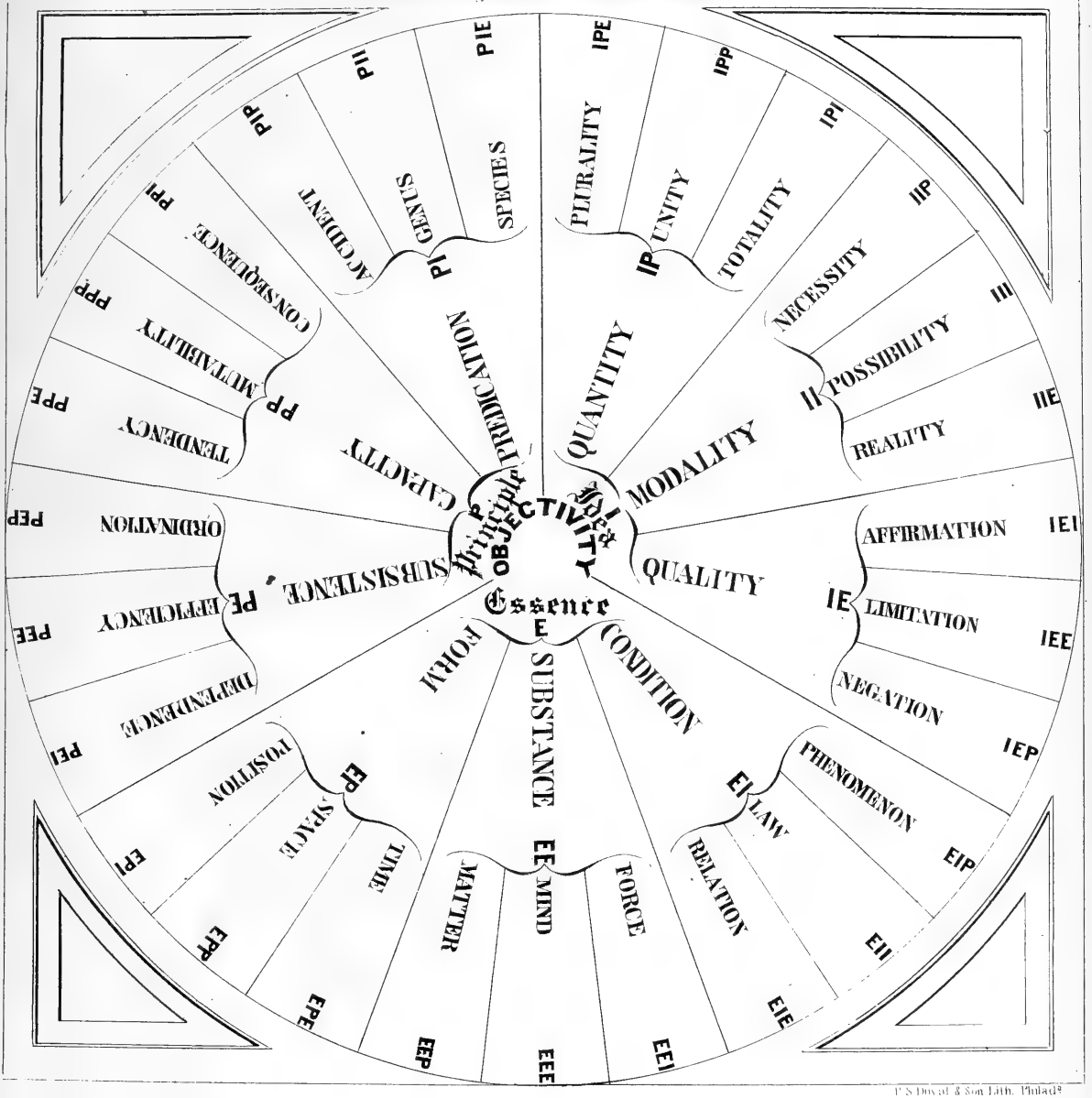
431. But even in finite intelligence, we may find reasons for reversing or modifying that opinion, for in every new invention that springs from the limited creative power which is typical of the Infinite creative power of an Infinite Intelligence, the idea is evidently antecedent and constitutive. The realized steam-engine is the adequate representative of all the ideas of its successive inventors and improvers, but our mental notion of the engine is generally an inadequate *re*-representation of the adequate representation. Our ideas, therefore, so far as they are representative, are but secondarily so, while the objective universe is primarily and immediately representative of the originally presentative idea of the Supreme Architect,—who has ideally determined the forms and relations of all reality.

432. No place has been assigned in the objective schema, for the Consciousness on which all our analysis is based. In one of its phases, it may be regarded as subordinate to the purely objective Mind (ÆEE), and as constituting one of its subdivisions. But Consciousness is authoritative, not merely on the plane of mind. Whether we ascend or descend,—whether we contemplate the highest conceivable forms of being, or its lowest and minutest subdivisions, the plane of Consciousness shifts with our shifting points of view. The pure subjective is the image of the Divine, inasmuch as it stands in correlation to everything, maintaining throughout a distinct independence, which entitles it to the place we at first assigned it, as one of the forms of the highest duality which is immediately subordinated to the highest Unity.

433. The accompanying diagram exhibits the relations, together with the experimental nomenclature, of the several subdivisions of objective Being. In the chart of Consciousness, as each of the subdivisions is still fundamentally subjective, and as each successive analysis is based on the same primary relations, the symbolic order of M, S, R, is retained throughout. But in studying the Objective, we attempt to penetrate the mysteries of Being as it is in itself, independent of subjective relations, and it therefore seems proper to adopt an arrangement which will group the several subdivisions more systematically around the central symbols. This variety of possible collocation under uniformity of law, is an instance of the multiform *tendency* to system prevailing in nature, which is much more agreeable than absolute symmetry, and more consonant with the theory of a Supreme Free Intelligence. Other instances of the harmonious blending of Liberty and Law, may be found in Phyllotaxis,—in the different classifications of Natural Science,—and indeed,

ELEMENTARY FORMS of OBJECTIVE BEING

UNDER VARIOUS RELATIONS.



T. S. Duval & Son Lith. Phila.ª

in almost every attempt of philosophy to interpret the various developments of Divine Idea.

434. If we suppose Existence and Intelligibility* to be convertible terms, the three momenta of the Intelligence which sustains the Intelligible,—or Intelligence affected, Intelligence *per se*, and Intelligence affecting,—may perhaps be represented by Consciousness, Power, and Manifestation. As Existence is transmitted through all time and space, in infinite ramifications, we may readily suppose it to be accompanied by the parallel ramifications of Intelligence, or even to be identical with them. The general relations of the subjective and objective, which we have attempted to trace by a symbolic analysis, might thus be infinitely modified, and our deductions would become like mathematical formulas, which require a due regard to the conditions of every problem to which they are applied, in order to determine their concrete significance.

435. We have as yet but few data for judging of the adequacy of such a hypothesis, or of the effect that would be produced by extending the system which we have briefly examined under our elementary Intellectual development, so as to embrace the Moral and the Practical, the Personal and the Social, with their myriad forms and groups of new combinations and relations. But if we give a moment's reflection to the variety of those possible relations, the need of a good system of classification will be evident, and the great impulse that was given to mathematical discovery by the broad generalizations of the Calculus, shows the advantage of combining with such a system a language of symbols that will concisely, and at the same time plainly, embody the results of long and patient study, for future convenient use and reference.†

436. The very errors of speculation, seem to confirm the fundamental relations of our present analysis. If it be admitted that every doctrine must have some basis of truth, in order to commend itself to any intelligent acceptance, the erroneous exaggerations which give undue prominence to favorite views, may be expected to show a natural grouping about certain primitive points of relationship. Such a grouping is evident in Cousin's division of philosophic systems into Sensualism, Skepticism, Idealism, and Mysticism.

437. If we place a too exclusive dependence on the affection of Consciousness by the

* Not the imperfect Intelligibility of a finite mind, but that of the Infinite and All-pervading.

† The ternary division is not *necessarily* applicable, except when we wish to represent the modifications of any single power under its relations to itself and to another power. The successive subdivisions according to the same law are, however, perfectly natural, and may be extended as far as may seem desirable, in order to accomplish any special intellectual purpose. Whenever any such purpose can be better accomplished by a binary, quaternary, or other division, such a division should undoubtedly be adopted, but even then, a close examination would perhaps enable us to trace the new basis of classification to some blending and modification of two or more relative triplicities.

objects of its cognition (OS), the senses, which are the immediate avenues for our intercourse with the external world, may be regarded as the sole instruments of knowledge, and the sensual school will then appear to embrace all the correct expounders of the mysteries of nature. If the mind be assumed as its own sole interpreter of truth (SS), and no importance is attached to any external means for verifying its inferences or removing whatever doubts may arise, we shall soon be landed in inevitable Skepticism. If the reality of things be regarded as precisely commensurate with the reality of thought (SO), the broad foundation of Idealism is laid. If an attempt be made to exclude all mental bias and coloring, and to penetrate the crust of phenomena, in order to ascertain the substantial nature of things as they are in themselves (OO), the unconscious deductions of analogy may be assumed as the illuminations of absolute, unmodified, and unrelated truth, and the result will be Mysticism.

438. To a perfect intelligence, it might be a matter of indifference what system of exegesis should be adopted, but the finite mind cannot concentrate its attention upon any single point, without slighting to some extent, other points that are important in forming accurate general conclusions. A liberal Eclecticism, that attempts to embrace in its range of vision the whole landscape of truth, may have the most correct idea of the relative bearing of all the different portions, but it will lose many of the most beautiful features that a closer local inspection would discover. Although its creed may contain the most correct exposition of the "Common Sense" of the race at the moment, it will contribute comparatively little, except by its exposition of the true state and needs of philosophy, to the progress that is mainly effected by myriads of co-workers, who may each be men of "one idea," but whose combined labors tend to the contemporaneous development of many ideas.

CHAPTER XIV.

THE ABSOLUTE.

439. THE goal, as well as the starting-point,—the Omega as well as the Alpha of Philosophy, is the Absolute.* The love of wisdom commences in Faith, and in Faith alone can

* "There are three terms, familiar as household words, in the vocabulary of philosophy, which must be taken into account in every system of Metaphysical Theology. To conceive the Deity as He is, we must conceive Him as First Cause, as Absolute, and as Infinite. By the *First Cause*, is meant that which produces all things, and is itself produced of none. By the *Absolute*, is meant that which exists in and by itself, having no necessary rela-

it find any final resting-place. The sages of India and China, of Persia and Egypt, of Greece and Rome, have all sought in vain to find out by unaided reason, the Infinite and Eternal One, who is "without variableness or shadow of turning." By successively rejecting all the perceived relations which are felt to be the restraints or limits of imperfection, they have arrived at a dim shadowy Idea, which is supposed to be devoid of all relation, and of which nothing can be predicated except negations and a name.

440. What is this ghostly Idea,—this idol of the finite Intelligence, but the highest or most abstract form of that inappreciable, and so far as the human Consciousness is concerned, non-existent relation, which we have designated as the Objective-Objective.* Reason, conscious of her own weakness, and yet confident in her instinctive belief that there must be some Greatest, regards the Objective under relation to herself, whether that relation be Objective-Subjective or Subjective-Objective, as limited by the relation, and therefore, imperfect and finite. But in the Objective-Objective, if there be any limitation, it can never be appreciable by human intelligence, and there, if anywhere, must exist that abstract, underlying Infinite, which is in itself devoid of all relation. The belief on which this deduction is based, so far as it is instinctive, is one of those primary revelations of faith, which is infallible, provided it is received in its primitive simplicity, and whatever error may be supposed to spring from it, must arise from the gloss of imperfect human apprehension. Let us examine a few of the formulas that have been devised for the expression of this almost universal creed of humanity, in order to ascertain, if possible, the precise extent of the truth that it represents.

441. Anaximander. "The original essence which he assumed, and which he is said to have been the first to have named principle (ἀρχή), he defined as the 'unlimited, eternal, and unconditioned,' as that which embraced all things, and ruled all things, and which, since it lay at the basis of all determinations of the finite and the changeable, is itself infinite and undeterminate."†

442. Aristotle. "Hence the famed Aristotelian definition of the Absolute, that it is

tion to any other Being. By the *Infinite*, is meant that which is free from all possible limitation; that than which a greater is inconceivable; and which, consequently, can receive no additional attribute or mode of existence, which it had not from all eternity." *Mansel*, p. 75.

* "God, considered without relation with the world and humanity, undoubtedly still exists. He exists wholly in the depths of His essence, invisible, inaccessible, incomprehensible; but this is no longer the God of the world and the God of humanity; it is no longer a God who overlooks and superintends His work, the God whom men adore and bless under the name of Providence." *Cousin: Hist. of Mod. Phil.*, Vol. I, p. 163. "The Bhagavad-Gita expressly teaches that, in the hierarchy of the human faculties, the soul is above sensibility, that above the soul is intelligence, and that there is something still above intelligence,—being." *Ib.*, Vol. I, pp. 392-3.

† Schwegler, p. 22.

the thought of thought (*νόησις νοήσεως*), the personal unity of the thinking and the thought, of the knowing and the known, the absolute subject-object. In the Metaphysics (XII, 1) we have a statement in order of these attributes of the Divine Spirit, and an almost devout sketch of the eternally blessed Deity, knowing Himself in His eternal tranquillity as the absolute truth, satisfied with Himself, and wanting neither in activity nor in any virtue."*

443. HERBART. "If the world actually exists as a whole, disposed according to design, it follows that we must inquire also for the author of this arrangement, and shall find him in an essence that is above us, but not merely within *our* vision, which would only transfer the reason of man to nature. This belief in a Spirit of Order, little as it is grounded on demonstration, yet depends directly upon the same conclusions, and has the same certainty as the belief by which every man is convinced of the existence of other rational spirits; for of my fellow-men I see only forms and teleological acts, and that these proceed from rational thought is only a belief, but one so worthy of confidence that it stands in certainty above all knowledge."†

444. SCHELLING. "To bring Realism and Idealism into a state of reciprocal penetration, such has been the declared object of all my endeavors. The notion of the absolute substance, ... obtained by the higher method of contemplating nature, and from the unity that was recognized as subsisting between the dynamical and the psychical or mental, a living basis, out of which grew the Philosophy of Nature, ... which, when considered in reference to the whole of philosophy, must invariably be regarded as that real portion of the latter, which, by a process of redintegration through the influence of the ideal, in which freedom prevails, becomes susceptible of elevation into the true sphere or system of rational thought."‡

445. "'Our mind strives after unity in the system of its knowledge; it will not endure that there should be pressed upon it a separate principle for every single phenomenon, and it will only believe that it sees nature when it can discover the greatest simplicity of laws in the greatest multiplicity of phenomena, and the highest frugality of means in the highest prodigality of effects. Therefore, every thought, even that which is now rough and crude, merits attention so soon as it tends towards the simplifying of principles, and if it serves no other end, it at least strengthens the impulse to investigate and trace out the hidden process of nature.' The special tendency of the scientific investigation of nature which prevailed at that time, was to make a duality of forces the predominant element in the life of nature. . . . . In opposition to these dualities, Schelling now insisted upon the unity of everything opposite, the unity of all dualities, and this not simply as

* Schwegler, p. 126. † Chalybäus, p. 136. ‡ Ib. p 265.

an abstract unity, but as a concrete identity, as the harmonious co-working of the heterogeneous."*

446. "How is it possible that our thought should ever rule over the world of sense, if the representation is conditioned in its origin by the objective? The solution of this problem, which is the highest of transcendental philosophy, is the answer to the question: how can the representations be conceived as directing themselves according to the objects, and at the same time the objects conceived as directing themselves according to the representations? This is only conceivable on the ground that the activity through which the objective world is produced, is originally identical with that which utters itself in the will."†

447. HEGEL. "Now, those counterparts, or opposites, bear reference altogether to the definite antagonism of indifference and difference, identity and difference, matter and form, internal and external, and especially positive and negative. It is true that by essence we usually think at first of the substratum, which has in itself certain determinate states, or which lies at the bottom of these. These determinate states, modes, and forms, ... are not to be separated from the essence, but to every present appearance there must be at bottom a real or essential element, or, to use the expression of Herbart, for every appearance there must be a real to which the former points."‡

448. "We thus arrive as a result at the Aristotelian νόησις τῆς νοήσεως, the self-thinking process of thought, or the self-knowing truth, Absolute Idealism, which in itself is absolute realism, or an identity in which those antagonisms have coalesced, in order to generate or engender themselves anew, without positing therewith a duplicity of principles; seeing that the production of the antagonisms, or, to speak more concisely, the powers of self-opposition or *absolute negativity*, is the one absolutely self-moving principle."§

449. Hamilton, as we have seen, uses the term Absolute to denote what is "*finished, perfected, completed;* in which sense the Absolute will be what is out of relation, &c., as finished, perfect, complete, total." "In this acceptation . . . the Absolute is diametrically opposed to, is contradictory of, the Infinite." He also speaks of the Unconditioned as "the genus of which the Infinite and Absolute are species," and says that "the Absolute and Infinite are conceived only as negations of the conditioned in its opposite poles."‖ We have already examined some of the contradictions in which, by his own admission, these definitions necessarily involved their author, and those necessary contradictions might be reasonably assumed as sufficient evidence of error. But even without regard to the consequences of the definitions, what can be "the opposite pole" to the Infinite or

* Schwegler, p. 317. † Ib. p. 323. ‡ Chalybäus, p. 325.
§ Ib. p. 311. ‖ *Discussions*, pp. 21, 36.

Unlimited if it be not the Finite or Limited? The limited must be conditioned by its limits,—therefore the unconditionally limited is an absurdity. On the other hand, the unconditioned is necessarily unlimited, or infinite.

450. To the doctrine of Cousin, that the idea of the infinite, or absolute, and the idea of the finite, or relative, are equally real, because the notion of the one necessarily suggests the notion of the other, Hamilton replies:

451. "Correlations certainly suggest each other, but correlations may, or may not be equally real and positive. In thought, contradictories necessarily imply each other, for the knowledge of contradictories is one. But the reality of one contradictory, so far from guaranteeing the reality of the other, is nothing else than its negation. . . . . It therefore behooved M. Cousin, instead of assuming the objective correality of his two elements on the fact of their subjective correlation, to have suspected, on this very ground, that the reality of the one was inconsistent with the reality of the other."*

452. No one ever claimed that the finite mind could fully comprehend or understand the Infinite, but we certainly have so far the power of conceiving it, as to positively assert its existence. If of the two correlations, the finite and infinite, either is unknown, is it not the finite? The infinite is wholly independent of any subjective relation or coloring, but the finite is apprehended only under the subjective relations which we assign it, and it may plausibly be regarded as merely a subjective notion, destitute of any objective reality. The Infinite and Unconditioned are certainly objects of thought, and though we may know nothing more *of* them (as we know nothing more of mind and matter), than their relative manifestations, we may know that there is something more *in* them. Though we cannot identify ourselves with the Absolute in reality, may we not cognize it under ideal relations? When we think of our own subjectivity, how is the "subject contradistinguished from the object of thought,"† except in idea?

453. A recent writer on "the philosophy of the Infinite," thus notices Hamilton's argument,—that if, in any instance, we imagine that we obtain a knowledge of the Infinite, we only deceive ourselves by substituting *the indefinite* for the infinite.‡

454. "While we endeavor to answer this argument, let it be remembered that both Sir William and we have this common ground,—that the Indefinite is only a characteristic

* *Discussions*, p. 34.

† "The mind knows nothing, except in parts, by quality, and difference, and relation; consciousness supposes the subject contradistinguished from the object of thought; the abstraction of this contrast is a negation of consciousness; and the negation of consciousness is the annihilation of thought itself." *Discussions*, p. 26.

‡ "Condillac denies the infinite, unity, substance, etc., and reduces everything to the indefinite, to the finite multiplied by itself, to a simple collection of quantities and accidents, etc." *Cousin: Hist. of Mod. Phil.*, Vol. I, p. 178.

of thought; while the Infinite is an object of thought. . . . . We admit to Sir William that the knowledge which we have been describing, and the knowledge of the Infinite, which we intend to describe at still greater length, is an *indefinite knowledge*. But it is an indefinite knowledge of what? Of this: It is an *indefinite knowledge* of an *infinite object*. It is not a knowledge of the finite, for we can find no limits; according to our own consciousness, and according to Sir William's statement, it is an indefinite knowledge of something; therefore it is an indefinite knowledge of the infinite. We profess nothing but an *indefinite* knowledge, but it must be a knowledge of something, and as not of the finite, it must be of the infinite. Sir William's argument we consider valid, if viewed as a refutation of the assertion that we have a clear and definite knowledge of the Infinite. But, on the other hand, Sir William maintains for himself that we can have no knowledge of the Infinite. This conclusion we consider no more valid than the other, for it does not follow that, since we have not a clear and definite knowledge of the Infinite, therefore we can have no knowledge of it at all. . . . . While it is true that the finite mind cannot have infinite thoughts, we hold it equally true that the finite mind can have finite thoughts concerning an infinite object. . . . In so far as Sir William maintains that we cannot have a clear knowledge of the Infinite in all its extent; and in so far as M. Cousin maintains that we can have some knowledge of the Infinite; we consider that they both are right."*

455. A limited idea may be a partial representation of an unlimited reality. "Time is the image of eternity," and in like manner the human Consciousness may be an image, though a faint one, of the Infinite Intelligence. In the variety of possible relations, each single relation may furnish the expression of a partial truth, and the greater the number of relations that is brought under our cognizance, the more nearly adequate will be our conception of the reality.

456. Relation does not necessarily limit anything but conception, and the Absolute, though independent of all relation, may and does place itself in relation to finite intelligence, without detracting from its own infinite perfection. The Infinite might, perhaps, even become self-limited, in certain directions, for the accomplishment of its own purposes; —it certainly does not become us to deny such a possibility, when by making the denial, we attempt to make our own conceptions the limits of Divine power.

457. Among the great controlling forces of the material universe, light, heat, electricity in its various forms, attraction, inertia, repulsion, there are many indications of unity. And although the principles of correct philosophizing will not allow us to assume their essential identity until it is more fully demonstrated, the same natural instinct of Reason that

* Calderwood, pp. 77–79.

has enabled us to approach so nearly to a unity of force, compels us to mount still higher, until we attain to the conception of the Necessary, Supreme Being, who is absolutely knowable, so far as the reality of His existence is concerned, and at the same time absolutely incomprehensible, and only faintly shadowed forth under such relations as He sees fit to employ in His revelation to His intelligent creatures.

458. But while Reason thus ascends through the analogies of Spontaneity to the Greatest, and after the successive abstraction of all subordinate relations, finally abstracts relation itself, and thus forms the conception of the Absolute, there are other needs of our nature that equally demand supreme satisfaction. In all the impulses of Motivity, there is an underlying idea of good, which points to some infallible Best, and in Intelligence, whose especial province it is to know how to accomplish ends, we see a like pointing to some Wisest, whose purposes could not be thwarted by any inferior Intelligence.

459. Following these pointings of its co-ordinate faculties, Rationality discovers that the Absolute must also be the Best, Greatest, and Wisest. The Supreme Being must be self-impelling, or active solely for subjective reasons, otherwise He would be subordinate to a higher power; self-acting, or He would not be Supreme; intelligent, or He could not be self-acting.*

460. Necessity is but another name for accordance with the eternal and unchangeable Divine Will, and so far as necessity becomes evident, we are able to perceive Divine determination. Philosophy, resting on revelation, may use all the facts and teachings of faith as the materials of its deductions, and it should verify its results by comparing them with the well-recognized truths of revelation. By making such a comparison, it will ascertain that there is not only an Absolute, which is in itself entirely independent of all external relation, and therefore entirely aloof from all possible human conception, except

* "Aided by instruments which the necessities of reason itself have called into existence, man, in these last times, has well demonstrated the homogeneousness of his mind with the Supreme Creative Mind, and he has done so on a field not narrow, for it is as wide as the stellar universe. There can be no irreverence,—there can be no presumption in plainly stating a fact which rests upon evidence so clear and sure. Even if this same averment were made in terms still stronger and more comprehensive, we need not fear a rebuke on the part of Christian piety, for what we so affirm does but illustrate and attest the Biblical doctrine, that 'God made man in his own image.'" *Taylor: World of Mind*, p. 167.

"In the prosecution of the modern Physical Sciences, the human mind has demonstrated the congruity of the human Reason with *that* REASON of which the material universe is the product; for when we say that (within certain limits) we understand the scheme of the world as to its structure and as to its dynamics, we affirm that the mind which understands and the MIND which has produced this scheme of things are in unison, or that they are convertible, the one into the other." *Ib.* p. 327.

in the mere idea of Existence, but that there is also an ABSOLUTE-RELATIVE, which has voluntarily placed itself in relation with its works.*

461. Only under the conception of such an Absolute-Relative is it possible for us to believe in a Divine Love that works teleologically for benevolent purposes,—a Divine Activity, "upholding all things by the word of His power,"—a Divine Wisdom by which all things were made,—and thus to form some idea, however feeble it may be, of that ineffable Divine Image in which man was created. Only under such a conception can we understand that in our ascent to the Absolute, we can never overstep that Highest Unity, which is at once Knowing and Known, and that the atheistical notion of a blind fate, an unreasoning power, an unintelligent "order of nature," is opposed to the plainest deductions of reason, as well as to the teachings of revelation. Only under such a conception can we feel that man has not been created in vain,—that all the needs of our toiling, struggling, suffering race, have been provided with the means of satisfaction,—that the Infinite Creator is "not a God afar off," but that He is "Our Father" in heaven, with more than a father's sympathy and love,—"the Lord merciful and gracious, long-suffering, and abundant in goodness and truth."

462. Under this conception, what a halo of glorious beauty is thrown around the Christian Revelation! However imperfect may be our appreciation of the Divine mysteries,—however feeble and halting our faith,—however sad and desponding our hope,—or however arrogant our self-sufficiency and impatience under fancied dictation,—the dignity, simplicity, and majesty portrayed in the inspired records, will be accepted as the manifest indications of that mysterious blending of the Absolute with the Relative,—the Divine with the Human, in which faith and philosophy both find their final resting-place.

463. He who wept at the grave of Lazarus, gave eternal evidence of the intimate union between Divine love and human sympathy with suffering. The charity that, in the midst of the agony in the garden, forgave the weakness of the heavy-eyed disciples, will ever

* "I will repeat my innermost conviction, that the existence of free will, in man as a fact of the consciousness, in God as an object of our faith, is the cardinal point on which all that is sound in philosophy or true in religion ultimately turns. Banish it from heaven and earth, and men become nothing more than the petty wheels in the vast machine, of which God is the involuntary motive power. But the engineer is absent, and he whom we then call God, is bound in the trammels of a merciless necessity,—no object of love, for he cannot hate, no object of prayer, for he cannot aid, no object of praise, for he is a tool in the hands of a higher fate. . . . . Restore free will, and where all before was death and darkness, all now becomes life and light. Then indeed does God cease to be the omnipresent automaton, the dead God of the dead, and becomes a spirit and a power, and the living God of the living. Then, indeed, are love, and prayer, and praise, His just meed and our high privilege, for of His own free will, and of no necessity, is He a gracious God and merciful, slow to anger and of great kindness, and His tender mercies are over all His works. For of Him, and through Him, and to Him, are all things; to whom be glory forever." *Solly*, p. 282.

continue to inspire erring humanity with the hope of forgiveness, for the consequences of its own feebleness and imperfection. The great mystery of all mysteries,—God the Incarnate Word, by whom all things were made, who came unto His own, and His own received Him not, in whom was life, and the life was the true Light which lighteth every man that cometh into the world, is at once a revealed evidence, and a philosophical consequence of the mediating relativity of the Absolute. Here, then, may baffled speculation, which in its endeavors to grasp the unrelated Infinite, has laid a vain oblation on the altar of "the unknown God," at length find satisfaction, and bow reverently and thankfully as it hears the voice of the once persecuting, but afterwards converted and zealous apostle, proclaiming to the philosophers of all time, as well as to the "too-superstitious" Athenians,—"Whom therefore ye ignorantly worship, Him declare I unto you."

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* Some of my notes were made so long ago, that I may have inadvertently neglected to make due acknowledgments. It is impossible, even with extraordinary care, to distinguish at all times between thoughts that are original, and those that are borrowed.

Schwegler, Albert. History of Philosophy in Epitôme. New York, 1856.
Sextus Empiricus.
Socrates.
Solly, Thomas. The Will, Divine and Human, Cambridge (Eng.), 1856.
Solomon.
Spinoza, Benedict de.
Stewart, Dugald. Philosophy of the Human Mind.
Taylor, Isaac. Elements of Thought, 2d American edition, New York, 1857.
Taylor, Isaac. The World of Mind, New York, 1858.
Von Weiller.
Wasson, D. A.
Wayland, Francis. Elements of Intellectual Philosophy, Boston, 1854.
Webster, Noah.
Werenfels, Samuel.
Wolff, Christian.
Xenocrates.
Xenophanes.

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