Correlation and diversity in classification and nomenclature of the rocks of the Colorado Front Range region as given in various publications.

System.	Series.	Finlay (1916).[a]	Richardson (1915).[b]	Stose (1912).[c]	Henderson (1909).[d]	Darton (1905).[e]	Fenneman (1905).[f]	Gilbert (1897).[g]	Emmons, Cross, and Eldridge (1896).[h]	Cross (1894).[i]	Hayden Survey (1869–1876).
Tertiary.	Oligocene.	(Absent.)	Castle Rock conglomerate.						Monument Creek formation (Neocene).		Monument Creek group (Miocene).
	Eocene.	Dawson arkose.	Dawson arkose.			Denver formation (Tertiary).			Denver formation (Cretaceous).		Laramie formation. / Lignitic group.
						Arapahoe formation (Tertiary).			Arapahoe formation (Cretaceous). ["Monument Creek formation" as revealed by recent studies in the Denver Basin.]		
Cretaceous.	Upper Cretaceous.	Laramie formation.	Laramie formation.		Laramie formation.	Laramie formation.	Laramie formation.		Laramie formation.		Laramie.
		Montana group: Fox Hills sandstone.	Montana group: Fox Hills sandstone and Pierre shale.		Montana group: Fox Hills formation.	Fox Hills formation.	Fox Hills formation.		Montana group: Fox Hills formation.	Montana formation.	Fox Hills.
		Montana group: Pierre shale.			Montana group: Pierre formation.	Pierre shale.	Pierre formation.	Pierre shale.	Montana group: Pierre formation.		Fort Pierre.
		Colorado group: Niobrara formation.	Colorado group: Niobrara and Benton formations.	Niobrara group: Apishapa shale.	Colorado group: Niobrara formation.	Niobrara formation.	Niobrara formation.	Niobrara formation.	Colorado group: Niobrara formation.	Colorado formation.	Niobrara.
		Colorado group: Carlile shale.		Niobrara group: Timpas limestone.							
		Colorado group: Greenhorn limestone.		Benton group: Carlile shale.	Colorado group: Benton formation.	Benton group: Carlile shale.	Benton formation.	Benton group: Carlile shale.	Colorado group: Benton formation.		Fort Benton.
		Colorado group: Graneros shale.		Benton group: Greenhorn limestone.		Benton group: Greenhorn limestone.		Benton group: Greenhorn limestone.			
				Benton group: Graneros shale.		Benton group: Graneros shale.		Benton group: Graneros shale.			
		Dakota sandstone.	Dakota sandstone.	Dakota sandstone.							
	Lower Cretaceous.	Purgatoire formation: Glencairn shale member.	Purgatoire formation.	Purgatoire formation.	"Dakota?" formation (probably in part Comanche).	"Dakota" sandstone (probably includes some Lower Cretaceous).	Dakota formation.	Dakota sandstone.	Dakota formation.	Dakota formation.	Dakota.
		Purgatoire formation: Lytle sandstone member.									
Cretaceous or Jurassic.	Lower Cretaceous or Upper Jurassic.	Morrison formation.	Morrison formation.	Morrison formation.	Morrison formation (Upper Jurassic or Lower Cretaceous).	Morrison formation (Lower Cretaceous).	Morrison formation (Jurassic).	Morrison formation (Juratrias).	Morrison formation (Juratrias).	Morrison formation (Juratrias).	Jurassic.
Jurassic.	Upper Jurassic.	(Absent.)	(Absent.)		Sundance marine beds.						
Carboniferous.	Permian (?).	Lykins formation.	Lykins formation.		Lykins formation (upper part Triassic?).	Upper Wyoming formation (Chugwater) (Triassic? or Permian).	(Triassic?). Lykins formation.	Fountain formation (Juratrias?).[j]	Wyoming formation (Juratrias).		Red Beds (Triassic).
	Pennsylvanian.	Lyons sandstone.	Lyons sandstone.		Lyons formation.	Lower Wyoming formation (Fountain). (Pennsylvanian).	(Triassic?). Lyons sandstone.				
		Fountain formation: Glen Eyrie shale member.	Fountain formation.		Fountain formation.		(Triassic?). Fountain sandstone.			Fountain formation (Carboniferous and Juratriassic?).[k]	
	Mississippian.		Millsap limestone.		Mississippian.	Millsap limestone.		Millsap limestone.		Millsap limestone.	
Ordovician.	Upper and Middle Ordovician.	(Absent.)	(Absent.)			Fremont limestone.				Fremont limestone.	
		Harding sandstone (included with Manitou limestone).				Harding sandstone.		Harding sandstone.		Harding sandstone.	
	Lower Ordovician.	Manitou limestone.	Manitou limestone.			Manitou limestone.				Manitou limestone.	
Cambrian.	Upper Cambrian.	Sawatch sandstone.	Sawatch sandstone.			Reddish sandstone.					
Pre-Cambrian.		Pikes Peak granite.	Pikes Peak granite.		Algonkian.		Algonkian quartzite.	Archean schist and granite.	Archean gneiss, granite, and schist.	Algonkian quartzite, granite, including Pikes Peak granite, and gneiss.	
					Archean.		Archean granite and gneiss.				

[a] Finlay, G. F., U. S. Geol. Survey Geol. Atlas, Colorado Springs folio (No. 203), 1916.
[b] Richardson, G. B., U. S. Geol. Survey Geol. Atlas, Castle Rock folio (No. 198), 1915.
[c] Stose, G. W., U. S. Geol. Survey Geol. Atlas, Apishapa folio (No. 186), 1912.
[d] Henderson, Junius, The foothills formations of north-central Colorado: Colorado Geol. Survey First Rept., pp. 145–188, 1909.
[e] Darton, N. H., Preliminary report on the geology and underground water resources of the central Great Plains: U. S. Geol. Survey Prof. Paper 32, 1905.
[f] Fenneman, N. M., Geology of the Boulder district, Colo.: U. S. Geol. Survey Bull. 265, 1905.
[g] Gilbert, G. K, U. S. Geol. Survey Geol. Atlas, Pueblo folio (No. 36), 1897.
[h] Emmons, S. F., Cross, Whitman, and Eldridge, G. H., Geology of the Denver Basin in Colorado: U. S. Geol. Survey Mon. 27, 1896.
[i] Cross, Whitman, U. S. Geol. Survey Geol. Atlas, Pikes Peak folio (No. 7), 1894.
[j] May include Lyons sandstone and Lykins formation.
[k] As mapped in southeastern part of Pikes Peak quadrangle it included Lyons sandstone and Lykins formation.

COLUMNAR SECTION

GENERALIZED SECTION OF THE ROCKS EXPOSED IN THE COLORADO SPRINGS QUADRANGLE, COLO.

SCALE: 1 INCH=1,000 FEET.

System.	Formation.	Symbol.	Section.	Thickness in Feet.	Character of Rocks.	Character of Topography.
TERTIARY (EOCENE)	Dawson arkose.	Td		1,000±	White and gray arkose with conglomeratic layers and interbedded clays.	Undulating plains with prominent escarpments.
	Andesitic sandstone member.	(Tda)		(90)	Almost wholly fine-grained andesitic débris. Gray siliceous sandstone locally at base.	
	UNCONFORMITY					
CRETACEOUS — UPPER CRETACEOUS	Laramie formation.	Kl		250–800	Fine-grained white quartz sandstone and some black shale and thin seams of coal.	Slopes and low ridges.
	Fox Hills sandstone.	Kfh		600	Dark-gray and brownish-gray fine-grained sandstone, interbedded with shale in lower part.	Slopes and low ridges.
	Pierre shale.	Kp		2,500	Fine-grained dark-gray shale with columnar masses of limestone that here and there form "tepee buttes."	Small isolated conical hills called "tepee buttes."
					Fine-grained drab shale with ferruginous concretions of lime and iron carbonates.	Plains and slopes.
					Drab shale with disseminated gypsum, local sandy layers, and numerous limestone concretions.	
	Niobrara formation.	Kn		400–500	Upper part gray shale with disseminated gypsum; lower part light-gray calcareous shale with pale-gray limestone at base.	Plains, slopes, and low ridges
	Carlile shale.	Kcr		60	Black shale with brownish-gray calcareous sandstone at top.	Valley slopes.
	Greenhorn limestone.	Kgn		50	Light bluish-gray limestone and thin gray interbedded shales.	Terraces on valley slopes.
	Graneros shale.	Kgs		175–220	Gray to drab shale.	Valleys and outer slopes of hogback ridges.
	Dakota sandstone.	Kd		100	Whitish-gray and buff fine-grained sandstones; upper part cross-bedded.	High hogback ridges with cliffs.
	UNCONFORMITY					
LOWER CRET.	Purgatoire formation: Glencairn shale member.	Kgc		50-150	Bluish-black and drab shales.	Slopes.
	Purgatoire formation: Lytle sandstone member.	Kly		145	Coarse porous pebbly sandstone.	Low hogback ridges and slopes.
CRETACEOUS OR JURASSIC	Morrison formation.	Km		225±	Maroon and olive-green clay shales with thin limestone and sandstone near base.	Slopes and low hills.
	UNCONFORMITY					
PERMIAN ?	Lykins formation.	Cl		180	Thin red sandy shales with gypsum layers near top and thin limestone near base.	Low slopes and ridges.
CARBONIFEROUS — PENNSYLVANIAN	Lyons sandstone.	Cly		800–850	White to pink fine-grained homogeneous sandstone in upper part; cross-bedded brick-red fine-grained homogeneous sandstone in lower part.	Ridges and prominent rock pinnacles in the Garden of the Gods and elsewhere in the foothills.
	Fountain formation.	Cf		800–4,500	Red, maroon, and white sandstone, arkose, and conglomerate, with small amounts of interbedded red and green shale.	Rugged valleys with picturesque monuments and other erosion forms in the Garden of the Gods, Monument Park, and elsewhere in the foothills.
	Glen Eyrie shale member.	(Cg)		(100)	Fine-grained thin-bedded buff and gray sandstones and black and drab shale.	
	UNCONFORMITY					
ORDOVICIAN	Manitou limestone.	Om		50–250	Red to gray limestone and massive blue-gray limestone. A few feet of overlying Harding sandstone of Silurian age present in the southwestern part of the quadrangle.	Slopes of mountain spurs and cliff walls.
CAMBRIAN	Sawatch sandstone.	€s		45	White fine-grained quartz sandstone with brownish-red glauconitic calcareous limestone at top.	
	UNCONFORMITY					
PRE-CAMBRIAN	Pikes Peak, Cripple Creek, and Mount Rosa granites.	ppg ccg mrg			Granite, mostly pink, intersected by syenitic and other dikes.	High ridges and mountain summits.

PLATE I.—FRONT RANGE FROM THE PLAINS EAST OF COLORADO SPRINGS.

Highest peak near center of mountain group is Pikes Peak; small round knob to left is Cameron Cone; large mass to left is Mount Garfield; sharp peak at extreme left is Mount Rosa. Mountain tops at right of Ute Pass and valley of Fountain Creek are part of a high plateau. Back of Colorado Springs is a gravel-capped terrace, which merges into The Mesa at right. Beyond The Mesa are the sedimentary rock ridges of the Garden of the Gods. The Ute Pass fault, which comes out of mountains along Fountain Creek, follows foot of range to left.

PLATE II.—PIKES PEAK SUMMIT FROM THE NORTHEAST SPUR.

Large granite masses like those shown in foreground cover much of the top of the mountain. Mountain tops at left are part of an elevated plateau. Sharp peak at extreme left is Mount Rosa.

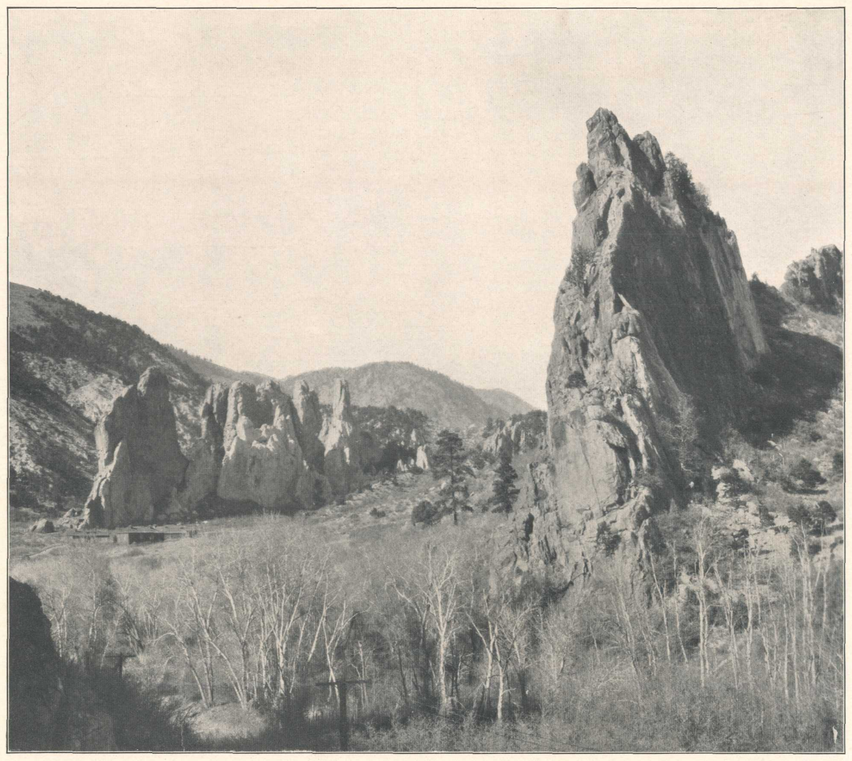

PLATE III.—HOGBACK RIDGE OF DAKOTA SANDSTONE IN GLEN EYRIE.

View looking northwest. Dakota sandstone in foreground dips steeply to the east. High ledges of vertical red and white sandstones of Lyons formation in middle distance. Manitou limestone on lower slopes of Front Range in left distance.

PLATE IV.—RIDGE OF BASAL LIMESTONE BEDS OF NIOBRARA FORMATION IN FOOTHILLS NORTH OF FOUNTAIN CREEK, COLORADO CITY.

View looking north. Vertical beds of lower formations form pinnacled ledges in left middle distance. Front Range in left background. The Mesa, capped by gravel, in right distance.

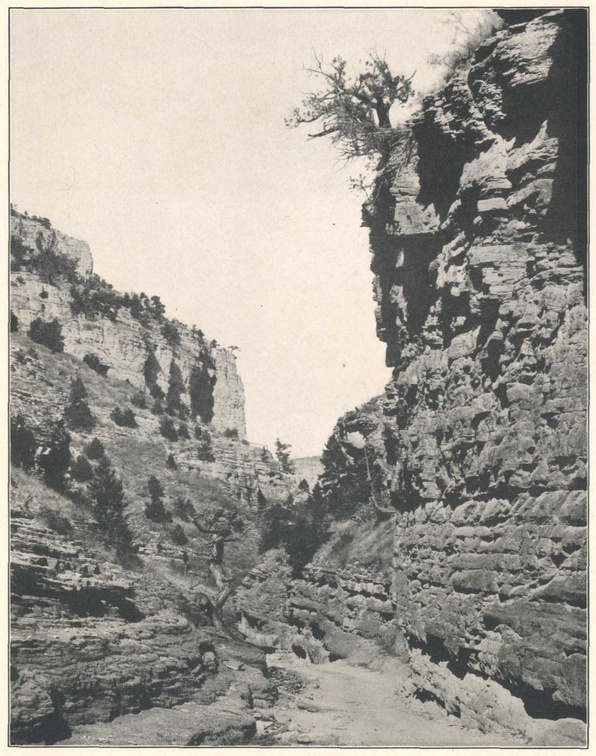

PLATE V.—MANITOU LIMESTONE AND SAWATCH SANDSTONE IN WILLIAMS CANYON NEAR THE NARROWS, MANITOU.

Manitou limestone forms upper white cliffs on left. Lower cliffs are composed of Sawatch sandstone.

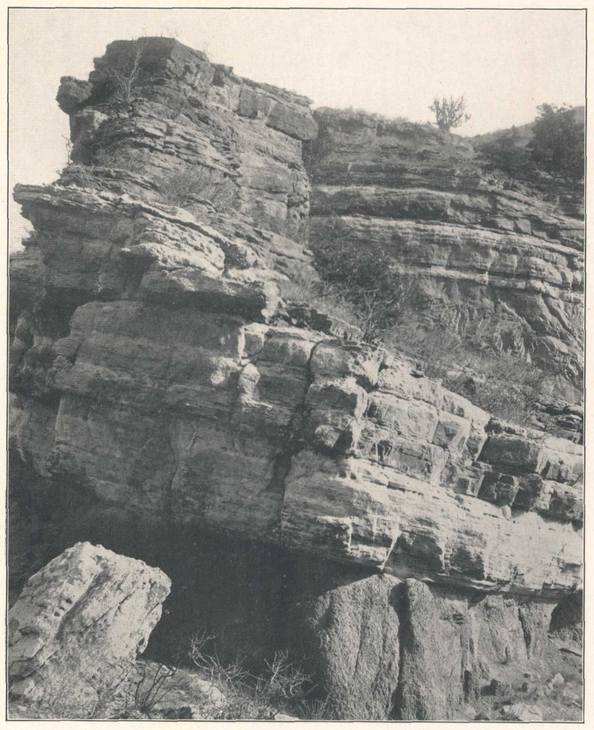

PLATE VI.—SAWATCH SANDSTONE RESTING ON EVEN SURFACE OF PIKES PEAK GRANITE.
Ute Pass, near Manitou.

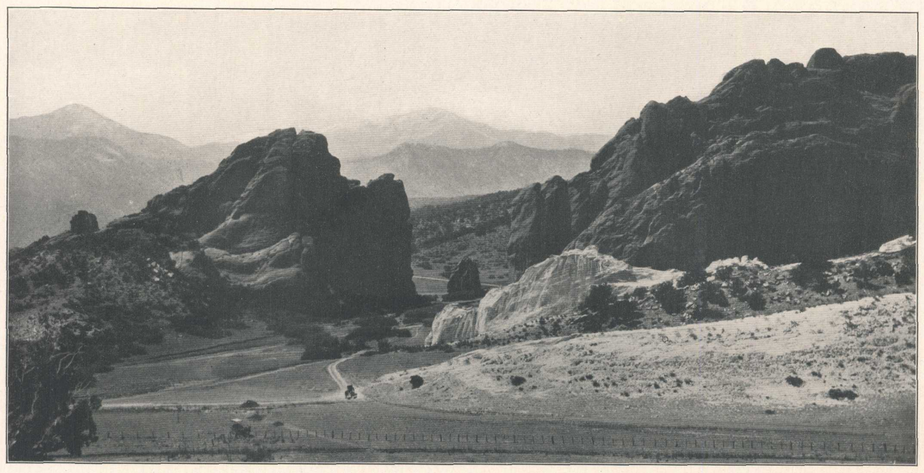

PLATE VII.—GATEWAY OF GARDEN OF THE GODS.
View looking west to Pikes Peak in the distance. The gateway is formed by vertical beds of red sandstone of Lyons formation. High white ledge in front of the red sandstone is the top sandstone of the Lyons, and lower white ledge in foreground is gypsum at top of Lykins formation.

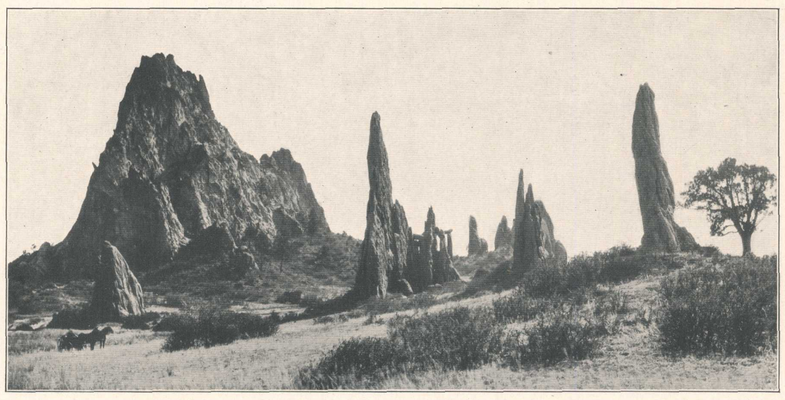

PLATE VIII.—ROCK PINNACLES FORMED BY EROSION IN GARDEN OF THE GODS.
View looking east. Pinnacles of vertical thin-bedded red sandstone of Fountain formation. More massive forms of thicker sandstones of Lyons formation on left.

PLATE IX.—THE "MAJOR-DOMO," IN GLEN EYRIE.
A monument formed by erosion of vertical beds of red sandstone of Fountain formation.

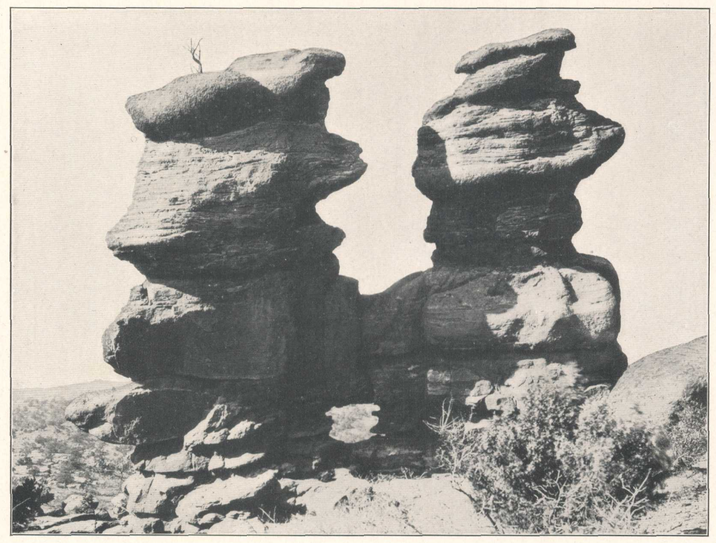

PLATE X.—"HOODOOS" IN SOUTHERN PART OF GARDEN OF THE GODS.
View looking west. These curious-shaped masses are formed by erosion of red conglomeratic sandstone of Fountain formation.

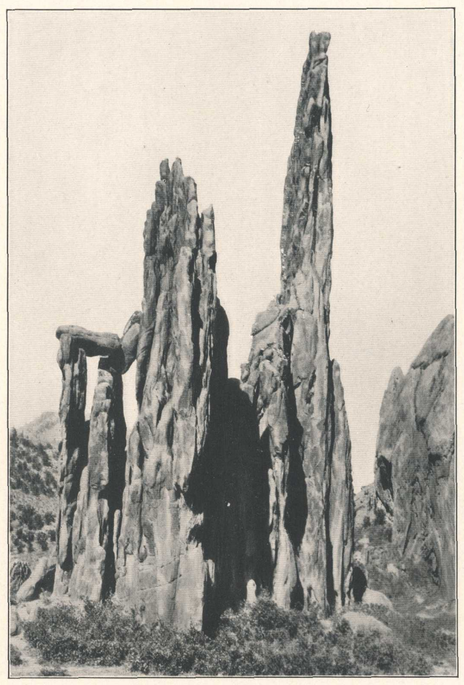

PLATE XI.—"CATHEDRAL SPIRES" IN GARDEN OF THE GODS.
Near view looking west of pinnacled forms shown in Plate VIII.

PLATE XII.—NATURAL MONUMENTS FORMED BY EROSION IN MONUMENT PARK.
The monuments are formed of Dawson arkose, layers of which have been hardened by a cement of iron oxide and have resisted weathering, thus forming a cap that has protected the softer rocks beneath. Two of these hard layers are shown in monument at left.

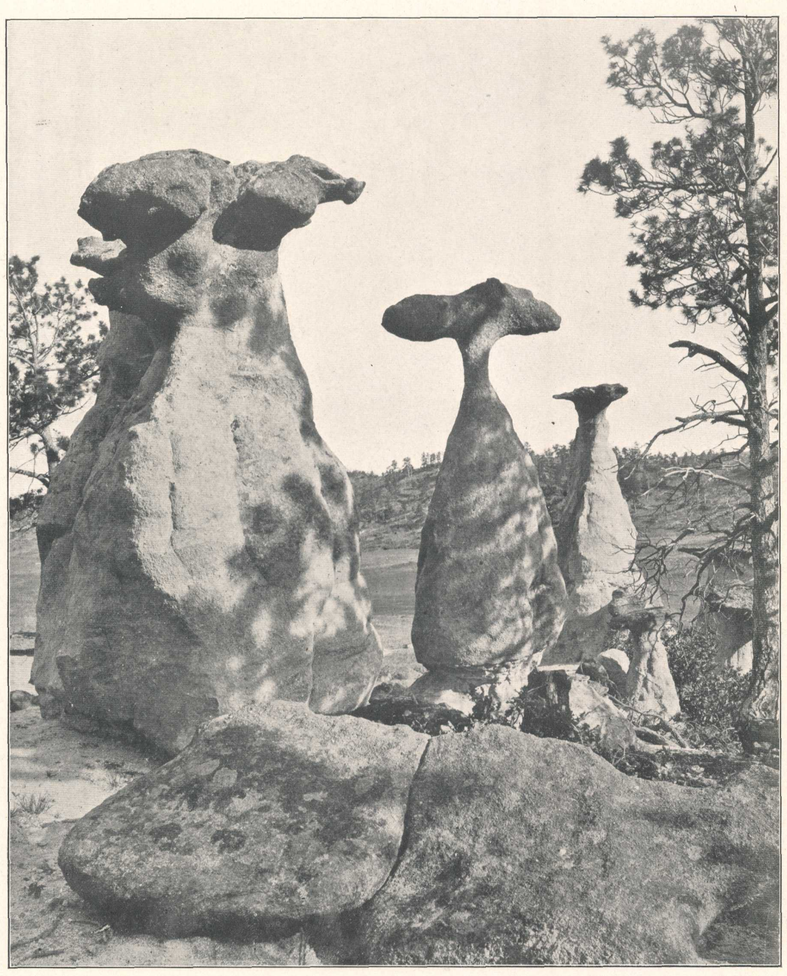

PLATE XIII.—BOTTLE-SHAPED MASSES FORMED BY EROSION OF DAWSON ARKOSE IN MONUMENT PARK.
Capping layer is brownish conglomeratic material hardened by iron oxide.

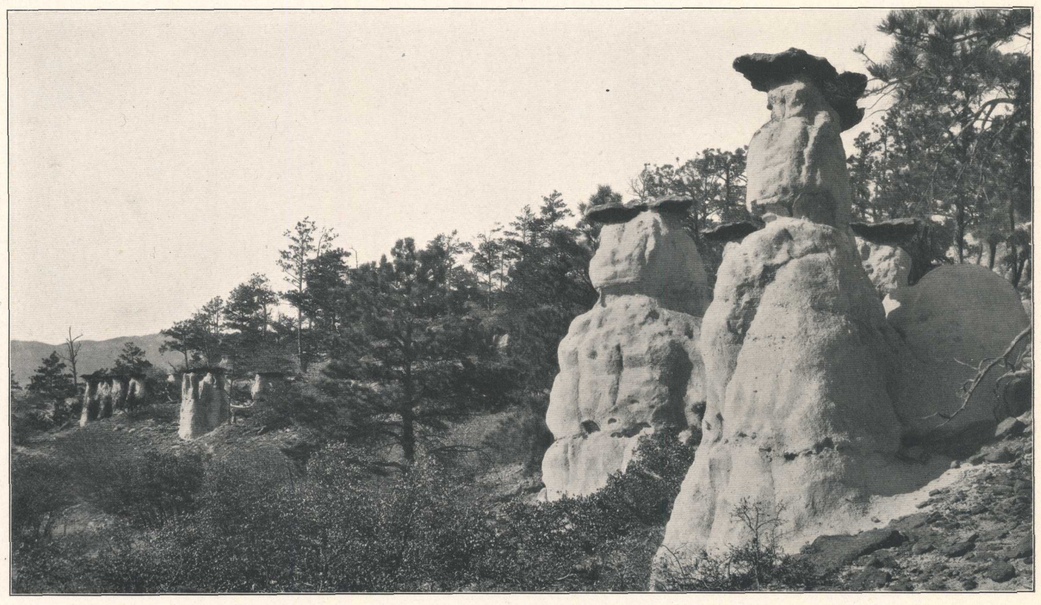

PLATE XIV.—NATURAL MONUMENTS FORMED BY EROSION OF DAWSON ARKOSE IN MONUMENT PARK.
Shows wide extent of capping of hard layer of brown sandstone.