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C.A. Ross Collection /6683/

Under this number are samples from 43 measured sections and about 100 miscellaneous samples from the Pennsylvanian and lower Permian of the Marathon Basin and the Glass Mountains, Texas.

Miscellaneous collecting localities are followed by the measured sections.

COLLECTING LOCALITIES

Localities in measured sections are indexed by two numbers separated by a hyphen i.e. 2-14. The first number (2) indicates the measured section, and the second (-14) indicates the unit within that measured section from which its sample came. An additional letter may follow, i.e. 2-14A or 2-14B: A indicates that the sample is from a lower part of the particular unit than sample B and that sample B is from a lower part than is sample C. X is used for samples which were found loose in a particular interval and its exact stratigraphic position is less certainly known. These localities with their fauna are listed in the stratigraphic sections.

Localities not in measured sections are indexed by single numbers and are listed below together with their fauna, geographic and stratigraphic position.

— p. loc. #1683 gives Gaptank Fm

1. Haymond formation, 1.3 miles SW of Gap Tank, upper limestone and shale along old road cut; Fusulina attenuata.
2. Gaptank formation, 4.1 miles west of Marathon, just south of Highway 90, float near center of cyncline; Triticites ventricosus.
3. Gaptank formation, 4.1 miles west of Marathon, just south of Highway 90, sandstone in flanks of syncline; Triticites comptus.

[cont. in back of book]

130 pages

STRATIGRAPHIC SECTIONS

Forty-three sections were measured along the Glass Mountains escarpment from Dugout Mountain northeastward to the vicinity of the Allison ranch house.

Type sections: The lower part of Section 8 (units 2-23) is the type section for the Lenoxhills formation; the lower part of Section 22 (units 2-30) is the new type section of the Nealranch formation; and Section 43 is the redescribed type section of the Gaptank formation.

The sections are divided into lithologic units which are numbered in ascending order from the base of the exposure. The terminology used to describe the rock types in these sections is briefly outlined below.

Calcirudite: pebbles and cobbles dominantly limestone; matrix of finer calcite fragments and calcite cement.

Conglomerate: pebbles and cobbles of various rock types, commonly with limestone cobbles; siliceous material forming the matrix and clay minerals as the bonding agent.

Calcarenite: calcite or carbonate particles (commonly fine shell fragments) of sand size dominant; interstices of the rock filled by diagenetic calcite, but much original clay mineral material may also be present.

Sandstone: sand size particles, usually quartz or siliceous fragments, calcite particles generally not dominant.

Limestone: very fine sand and silty size calcite fragments in which the particles have been largely recrystallized to form diagenetic cement; the original calcite particles are thus largely obscured or obliterated; a few larger shell fragments may be present.

Siliceous shale: shale more or less cemented either diagenetically or secondarily by chert, commonly as layers in siltstone and shale units.

Other terminology follows Dunbar and Rodgers (1957).

Section 1

Measured up the southwestern corner of the southwestern flank of Dugout Mountain.

Top of ridge	Thickness (feet)
Leonard Formation	
21. Limestone, gray to brown-gray weathering, of organic fragmental calcarenite and calcirudite, coll. 1-21. *Parafusulina schucherti*?	11
20. Limestone, yellow to gray-tan weathering, conglomeratic near base, biohermal near top with a flat 2 inch dark siliceous capping . .	4
19. Sandstone, like unit 17	3

Section 1 contd.

	Thickness (feet)
18. Limestone, medium to dark gray, massive, containing many different fossil fragments, top of unit capped by an even siliceous band, coll. 1-18	35
17. Sandstone, light brown, very silty, made of 1/16 inch lamellae	5
16. Calcirudite, medium gray weathering, massive, including 3 foot blocks of limestones like those below (units 1-15) and only a few of Gaptank lithologies, top rippled, marked with a dark siliceous surface	22
Lenoxhills Formation	
15. Limestone, light gray weathering, dense with vertical fracturing pattern, primarily a calcilutite in 6 inch to 2 foot beds, coll. 1-15, Schwagerina franklinensis	19
14. Limestone, medium to dark gray weathering, primarily a calcilutite, some mottled colors, coll. 1-14	7
13. Limestone, light yellow-brown weathering, very sandy and silty, 6 inch to 3 foot beds	12
12. Limestone, light gray, like unit 10 but with more abundant fusulinids, coll. 1-12, Schwagerina franklinensis, S. lineanoda . . .	6

Section 1 contd.	Thickness (feet)
11. Covered, ...	2
10. Limestone, light gray, 1 to 3 foot beds, calcilutite, scattered fusulinids, coll. 1-10.	8
9. Covered	3
8. Limestone, medium gray weathering, fusulinid hash, coll. 1-8, Schwagerina tersa, Parafusulina schucherti?	3
7. Covered	4
6. Limestone, brown-gray weathering, very silty, upper 2 inches an intraformational conglomerate	1 1/2
5. Covered	4
4. Calcarenite, medium gray weathering, medium sand size, no identifiable fossils	2 1/2
3. Covered, probably much like unit 2	7
2. Limestone, red-brown weathering, very sandy (very fine quartz sand), highly porous, coll. 1-2. . . .	5
1. Covered	13

Folded Gaptank beds below.

Section 2

Measured up to the saddle in the southwestern windgap on the southwestern flank of Dugout Mountain. Top of section at base of limestone conglomerate

	Lenoxhills Formation	Thickness (feet)
8.	Covered, dip-slope at this point	15
7.	Limestone, light tan weathering very silty, in 1 foot beds, with patches of darker brown and gray colors, 1 or 2 dark limestone layers 6 inches thick coll. 2-7	6
6.	Limestone, dark gray, 3 to 6 inch beds	5
5.	Limestone, medium gray, massive, organic fragmental, crinoid columnals abundant	3
4.	Calcarenite, medium grayish brown, of coarse sand sizes, with few poorly preserved fusulinids and other organic fragments, in 6 inch beds	4
3.	Sandstone, and siltstone, light brown, friable, 1/4 to 1/2 inch beds	25
2.	Limestone, brown-gray weathering, very conglomeratic, 1/2 to 1 inch chert and limestone pebbles	12
1.	Covered	20

Folded Gaptank beds below.

Section 3

Measured up lower portion of Dugout Mountain about one-third of a mile southwest of Section 26. Top of section at

base of limestone conglomerate

		Thickness (feet)
	Lenoxhills Formation	
7.	Covered	87
6.	Shale, blue-gray, very silty and limey . . .	16
5.	Sandstone, mottled light green and light orange brown, with irregular bedding, very silty . .	8
4.	Sandstone, like unit 2, but with a few beds of conglomerate like unit 3, both lithologies are lenticular, top surfaces are flat and darker brown than rest of rock	10
3.	Conglomerate, mostly limestone pebbles, some up to 1 1/2 inches in diameter, with large percentage of light colored sand and a few beds of dominantly chert pebbles	8
2.	Sandstone, light tan to light gray weathering of medium to coarse quartz sand, with some calcite grains and cement and scattered fusulinids, coll. 3-2 Schwagerina hessensis	18
1.	Covered	4

Folded Gaptank beds below.

Section 4

Measured up the highest portion of Dugout Mountain about one-quarter of a mile south of the northern windgap.

Top of measured sequence	Thickness (feet)
Leonard Formation	
30. Limestone, light gray weathering, contains some 1 to 3 inch chert pebbles; this is King's first Leonard limestone unit	20
29. Covered	14
28. Calcarenite, like unit 25, and interbedded brown sandstone, like unit 24, five repetitions	8
27. Calcarenite, like unit 25, 4-27	2
26. Sandstone, dark green-gray weathering, very silty	1 1/2
25. Calcarenite, orange-brown weathering, dark gray to dark brown on fresh surface, medium to coarse sand size, crinoid columnals, bryozoans, brachiopod fragments are primary constituents	1/2
24. Sandstone, light brown, friable and porous, 1/16 inch lamellae	1 1/2
23. Conglomerate, medium brown weathering, cobbles up to 5 inches diameter in middle of unit, top is gradational with unit 24	3 1/2

Section 4 contd.

	Thickness (feet)
22. Sandstone, and siltstone, light brown weathering, 1/16 inch lamellae, very fine calcarenite at top of unit 6 inches thick	31
21. Calcarenite, medium gray weathering, very fine grained, very quartzitic locally, siliceous bands 1/2 inch common	4
20. Sandstone and siltstone, brown weathering . .	24
19. Calcarenite, like unit 17	1/2
18. Covered, probably mostly brown sandstone and siltstone, coll. 4-18X, (float) Schwagerina guembeli	29
17. Calcarenite and fine chert conglomerate, bryozoans, small brachiopods and crinoid colomnals dominant fauna	2
16. Sandstone and siltstone, light brown to orange-brown weathering	19
15. Calcarenite, medium to coarse grained, dark gray weathering, fetid odor, coll. 4-15	2
14. Sandstone, medium brown weathering, very silty	5
13. Conglomerate, chert, quartzite, and limestone cobbles, well rounded, maximum diameter 6 inches	17

Section 4 contd.	Thickness (feet)
12. Limestone, light gray weathering, dense and massive, coll. 4-12.	3
11. Conglomerate, chert and quartzite pebbles, 1 to 2 inches in diameter	0 to 2
10. Limestone, light brown-gray weathering, well bedded in 1 to 4 foot beds, lower 6 feet contain brown chert pebbles, coll. 4-10, Schwagerina hessensis, S. hawkensi, S. tersa, S. nelsoni, S. crebrisepta, S. diversiformis, S. compacta?, Parafusulina schucherti?	26
9. Calcirudite, boulders 4 feet in diameter, very chert pebbles, massive beds	44
Lenoxhills Formation	
8. Covered	25
7. Siltstone and shale, brown to light brown weathering	2
6. Calcarenite, like unit 4	1/2
5. Sandstone, light brown, very friable	2
4. Calcarenite, dark brown on fresh surface, contains fragments of brachiopods and crinoids, and a few fusulinids, coll. 4-4, Schwagerina knighti	2

Section 4 contd.

	Thickness (feet)
3. Shale, blue-gray with some brown lenses, becomes sandy upwards in unit, very silty throughout	67
2. Sandstone, light yellow and brown weathering, very fine sand grains	4
1. Conglomerate, large boulders up to 1 foot in diameter, the larger boulders are dark limestones, pebbles are mainly chert, base of unit not exposed . . . . . at least	30

Covered below.

Section 5

Measured near the northeastern end of the ridge which extends northeastward from Dugout Mountain. Dips in the lower portion of the section are extremely variable, ranging from 15° to 30°.

Top of measured sequence

	Thickness (feet)
Lenoxhills Formation	
5. Conglomerate, with pebbles and cobbles of lithologies representing most of the older rocks in the Marathon fold belt	150

Section 5 contd.

		Thickness (feet)
4.	Conglomerate, chert and quartzite pebbles dominate over limestone pebbles, several lenses of brown sandstone.	15
3.	Covered, probably conglomerate	12
2.	Calcirudite, cobbles are limestones of many lithologies, a small percentage of chert pebbles	160
1.	Covered	15

Folded Gaptank formation below.

Section 6

This section begins at the base of the Lenox Hills escarpment 2 1/4 miles N 70° W of the Decie ranch house and continues up the section to base of the escarpment-forming limestone.

Top of section

		Thickness (feet)
	Leonard Formation	
40.	Limestone, gray weathering, organic fragmental, biohermal in part, coll. 6-40.	not measured
39.	Sandstone, light brown weathering very fine quartz sand, medium laminations	8

Section 6 contd.	Thickness (feet)
38. Limestone, medium gray weathering, brown on fresh surface, very silty and sandy, many very small cephalopods, coll. 6-38.	1/2
37. Sandstone, like unit 35	8
36. Covered	5
35. Sandstone, light brown weathering, beds up to 1 inch thick, very fine quartz sand	23
34. Sandstone and siltstone, light brown to yellow brown weathering, very fine quartz sand; beds grade laterally into calcarenites and beds with calcite cement	8
33. Siltstone, light brown to gray-brown weathering, calcite cement	1/2
32. Covered	13
31. Limestone, light brown to gray-brown weathering, very silty and quartz sand common, 3 inch pebble conglomerate in part	1/2
30. Sandstone, like unit 28	8
29. Limestone, dark gray weathering, clastic, mostly calcarenite but a few 1/4 inch diameter chert pebbles, 1/2 inch red-brown chert band forms upper surface	1/2
28. Sandstone, light brown weathering, very fine quartz sand	7

Section 6 contd.

		Thickness (feet)
27.	Limestone, light brown and light gray weathering, very silty; the two shades of silty limestone occur interlocked with each other, coarse sand and small cobbles are incorporated in this matrix as well as fragments of brachiopod and bryozoan shells	1 1/2
26.	Covered, probably sandstone and siltstone . .	31
25.	Calcarenite, light gray-brown weathering, both clastic and organic fragmental, 1 to 2 foot beds, lineation of small echinoid spines is N 70° E	12
24.	Covered	14
23.	Calcarenite, brown-gray weathering, clastic and organic fragmental, poorly sorted near base of beds but becomes well sorted and silicified near top of beds, beds 3 to 4 feet thick, coll. 6-23	7
22.	Sandstone, light brown weathering, very fine quartz sand, thin but uneven lamellae, two 3 inch calcarenite bands near middle . .	9
21.	Calcarenite, gray weathering, much quartz sand, flat top beds with siliceous bands (1 inch) at top, 5 beds, coll. 6-21A (at base), 6-21B (15 feet up)	18

Section 6 contd.	Thickness (feet)
20. Covered	6
19. Calcarenite, brown-gray weathering, organic fragmental with very fine quartz sand matrix, more quartz rich upwards	9
18. Covered	17
17. Calcarenite, dark brown-gray weathering, organic fragmental and clastic, a few small chert pebbles up to 1/4 inch diameter, a few scattered fusulinids and echinoid spines.	2
16. Covered	5
15. Calcarenite, medium gray weathering, organic fragmental, poorly consolidated near base, well sorted only in upper 6 inches, top 1 inch is brown laminated chert, upper surface is planar, A. coll. 6-15.	2 1/2
14. Covered	5
13. Calcarenite, medium gray weathering, organic fragmental, mostly bryozoan, crinoidal, and brachiopod fragments, A coll. 6-13	1 1/2
12. Covered, probably clastic limestones and conglomerates	24
11. Calcarenite, medium gray weathering, chert and quartzite pebbles up to 3 inches in diameter, 1 to 2 foot beds, planar	

Section 6 contd.	Thickness (feet)
upper surface with 1 inch silicified band, well sorted in upper 2 inches	9
10. Covered	3
9. Calcarenite, gray weathering, in 1/2 foot beds, well sorted separated by brown weathering siltstone	3
8. Siltstone, and sandstone, like unit 4. . . .	6
7. Calcarenite, like unit 5	1 1/2
6. Siltstone and sandstone, like unit 4.	5
5. Calcarenite, gray weathering, chert pebbles up to 1 inch in diameter, unit thins to NE and thickens to SW	1
4. Siltstone, orange-brown weathering, fine sandstone brown weathering, well cemented with secondary chert	11
3. Covered	4
2. Calcarenite, medium gray weathering; minor amounts of fine chert pebbles which occur in thin beds near base, matrix is mostly sand size, upper 40 feet well sorted, beds 1 to 4 feet thick, dip 10° N 70° W	52

Lenoxhills Formation

1. Conglomerate, pebbles and cobbles from Santiago chert and later Paleozoic forma-	

Section 6 contd.

	Thickness (feet)
tions make up bulk of unit, poorly cemented, base not seen	55

Covered below.

Section 7

Section begins at the base of the Lenox Hills escarpment two miles N 45° W of the Decie ranch house, on the northeast side of a gully. Units 1-4 are faulted and folded and are unconformably overlain by unit 5. To the southwest across the gully additional units below this unconformity crop out. The section continues up the face of the escarpment to the top of the ridge.

Top of section

	Thickness (feet)
Leonard Formation	
24. Calcarenite, brown-gray weathering, beds poorly sorted near bases, well sorted and silicified near tops, 5 feet thick, with flat tops, coll. 7-24 (near top).	21
23. Limestone, brown-gray weathering, calcarenite in large part, chert and limestone pebble zones and scattered pebbles throughout . . .	15
22. Sandstone light brown weathering, much coarse limestone sand, dominantly very fine quartz sand.	2

Section 7 contd.	Thickness (feet)
21. Calcirudite, with chert cobbles near base, grades upwards into calcarenite in upper 6 inches, planar siliceous upper surface, A coll. 7-21.	7 1/2
20. Sandstone, unit 15	4 1/2
19. Limestone, gray weathering, biohermal with brown chert pebbles, upper 2 feet calcarenite with planar upper surface, siliceous brown cap, coll. 7-19	6
18. Calcarenite, like 16	2
17. Sandstone, brown weathering, upper surface irregular and apparently eroded before deposition of unit 18	1/2
16. Calcarenite, brown weathering, organic fragmental particles up to 2 inches in diameter	1
15. Sandstone, light brown, 1/16 to 1/2 inch beds.	7
14. Calcirudite, gray weathering, grading upward into a calcarenite of algal, sponge, and fusulinid fragments,	6
13. Covered, probably brown siltstones and sandstones	6
12. Calcarenite, medium gray weathering, organic fragmental, 2 foot beds, coll. 7-12	6

Section 7 contd.

		Thickness (feet)
11.	Conglomerate, brown to medium gray weathering chert, quartzite, and limestone cobbles, becomes dominantly a calcirudite in upper 10 feet, many fragments of shells, very lenticular, Coll. 7-11A (35 feet above base), 7-11B (45 feet above base)	49
10.	Calcarenite, dark brown weathering, a few bands of chert pebbles, 2 inch to 2 foot beds, irregular lower surface cut into unit 9, upper surface is planar and siliceous	22
9.	Conglomerate, brown and gray weathering, limestone, chert and quartzite pebbles up to 3 inches in diameter, brown quartz sand, ...	3
8.	Covered, probably mostly poorly cemented conglomerate	65

Lenoxhills Formation

7.	Conglomerate, brown weathering, poorly sorted, chert, quartzite, limestone pebbles, some small cobbles, massive cliff forming, becomes coarser upwards, 1 to 20 foot beds	84
6.	Covered for most part, probably conglo-	

Section 7 contd.

	Thickness (feet)
merate like unit 7, coll. 7-6, *Triticites* sp. (reworked?) (60 feet above base of unit)	145
5. Calcirudite, gray to brown-gray weathering, lower 10 feet are dominantly light gray calcarenite with a few limestone cobbles and pebbles, upper 30 feet are very similar to unit 7, 3 foot beds, ...	46

Nealranch Formation

4. Limestone, medium gray weathering, biohermal, organic fragmental, no definite bedding, fusulinids, cephalopods, crinoid columnals, and brachiopod, unconformably overlain by unit 5, coll. 7-4, *Triticites uddeni*	29
3. Covered	10
2. Conglomerate, brown weathering, 1/4 to 1/2 inch chert pebbles, brown quartz sand, a few crinoid fragments	5
1. Sandstone, green-gray weathering, large amounts of green silt, coll. 7-1	1/2

Covered below.

Section 8

Measured up the southeastern face of the Lenox Hills 2 1/2 miles N 10° W of the Decie ranch house; this is about 1/3 mile NNE of the Slick-Urschel no. 1 Mary Decie well site.

Top of measured sequence	Thickness (feet)
Leonard Formation	
54. Calcirudite, light gray weathering, limestone cobbles up to 6 inches in diameter, massive	8
53. Siltstone, light yellow-brown weathering, and thin calcarenite; interbedded in repetitious sequence, siltstones have siliceous secondary bands, coll. B-53 (at top).	12
52. Limestone, light gray weathering, primarily a calcarenite or organic fragments, upper 2 inches siliceous	2 1/2
51. Calcirudite, and interbedded chert-quartzite conglomerate, light gray weathering for most part, two thin siltstone beds near middle of unit	8
50. Covered, probably light brown siltstone . . .	9
49. Calcarenite, light blue-gray weathering blebs of brown siltstone, small cephalopods common, coll. B-49.	2

Section 8 contd.	Thickness (feet)
48. Siltstone, light gray-brown weathering, fills eroded upper surface of unit 47 which has 1 1/2 feet of relief, coll. 8-48. Smaller Foraminifera, sponge spicules, A coll. 8-48	14
47. Sandstone, light gray-brown weathering, mottled shades in irregular patches, very fine quartz sand, lenticular	0-1
46. Limestone, medium gray weathering, organic fragmental, lower surface irregular on eroded top of unit 45, siliceous upper 2 inches, edgewise conglomerate in part . . .	1
45. Shale, medium gray, and siltstone, light yellow-brown	29
44. Sandstone, light brown weathering, medium gray-brown on fresh surface, fine quartz sand, very silty in upper portion	1
43. Shale, siltstone, and mudstone, light yellow-brown weathering, dark gray on fresh surface	42
42. Calcarenite, light yellow-gray weathering, organic fragmental, dominantly brachiopods, crinoid columnals, echinoid spines and fusulinid fragments, A coll. 8-42	1

Section 8 contd.

	Thickness (feet)
41. Siltstone, yellow-brown weathering, grades upward into dark gray shale	29
40. Calcarenite, light gray-yellow weathering, irregular lenses of light brown siltstone, a few fusulinids, algal masses, and other fossil fragments, coll. B-40	3
39. Covered, one thin bed like unit 40, coll. B-39.	18
38. Siltstone, light yellow-brown weathering, with lenses of gray weathering calcarenite	9 1/2
37. Calcarenite, dark gray, fetid, weathers yellow-brown, fusulinids common, upper surface is planar, well sorted, coll. 8-37, Parafusulina schucherti	1 1/2
36. Shale, dark gray, and siltstone, light yellow-brown, these two lithologies grade laterally back and forth into each other coll. 8-36, smaller Foraminifera	16
35. Covered, probably dark gray shale	12
34. Sandstone, light brown weathering, grades upward into siltstone and then into shale	9
33. Calcirudite, yellow-brown weathering, grades upward into calcarenite and then	

Section 8 contd.

		Thickness (feet)
	into fine quartz sand, several 1/2 inch shale partings	1 1/2
32.	Shale, dark gray, coll. 8-32X, Parafusulina schucherti	16
31.	Conglomerate, like unit 27	1
30.	Shale, medium gray-brown	2 1/2
29.	Calcarenite, orange-brown, organic fragmental, very fine pebbles of crinoid columnals and echinoid spines	1/2
28.	Shale, dark gray-brown, coll. 8-28, Schwagerina hawkensi, Parafusulina schucherti, Smaller Foraminifera	3
27.	Conglomerate, orange-brown weathering, fine pebbles of chert, limestone, and quartzite, in a quartz sand matrix, poorly sorted at base becoming well sorted at top of unit, 6 to 12 inch beds, coll. 8-27 Schwagerina hessensis, S. franklinensis, S. hawkensi . .	10
26.	Covered, probably gray shale, one pebble conglomerate (8 inch) crops out near middle of unit	15
25.	Sandstone, light brown-gray weathering, grades upward into conglomerate and organic fragmental rock, planar upper surface,	

Section 8 contd.

	Thickness (feet)
siliceous replacement in upper 2 inches, tetracorals common, coll. 8-25, Schwagerina compacta, S. hessensis	8
24. Limestone, light to medium gray weathering, locally an organic fragmental rock, but elsewhere a few feet along strike becomes a calcirudite or chert conglomerate, coll. 8-24, Schwagerina hawkensi, S. tersa?. S. diversiformis, S. compacta, S. hessensis, Parafusulina schucherti	25
23. Covered	5
22. Limestone, medium gray, organic fragmental, locally over 30 percent limestone and chert cobbles, 2 to 5 foot beds, coll. 8-22	18
Lenox Hills Fm	
21. Covered, probably brown-gray shale, (8-21, shale)	26
20. Shale, brown-gray, Bryozoa fragments, Smaller Foraminifera, siliceous sponge spicules, coll. 8-20	28
19. Calcarenite, yellow-brown weathering, lower 8 inches have many pebbles, upper 4 inches are well sorted, evenly laminated, fine calcite and quartz sand, upper surface is planar	1
18. Shale, gray to gray-brown weathering, slightly silty	12

See Ross, 1963, G.S.A. Ec. Mon. C, 1963

Section 8 contd.

		Thickness (feet)
17.	Calcarenite, yellow-brown weathering, becomes well cemented and contains chert pebbles in upper 5 inches, coll. 8-17, Schwagerina nelsoni, S. diversiformis, S. dispansa, Bryozoa, Smaller Foraminifera, siliceous sponge spicules	1 1/2
16.	Covered, probably gray shale	11
15.	Calcarenite, orange-brown weathering, a few cobbles up to 4 inches in diameter, becomes better sorted and finer grained towards top of unit especially in upper 5 inches, planar upper surface, coll. 8-15, Pseudoschwagerina robusta, P. texana, Schwagerina nelsoni, S. crebrisepta, S. hessensis?	4 1/2
14.	Shale, gray with slight brown tinge, siliceous sponges spicules	5
13.	Covered, probably gray shale	13
12.	Calcarenite, green and orange-brown weathering, poorly sorted near base, some fine chert pebbles near base, upper 4 inches well sorted, coll. 8-12, Pseudoschwagerina robusta, Schwagerina crebrisepta, S. nelsoni, S. laxissima	3 1/2

Section 8 contd.	Thickness (feet)
11. Covered, probably gray-brown shale	30
10. Conglomerate, brown to brown-gray weathering, chert and quartzite pebbles, brown quartz sand matrix, upper bed has planar upper surface	3
9. Shale, brown-gray weathering, 5 inch brown weathering sandstone at top	8
8. Conglomerate, light gray-brown weathering, with two thin shales	2 1/2
7. Shale, brown-gray weathering, 6 inch sandstone brown weathering, at top, coll. 8-7, Schwagerina diversiformis, siliceous sponge spicules.	6
6. Conglomerate, light brown weathering, chert and quartzite pebbles	4
5. Sandstone, yellow-brown weathering, very fine to fine quartz sand, silty, poorly cemented 1 to 3 inch beds	6
4. Conglomerate, brown weathering, chert and quartz sand matrix, 6 inch to 4 foot beds	74
3. Sandstone, brown to gray-brown weathering, secondary mineralization weathers purple or magentia, coll. 8-3, Pseudoschwagerina	

Section 8 contd.

	Thickness (feet)
beedei, Schwagerina hessensis?	14
2. Conglomerate, brown weathering, chert, quartzite, and dark gray limestone pebbles and cobbles, brown quartz sand, this unit truncates beds below and strikes N 30° E and dips 11° N W, lower beds have irregular relief of about 8 or 10 feet , . . .	29

Nealranch Formation

1. Limestone, dark gray to medium brown, organic fragmental; and siltstone, yellow; limestone contains 1/2 inch diameter chert pebbles, 2 foot beds, strike N 75° W, dip 9° NE, coll. 8-1, Triticites pinguis? T. uddeni, T. milleri?, Schwagerina gracilitatis	44

Cover below.

Section 9

Measured parallel to the Sullivan ranch road up the low hill just to the south of the point where the road enters the Lenox Hills, about 3 1/4 miles N 10° E of the Decie ranch house.

Top of Hill

		Thickness (feet)
	Leonard Formation	
12.	Limestone, light gray to light tan weathering, lower 6 to 10 feet have large limestone cobbles and small amounts fine chert pebbles, this unit is largely replaced by dolomite, coll. 9-12	58
11.	Covered	27
10.	Shale, siltstone, and very fine grained sandstone, light brown weathering, friable	17
9.	Calcarenite, dark gray weathering, some black chert pebbles, organic fragmental for most part, coll. 9-9	1 1/2
8.	Covered, probably light brown shale, and siltstone	25
7.	Calcarenite, medium gray to orange-brown weathering, a few small pebbles near base, upper 1 to 2 inches siliceous	2
6.	Covered, probably mostly light brown shales and siltstones	7
5.	Limestone, brown-gray weathering, biohermal 3 inch to 2 foot beds, large crinoid columnals	3 1/2
4.	Shale and siltstone, light brown, friable	1

Section 9 contd.

	Thickness (feet)
3. Calcarenite, medium to dark gray, well sorted, upper 1/2 inch is replaced by dark brown chert	1
2. Covered, probably brown siltstones and shales for most part	34
1. Limestone, medium gray, massive in part, forms base of slope, the lower 5 feet contains chert pebbles, several limestone conglomerate lenses higher in the unit, upper 1 foot is orange-brown weathering, well sorted, coll. 9-1, Parafusulina schucherti, Paraschwagerina plena, Schwagerina hessensis, S. franklinensis? Triticites ventricosus (reworked?), Nankinella umbilicatus	34

Covered below.

Section 10

This section starts in a small stream gully at the southwestern end of the ridge which lies to the west of Iron Mountain. The section rests on folded and faulted Dimple limestone, Santiago chert, and Tesnus sandstone, which have a general dip of 14° to the N 50° E. Unit 1 and higher units dip about 14°

to the N 40°W. Unit 14 was carried northeast along the face of this ridge to a point just west of the highest point on Iron Mountain where the higher units were measured to the top of the ridge.

Top of ridge

Thickness (feet)

Leonard Formation

20. Siltstone, orange-brown weathering, with brown siliceous bands 2 to 4 inches thick, forms most of back slope here, ...est. 30

19. Limestone, medium to light brown-gray weathering, dolomitic, organic fragmental hash 15

Fault with stratigraphic throw of about 5 feet

18. Dolostone, light tan weathering, massive beds, grades laterally into organic fragmental hash away from fault, molds of fossils 55

17. Calcirudite, limestone cobbles up to 1 foot in diameter, Scacchinella common, crinoid columnals up to 2 1/2 inches in diameter 12

16. Limestone, medium to light gray weathering, increasing percentage of pebbles and cobbles upward, upper 10 feet are fine pebble calcirudite, coll. 10-16A (loose on

Section 10 contd. Thickness (feet)

slope near base of unit), Schwagerina hessensis, S. crebrisepta, coll. 10-16B (from upper 10 feet) Schwagerina diversiformis 78

15. Limestone, medium gray weathering, clastic limestone sand with some brachiopod, crinoid, bryozoan, and fusulinid fragments, even bedding surfaces, strongly fetid, 1 inch to 1 foot beds, coll. 10-15 (near base), Schwagerina diversiformis, Triticites sp. (reworked?) 55

14. Calcirudite, limestone cobbles up to 7 inches in diameter, some small chert pebbles up to 1/2 inch diameter; some cobbles contain Triticites and Schwagerina, beds 5 to 10 foot 55

Lenoxhills Formation

13. Covered, but probably a continuation of unit 12 below 14

12. Sandstone, light tan, friable, some well cemented silty zones, 2 to 8 inch beds . . . 21

11. Sandstone, bright orange weathering, no internal lamination 1 1/2

Section 10 Contd.	Thickness (feet)
10. Siltstone, very sandy, and shale, light green-brown weathering; some orange, very fine, quartz sandstone	41
9. Sandstone, medium to light brown, medium to fine quartz sand, some chert pebbles	3/4
8. Siltstone, like unit 4	10
7. Sandstone, orange-brown weathering, like unit 3, coll. 10-7, Schwagerina dispansa, S. diversiformis	1/2
6. Siltstone, like unit 4.	2
5. Sandstone, like unit 3	1/4
4. Siltstone, mudstone, and shale, interbedded, gray to green-gray and green-yellow weathering, very sandy	22
3. Sandstone, orange-brown weathering, silicified in part, a few fossil fragments	1/4
2. Covered, probably light brown silty shale . . .	12
1. Conglomerate, brown, chert and quartzite pebbles (1/2 to 1 inch) dominate, brown cement, and a few dark limestone cobbles (3 inch), unit thins to the SW	0-15

Folded pre-Permian rocks below; coll. 10-0, 1/3 of the way up from base of slope near middle of ridge, from a brown limestone, Triticites milleri.

Section 11

Measured up a gully which heads in a slight reentrant near the western end of Leonard Mountain. Units 1 and 2 dip 10° S and are truncated by higher units which dip about 7° NW.

Top of ridge

		Thickness (feet)
	Leonard Formation	
15.	Limestone, medium to dark gray, thin bedded, siliceous bands near top of most units	not measured
14.	Siltstone, orange-brown weathering, many limestone bands are completely replaced by chert	32
13.	Limestone, light gray, numerous chert pebbles, 4 to 6 foot beds, but beds thicken and thin along strike	46
12.	Siltstone, orange to orange-brown weathering, some beds of sandstone, many thin siliceous bands	73
11.	Limestone, light gray, calcirudite ~~near~~ at top, chert replacement common, 2 to 4 foot beds.	120
10.	Covered, probably limestone and shale	41

Lenox Hills Formation

Section 11 contd. Thickness (feet)

9. Calcirudite, medium gray weathering, dolomitic, coll. 11-9, Schwagerina diversiformis, S. tersa, Parafusulina linearis . . 10

~~Lenoxhills Formation~~

8. Limestone, medium gray to gray-brown weathering, organic fragmental calcarenite, crumbly . . 25

7. Covered, probably shale and some interbedded limestone, coll. 11-7X (float) Schwagerina hawkinsi, S. tersa, S. guembeli? (large form), (Triticites ventricosus, T. beedei reworked) . . . . . about 100

6. Conglomerate, chert and dark limestone pebbles up to 3 inches in diameter, orange-brown sand matrix, Schwagerina linearis . . . 8

5. Covered, probably silty brown shale 35

4. Shale, light brown weathering, silty; and calcarenite, yellow-orange weathering, 6 inch beds, coll. 11-4 (near base), Schwagerina dispansa, S. laxissima, S. tersa, S. crebrisepta, S. diversiformis, Parafusulina linearis 16

3. Covered 20

Section 11 contd. Thickness (feet)

Gaptank Formation

2. Limestone, medium gray to brown weathering, becomes very dark gray along strike, massive, sparingly fossiliferous 17

1. Limestone, dark gray to black, 2 to 3 foot beds, Triticites sp. (Canyon type) 12

Covered below.

Section 12

Measured up the southwestern face of Leonard Mountain beginning from a gully at the foot of the escarpment due south of BM 5860 up to the top of the mountain. Units 1 through 4 are tightly folded and faulted and the thicknesses given are only estimates. Units 6 and 7 are in a sequence which dips 24° to the southwest and are truncated and unconformably overlain by unit 8. Unit 18, the dolostone, is not a consistent horizon when traced laterally.

Top of Ridge, BM 5860 Thickness (feet)

Leonard Formation

19. Limestone, medium gray, massive locally but grades into 6 inch to 1 foot beds laterally,

Section 12 contd. Thickness (feet)

coll. 12-19, Schwagerina compacta, S. guembeli (large form), S. crebresepta?, Parafusulina schucherti? 30

Lenoxhills Formation

18. Dolostone, medium brown, slightly orange on fresh surface, being an altered fossiliferous limestone conglomerate, changes to limestone to north and east, Leonard-Lenoxhills boundary about 60 feet below top, coll. 12-18, Schwagerina laxissima, S. nelsoni, Parafusulina schucherti? 120

17. Covered, probably limestone and shale. 30

16. Limestone, medium gray, very massive locally but grades laterally into 6 inch to 2 foot beds, coll. 12-16, Pseudoschwagerina robusta, Schwagerina tersa?, S. hessensis 55

15. Shale, green-gray, mostly covered, coll. 12-15, Schwagerina diversiformis, S. tersa 1

14. Limestone, medium gray, massive grading laterally into 6 inch beds, a few chert pebbles near base, coll. 12-14, Schwagerina ex-

Section 12 contd.

	Thickness (feet)
tumida, S. laxissima, S. knighti, S. hessensis, S. diversiformis, S. tersa, S. crebrisepta, S. bellula, Pseudoschwagerina robusta, Parafusulina linearis, Triticites kawensis (reworked), T. joensis (reworked?)	45
13. Calcarenite, orange-brown weathering, a few crinoid fragments and fusulinids, base of unit gradational with unit 12, thickens to west, coll. 12-13, Schwagerina hessensis, S. diversiformis, Pseudoschwagerina robusta, P. tumidosus	5-60
12. Calcirudite, brown-gray to tan weathering, up to 20 percent chert pebble; massive in lower part, 2 to 4 foot beds in upper part	75
11. Covered	50
10. Calcirudite, brown-gray to tan weathering, some chert pebbles, massive, ~~(coll. 12-10, Schwagerina extumida)~~.	220
9. Covered	20
8. Calcarenite, medium gray-brown weathering, medium to coarse grain size, massive	30

Section 12 Contd.

	Thickness (feet)
Gaptank Formation	
7. Covered where section was measured; coll. 12-7 was made from this unit 300 yards to northeast, Triticites comptus, T. primarius, T. milleri	80-150
6. Limestone, medium gray, organic fragmental, 5 foot beds, coll. 12-6, Triticites ohioensis, T. primarius	15
5. Covered	200
Haymond Formation	
4. Limestone, orange-brown weathering, on knoll SSW of summit of Leonard Mountain, coll. 12-4, Fusulina megista	4
3. Sandstone, orange-brown weathering, very silty, with interbedded light gray shale, 3 inch to 2 foot beds	100
2. Chert, dark brown to black, 3 to 6 inch beds with thin shale interbeds	70
Dimple Formation	
1. Limestone, dark gray, mostly calcarenite, 6 inch to 2 foot beds, thin shale partings, brown chert bands near top of most	

See Ross 1963 GSA Mem 88

Section 12 contd.

	Thickness (feet)
limestone beds . . . . . more than	150

Covered below

Section 13

Measured about one mile southwest of the Hess ranch house and just north of the east-west fence which crosses the eastern face of Leonard Mountain. This section begins at the top of an igneous intrusion and stops in the Lenoxhills conglomerate.

Top of section

	Thickness (feet)
Lenoxhills Formation	
4. Calcirudite and calcarenite, dark gray; sand matrix, orange-brown, top of unit badly covered . . . . . more than	25
Gaptank Formation	
3. Limestone, black, with orange cement, interbedded gray shale, 4 inch to 1 foot beds	20
2. Shale, gray, with two thin organic fragmental limestones in upper half of unit, coll. 13-2B (near top), Triticites milleri,	

Section 13 contd.

	Thickness (Feet)
Smaller Foraminifera; and coll. 13-2A (near base), Kegelites adjunctio (Cooper), Knightina? sp., Healdia sp.	40
1. Sandstone, orange-brown to green-gray weathering, 1 to 2 inch beds, badly covered	25

Sill below.

Section 14

Measured up the end of the ridge just north of the Hess ranch house; beds dip 15° to the N 30°W.

Top of ridge

	Thickness (feet)
Lenoxhills Formation	
5. Dolostone, dark gray weathering, molds of fossils but not well enough preserved for identification	14
4. Calcarenite, like unit 2, coll. 14-4, (near top), Schwagerina hessensis, S. crebrisepta, Pseudoschwagerina tumidosus, Parafusulina linearis	16
3. Conglomerate, dominately chert pebbles,	

Section 14 contd. Thickness (feet)

1/2 inch diameter, coll. 14-3, Parafusulina linearis 3

2. Calcarenite, medium gray weathering, coarse sand size, 4 to 8 inch beds, coll. 14-2A, Parafusulina linearis, Schwagerina nelsoni, S. hessensis; coll. 14-2B Pseudoschwagerina tumidosus 38

1. Calcirudite, some chert pebbles 1 inch diameter, but mostly limestone cobbles 4 to 6 inches in diameter, yellow-brown sand matrix 65

Covered below.

Section 15

Section begins at the top of an igneous intrusion about one-half mile northeast of the Hess ranch house and was measured up the escarpment to the north as far as the top of the ridge where it then proceeds east along the top of the ridge into the higher units; dip 10°N.

Top of section Thickness (feet)

Lenox Hills Formation
~~Leonard Formation~~

11. Limestone, light gray, very fine calcarenite,

Section 15 contd. Thickness (feet)

6 inch to 2 foot beds, coll. 15-11 (from ant hill 3 feet below top of unit), Schwagerina diversiformis 32

~~Lenoxhills Formation~~

10. Dolostone, medium brown-gray weathering, 1 to 1 1/2 foot beds, very porous 22

9. Limestone, light gray, fine grained calcarenite for most part, a few larger fossil fragments, 1 to 2 foot beds 17

8. Dolostone, dark to medium gray, slightly brown, 1 to 4 foot beds, replaced fossils lack structures 115

7. Covered 7

6. Calcarenite, brown-gray weathering, 2 inch to 3 foot beds, very few chert pebbles coll. 15-6 22

5. Calcarenite, gray-brown weathering, a few limestone pebbles but mostly chert pebbles, unit gradational with the upper 15 feet of unit 4, 1 to 3 foot beds, coll. 15-5 32

4. Calcirudite, pebbles and cobbles of well rounded limestone, some chert and quartzite pebbles (up to 25 percent),

Section 15 contd.	Thickness (feet)
light brown sand matrix, coll. 15-A	49
3. Covered, probably like unit 2	35
2. Calcirudite, 8 to 12 inch limestone boulders, up to 1 inch diameter chert pebbles, orange-brown sand matrix, 4 foot beds	25
1. Covered	5

Igneous intrusion.

Section 16

Measured up the escarpment about two miles east-northeast of the Hess ranch house; this is essentially the same place P.B. King measured his section 22.

Top of measured sequence	Thickness (feet)
Leonard Formation	
9. Limestone, medium gray, dolomitic, thin bedded	188
8. Limestone, medium to light gray weathering, pitted surface, dolomitic in part, massive, 4 to 10 foot ledges.	26
7. Limestone, like unit 9 above, coll. 16-7, *Schwagerina hessensis*, *S. guembeli*, *S.*	

Section 16, Contd.

	Thickness (feet)
tersa?	15
6. Limestone, medium gray weathering, 3 to 8 foot beds, this bed forms a distinctive marker bed which can be traced to the west and east for a considerable distance . . .	93
Lenoxhills Formation	
5. Limestone, medium gray to gray-brown weathering, fine grained calcarenite, patches of dolostone, 1 to 2 foot beds, a few poorly preserved fusulinids	95
4. Covered	26
3. Limestone, yellow to orange weathering, fine grained calcarenite in part with much silt, dolomitic, 6 inch to 1 foot beds, much interbedded shale	30
2. Covered	25
1. Conglomerate, limestone cobbles up to 5 inches in diameter, chert and quartzite pebbles up to 2 inches in diameter, becomes less coarse in upper part of unit . .	70

Covered below

Section 17

Measured from the top of the intrusion up the south side of Hill 5816, Hess ranch horst, to a point about three-quarters of the way to the summit.

Top of measured sequence	Thickness (feet)
Lenoxhills Formation	
18. Limestone, dark gray to light brown weathering, dolomitic, 2 foot beds, coll. 17-18, *Schwagerina tersa*, *Triticites joensis* (reworked) . . . . . more than	12
17. Dolostone, brown-gray weathering, 6 inch to 1 foot beds, granular texture, silty throughout, fossil molds common, chert pebbles common in upper portion	40
16. Sandstone, brown weathering, 6 inch to 2 foot beds, a few chert pebbles, well sorted, medium to fine grained quartz sand	20
15. Conglomerate, like unit 13, but in 2 to 3 foot beds, upper portion is dominantly gray quartz sandstone, coll. 17-15 (upper part), *Parafusulina linearis*, *Schwagerina nelsoni*, *S. diversiformis*, *Pseudoschwagerina tumidosus*, *P. texana*? . .	18

Section 17 contd.	Thickness (feet)
14. Calcirudite, like unit 12	19
13. Conglomerate, brown weathering locally, chert and quartzite pebbles more abundant than limestone pebbles, the change from unit 12 to unit 13 is rather abrupt even for conglomerate lenses, 4 to 6 foot beds	28
12. Calcirudite, gray to dark gray weathering, limestone cobbles up to 10 inches in diameter, chert as sand size particles only	20
11. Conglomerate, very fine chert pebbles, matrix of limestone sand with crinoid fragments	2
10. Covered, probably mostly shaly sandstone, coll. 17-10, Parafusulina linearis, Schwagerina nelsoni	23
9. Calcarenite, dark gray, coll. 17-9, Schwagerina compacta, S. laxissima, S. diversiformis, Pseudoschwagerina tumidosus, Paraschwagerina plena?	1
8. Sandstone, gray-brown, well sorted, very fine to fine sand, 6 inch to 3 foot beds . .	16
7. Limestone, dark gray, fine calcarenite	

Section 17 contd.	Thickness (feet)
with some quartz sand grains, coll. 17-7, Schwagerina tersa, S. hessensis, S. compacta, Pseudoschwagerina tumidosus, Parafusulina linearis	2
6. Calcirudite, light gray to light tan weathering, limestone pebbles up to 6 inches in diameter, chert pebbles up to 1 inch, massive, 8 to 10 foot beds. . . .	80
5. Shale, brown, silty, with 3 to 6 inch zones of calcarenite, coll. 17-5, Schwagerina hessensis, S. gracilitatis, S. diversiformis, S. nelsoni, S. laxissima, Pseudoschwagerina beedei	3
4. Shale, blue-gray, slightly metamorphorphosed wood fragments	8
3. Covered, shale in part, coll. 17-3, Parafusulina linearis?, Pseudoschwagerina tumidosus	8
2. Limestone, slightly metamorphosed, dark gray, fetid, organic fragmental, coll. 17-2, Schwagerina nelsoni, Pseudoschwagerina tumidosus	1
1. Shale and limestone, metamorphosed, varying dips because of intrusion below, coll. 17-1,	

Section 17, contd. Thickness (feet)

Schwagerina hessensis, Pseudoschwagerina tumidosus 10

Igneous intrusion.

Section 18

Measured from the top of the intrusion at the northeast end of the Hess ranch horst to the top of the ridge toward the north.

Top of section. Thickness (feet)

Leonard Formation

19. Limestone, light gray, organic fragmental, 6 to 2 foot beds, coll. 18-19, Schwagerina guembeli (large form) 12

Lenoxhills Formation

18. Dolostone, medium gray weathering 20
17. Limestone, light gray weathering, coll. 18-17, Schwagerina diversiformis 15
16. Limestone, light gray, dolomitized fossils throughout, upper 50 feet are dark gray, Perrinites? 71
15. Covered 30

Section 18 contd.	Thickness (feet)
14. Limestone, light gray weathering, locally a fusulinid fragmental limestone, 2 to 3 foot beds, coll. 18-14	7
13. Covered for most part, but a few coarsely dolomitized calcarenites are exposed	112
12. Conglomerate, like unit 10.	19
11. Dolostone, light gray, coarse sand size dolomite rhombs, 3 to 6 inch beds, a few scattered chert pebbles	13
10. Conglomerate, chert (brown and black), quartzite (brown), and various shades of limestone pebbles and cobbles	5
9. Dolostone, light gray weathering, coarse dolomite rhombs, porous, 3 inch to 1 foot beds, green and brown chert pebbles	24
8. Conglomerate, 60-80 percent fine, well sorted chert and quartzite pebbles, 1/2 inch diameter, 1 to 3 foot beds	38
7. Covered	75
6. Calcirudite, medium to light gray cobbles, 3 to 5 inch diameter, fine chert pebbles, 4 to 6 foot beds	91
5. Calcirudite, fine pebbles (1/2 to 1 inch diameter) of chert, limestone, and crinoid	

Section 18 contd.

	Thickness (feet)
columnals; with interbedded shale, 4 or 5 conglomerates 1 to 2 feet thick	51
4. Calcirudite, medium to light gray limestone cobbles, 4 inch diameter, fine chert and quartzite pebbles, 1 inch diameter, 3 foot beds	56
3. Shale, medium gray, badly metamorphosed . . .	23
2. Calcirudite, dark and light gray limestone cobbles, 4 to 6 inch diameter, finer black chert pebbles	3
1. Shale, medium gray; and siltstone, brown weathering, 6 inches thick; badly metamorphosed, some plant fragments	78

Igneous intrusion below.

Section 19

This section begins in the low hills about one mile west of the mouth of Geologist's Canyon, Wolf Camp Hills, and continues up the lower slope of the Leonard escarpment. This is approximately the same locality as the lower portion of section 23 of P.B. King, 1930.

Top of Section

Thickness (feet)

Lenoxhills Formation

40. Limestone, medium gray weathering, 1 to 3 foot beds, silty and clayey organic fragmental rock, silicified fusulinids and gastropods, coll. 19-40, Schwagerina knighti, S. dispansa 12

39. Limestone, gray, dolomitic for most part, poorly preserved remains of fusulinids common, beds 3 to 5 feet thick, coll. 19-39 (near middle), Schwagerina dispansa 68

38. Limestone, gray-brown weathering, silty and clayey; with interbedded brown shales and siltstones, coll. 19-38 (25 feet above base of unit), Schwagerina knighti, S. nelsoni 95

37. Sill 20

36. Limestone, dark gray, and shale, black, metamorphosed 5

35. Covered 57

34. Conglomerate, sandstone, and siltstone, light yellow-brown to green-gray weathering, very lenticular; one 10 foot conglomerate with cobbles 3 to 4 inches

Section 19 contd. Thickness (feet)

in diameter, may be traced laterally 10 yards into siltstone and sandstones; matrix for these conglomerates mostly quartz sand cobbles and pebbles both chert and limestone but neither particularly dominant; coll. 19-34 (15 feet above base), Bryozoa fragments, Smaller Foraminifera, Amphissites? sp. Kegelites adjunctio (Cooper), Knightina? sp., Bairdia spp. 160

33. Calcirudite, medium to dark gray weathering, with matrix of fine calcite sand, cobbles and pebbles dominantly limestone, up to 5 inches in diameter, a few small chert pebbles 8

Nealranch Formation

32. Shale, gray, some interbedded orange-brown sandstones and thin conglomeratic bands, largely covered, coll. 19-32B (upper 3 feet), Pseudoschwagerina beedei, Schwagerina emaciata, S. pugunculus, Parafusulina? linearis?, Triticites pinguis; coll. 19-32A (35 feet below top

Section 19 contd.

		Thickness (feet)
	of unit), Smaller Foraminifera, siliceous sponge spicules, Bairdia sp., Bairdiacypris? sp., Cavellina? sp.	53
31.	Covered	64
30.	Calcarenite, yellow-brown weathering, well cemented, interbedded with shales 50 yards to the west.	16
29.	Calcirudite, yellow-brown weathering, 1 1/2 inches in diameter pebbles becoming well sorted and coarse sand size near top, planar upper surface, coll. 19-29, Pseudoschwagerina texana, Schwagerina pugunculus, Triticites ventricosus (reworked)	3 1/2
28.	Covered	20
27.	Calcirudite, similar to unit 25	26
26.	Covered, probably poorly cemented limestone	11
25.	Calcirudite, gray weathering, brown mottled patches with organic fragmental material, beds 1 to 3 feet thick, upper surfaces of beds are finer and better sorted, coll. 19-25, Pseudoschwagerina texana?, P. beedei, P. uddeni, Schwagerina pugunculus	27

Section 19 contd.

	Thickness (feet)
24. Shale, gray weathering, in beds 1 to 6 feet thick, with interbedded thin calcarenites 3 inches to 2 feet thick, lower portions poorly cemented and poorly sorted, upper 2 inches are generally well sorted and cemented; these beds appear cyclic, at least 17 of these cycles seem to be represented, coll. 19-24 (65 feet above base), Pseudoschwagerina uddeni, P. texana, Schwagerina pugunculus, S. emaciata, Triticites uddeni, T. ventricosus (reworked)	85
23. Limestone, gray weathering, biohermal organic fragmental; upper part is crudely bedded in 2 foot ledges; lower part is poorly sorted and cemented, lacks well defined bedded	17
22. Calcarenite, brown weathering, 1/2 to 1 foot beds, and interbedded shale, gray, 1 to 2 feet thick, coll. 19-22.	11
21. Calcarenite, like unit 10	1 1/2
20. Covered, probably shale with thin brown weathering calcarenite	7
19. Calcirudite like unit 10, coll. 19-19.	1 1/2

Section 19 contd.	Thickness (feet)
18. Calcirudite, like unit 14	4
17. Calcarenite, brown weathering, coarse sand size, 3 inch shale at base.	1 1/2
16. Calcirudite, like unit 14	5 1/2
15. Calcarenite, brown weathering, organic fragmental, coarser near base, progressively finer toward top, medium sand size well sorted at top, no apparent lamination	3 1/2
14. Calcirudite, medium gray and mottled brown weathering, 6 to 18 inch beds, irregular bedding surfaces, cement has a large percentage of clay near top, coll. 19-H	18
13. Calcarenite, brown weathering, lower part is a poorly sorted organic fragmental rock; upper 4 inches are a well sorted and laminated bed with medium sand sizes . . .	4 1/2
12. Covered, probably gray shale	24
11. Shale, gray to brown-gray, with a 4 inch calcarenite at top of unit	1 1/2
10. Calcirudite, brown weathering, gray on fresh surface, 2 inch diameter pebbles, a few organic fragments	4
9. Covered, coll. 19-9X (float); 19-9A (15 feet above base) shale at base	76

Section 19 contd.

		Thickness (feet)
8.	Calcarenite, gray-brown weathering, medium sand size, a few fusulinid, crinoid columnal, and bryozoan? fragments	4
7.	Covered, probably gray shale	8
6.	Calcarenite, gray-brown weathering, shells of fusulinids, brachiopods, and crinoids make up most of lower portion of this unit, upper portion is well cemented, well sorted, and has an upper surface which is planar.	5
5.	Calcarenite, brown weathering, some quartz sand, medium sand size.	1/2
4.	Covered, probably shale	17
3.	Calcarenite, yellow-brown weathering, fusulinids, crinoid columnals and bryozoan fragments common, quartz sand dominant in upper 2 inches, planar upper surface	1 1/2
2.	Covered, probably shale	5 1/2
1.	Calcirudite, light yellow-brown weathering, gray on fresh surface, 1 to 1 1/2 foot beds, 1 1/2 to 2 inches in diameter pebbles, coll. 19-1, Triticites ventricosus	4 1/2

Covered below.

Section 19 contd.

Thickness (feet)

Section 20

This section begins at the base of the western end of the Wolf Camp Hills escarpment and continues to the top of that ridge and about 50 yards down the north slope.

Top of measured sequence

Thickness (feet)

Nealranch Formation

14. Calcarenite, brown-yellow weathering, 4 to 6 inch beds, silicified fossils, coll. 20-14, Triticites pinguis, T. uddeni 2

13. Covered 4

12. Shale, gray, grading upward into poorly cemented coarse calcarenite, with a well cemented medium to coarse, brown weathering calcarenite in the upper 2 feet; silicified fossils common, organic fragmental 5

11. Calcarenite, yellow-brown weathering, well sorted, medium size organic fragments, some quartz sand, coll. 20-11 1

Section 20 contd.	Thickness (feet)
10. Covered	2
9. Calcarenite, yellow-brown weathering, 6 inch to 1 foot beds, well sorted, organic frements, some quartz sand, planar upper surface, coll. 20-9	2 1/2
8. Covered, probably shale	21
7. Limestone, light gray weathering, massive, organic fragmental, but many fossils unbroken, tetracorals, bryozoan, brachiopods, fusulinids, and crinoid columnals, coll. 20-7 . . .	23
6. Covered	163
Gaptank Formation	
5. Calcirudite, similar to unit 1, but pebbles are 1/2 inches in diameter, this unit intertongues with shale to the west, coll. 20-5 . . .	16
4. Shale, blue-gray, in part covered	12
3. Calcarenite, brown weathering, shale interbeds, lower surface appears to be reworked by organisms, upper part is finely laminated, these beds and unit 4 are truncated by unit 5 to the east.	5
2. Covered, probably gray shale and brown calcarenites	25

Section 20 contd.

Thickness (feet)

1. Calcirudite, medium gray, pebbles and cobbles up to 4 inches in diameter, upper surface is planar and weathers brown, finer part is organic fragmental, coll. 20-1, Triticites ventricosus 16

Covered below.

Section 21

This section begins at the junction of a small south flowing tributary gully with Geologist's Canyon near the middle of the Wolf Camp Hills and continues north to the basal conglomerate of the Lenoxhills formation.

Top of measured sequence

Thickness (feet)

Lenoxhills Formation

34. Calcirudite, up to 10 inch boulders . . . .more than 30

Nealranch Formation

33. Covered 31

32. Shale, and siltstone, limy, some coarse quartz sand, well laminated in upper 2

Section 21 contd.	Thickness (feet)
inches, planar upper surface, coll. 21-32	2
31. Covered, probably gray shale	18
30. Calcarenite, brown weathering, organic fragmental, brachiopod, crinoid, and wood fragments, coll. 21-30	1
29. Covered, several calcarenites in a gray shale	41
28. Calcarenite, brown weathering, poorly sorted and cemented in lower portion, upper surface planar and has some very fine quartz sand, coll. 21-28, Schwagerina pugunculus, Triticites uddeni	2
27. Covered, probably shale and at least 2 thin calcarenite beds, coll. 21-27	30
26. Shale, gray, grading upwards into calcarenite at the top, coll. 21-26, Schwagerina pugunculus, Triticites koschmanni, T. uddeni, T. ventricosus	5
25. Shale, like unit 26.	5 1/2
24. Shale, like unit 26	3
23. Calcarenite, brown weathering, fine to medium grain size, upper 5 inches well laminated, planar upper surface	1

Section 21 contd.	Thickness (feet)
22. Covered, probably shale	5
21. Calcarenite, orange-brown weathering, some quartz	1
20. Covered, probably shale	10
19. Calcirudite, orange-brown weathering, fine pebbles, organic fragmental, grading upwards into calcarenite, coll. 21-19	3
18. Shale, gray, with three thin beds of orange-brown calcarenite, coll. 21-18, Smaller Foraminifera	24
17. Calcirudite, fine pebble conglomerate, many fusulinids, bryozoans, calcarenite near top, planar upper surface, coll. 21-17	3
16. Covered	14
15. Limestone, brown to gray weathering, both organic fragmental and complete fossils in silty, shaley near base, corals, brachiopods, sponges, and fusulinids, coll. 21-15, *Pseudoschwagerina texana, P. uddeni, Parashcwagerina gigantea, Schwagerina pugunculus*	10
14. Calcarenite, brown-yellow weathering, medium grain size, planar surface, followed by gray shale parting, and then calcirudite	

Section 21 contd.	Thickness (feet)
grading up into calcarenite, coll 21-14	9
13. Calcarenite, poorly exposed interval, poorly cemented medium to coarse grain size, some interbedded shale	26
12. Calcarenite, brown-yellow weathering, some quartz sand, fusulinids in upper 1 inch . . .	2 1/2
11. Covered, probably shale for most part	37
10. Calcarenite, brown-yellow weathering, gray on fresh surface, many crinoid fragments	3
9. Covered	53
8. Shale, black to blue-gray, silty, fetid, several brown siltstone zones, coll. 21-8, Smaller Foraminifera, siliceous sponge spicules	35
7. Calcarenite, brown-gray to yellow-brown weathering, fragments of crinoids, fusulinids, bryozoans, better sorted and finer grained near top, coll. 21-7	1
6. Covered, probably gray shale and poorly cemented calcarenite	3
5. Limestone, yellow-brown weathering, organic fragmental, chert replacement common, upper surface has fusulinids, upper 1	

Section 21 contd. Thickness (feet)

inch is quartz sand rich 1

4. Covered, probably shale with some nodular limestone 16

3. Limestone, like 5, coll. 21-3, Triticites pinguis, T. ventricosus 2

2. Covered, stream bed 6

Gaptank Formation

1. Limestone, light gray, upper several feet a calcirudite, 3 to 5 foot beds, coll. 21-1, Triticites koschmani, T. comptus, T. joensis, T. pinguis, T. ventricosus . . . . . base not observed

Covered below.

Section 22

This section begins at the north-northeast bend in Geologist's Canyon and extends up the west side of the creek to a windmill about one-third of the way up the Glass Mountains escarpment.

Top of measured sequence Thickness (feet)

Leonard Formation

Section 22 contd.

		Thickness (feet)
35.	Limestone, medium gray weathering, abundant fusulinids, units becomes more sandy and silty near base, coll. 22-35 (near top), *Schwagerina lineanoda*, *S. guembeli*, *S. crassitectoria*, *Staffella*? *lacunosa*	28
	Lenoxhills Formation	
34.	Limestone, shale, dolomite sequence, yellow-brown weathering interval, 6 inch to 1 foot beds	75
33.	Dolostone, brown weathering, very silty and sandy, 1 to 2 foot beds	6
32.	Covered	260
31.	Calcirudite, light to medium gray weathering, cobbles up to 1 foot in diameter, very few chert pebbles	38
	Nealranch Formation	
30.	Covered	11
29.	Shale, yellow to orange weathering, several siltstone layers, coll. 22-29, Smaller Foraminifera, *Bairdia* sp.	22
28.	Limestone, orange-brown weathering,	

Section 22 contd.	Thickness (feet)
organic fragmental	1 1/2
27. Shale, light gray weathering	3
26. Limestone, brown weathering, coll. 22-26, Schwagerina emaciata, S. pugunculus, Pseudoschwagerina beedei, Paraschwagerina gigantea	1 1/2
25. Shale interval, light gray weathering; with two 3 inch brown sandstone beds, coll. 22-25, Smaller Foraminifera	28
24. Limestone, brown-yellow weathering, lower part poorly sorted, poorly cemented, upper part finer, well sorted, laminated, quartz sand up to 30 percent, secondary chert in upper 1 to 2 inches, organic fragmental, coll. 22-24, Schwagerina emaciata, S. pugunculus, Schwagerina sp. A. Pseudoschwagerina beedei, Triticites uddeni	7
23. Covered, probably gray shale	8
22. Limestone, yellow-brown weathering, a few 1 inch black limestone pebbles, organic fragmental, coll. 22-22, Schwagerina emaciata, S. pugunculus, Paraschwagerina gigantea, Pseudoschwagerina beedei, Triticites pinguis, T. ventricosus	

Section 22 contd.	Thickness (feet)
(reworked)	3
21. Shale, gray, with dark brown silty zones . . .	17
20. Limestone, brown weathering, chert pebble conglomerate at base, calcarenite in upper part, coll. 22-20[A] (near base), Paraschwagerina gigantea, Pseudoschwagerina uddeni, Schwagerina pugunculus, Schwagerina sp. A, Triticites uddeni	1
19. Covered, mostly shale, coll. 22-19, Schwagerina pugunculus, Triticites uddeni, Smaller Foraminifera, Kirkbya sp. .	7
18. Limestone, like unit 24	2
17. Covered, probably shale, coll. 22-17, Smaller Foraminifera, Bairdia sp.	25
16. Calcarenite, brown weathering; shale, gray; 1 to 3 foot beds, coll. 22-16[B], Schwagerina pugunculus, S. emaciata, Pseudoschwagerina uddeni, Triticites pinguis, T. uddeni; coll. 22-16A Smaller Foraminifera, Burlella or Healdia spp.	8
15. Limestone, brown-yellow weathering irregular bedding, top 1 inch is fine quartz sand, coll. 22-15, Schwagerina pugunculus	1/2

Section 22 contd.

		Thickness (feet)
14.	Covered, probably shale	7
13.	Calcarenite, orange-brown weathering, fine grained, planar upper surface, coll. 22-13, Schwagerina pugunculus, Schwagerina sp. A, Pseudoschwagerina texana, P. uddeni, Paraschwagerina gigantea, Triticites pinguis, T. uddeni, T. comptus (reworked?)	1
12.	Covered, probably shale, one 4 inch brown sandstone near middle, coll. 22-12, Paraschwagerina gigantea, Smaller Foraminifera, siliceous sponge spicules, petrified wood fragments	23
11.	Limestone, orange-brown weathering, like unit 24, coll. 22-11, Pseudoschwagerina uddeni, P. texana, Triticites uddeni, Paraschwagerina gigantea	4
10.	Covered, probably brown to gray shale, coll. 22-10, Schwagerina pugunculus, Triticites uddeni, T. ventricosus, siliceous sponge spicules	30
9.	Limestone, orange-brown weathering, clay matrix, crinoidal hash, a few 1 inch	

Section 22 contd.

	Thickness (feet)
pebbles of chert, top surface is planar, upper most 1 to 2 inch band of laminated calcarenite replaced by chert, several gray shale partings, coll. 22-9, Schwagerina pugunculus, Paraschwagerina acuminata, Triticites uddeni, T. pinguis	6
8. Limestone, like unit 9, coll. 22-8, Schwagerina pugunculus, Triticites uddeni, T. ventricosus (reworked?)	2
7. Limestone, brown weathering, calcirudite at base, grades upward into coarse organic fragmental calcarenite, upper 4 inches are well sorted and laminated, flat upper surface, coll. 22-7, Schwagerina pugunculus, S. gracilitatis?, Triticites koschmanni, T. uddeni, T. ventricosus	6
6. Covered, one or two 6 inch brown weathering calcarenites	44
5. Calcirudite, yellow-brown weathering, upper foot is organic fragmental calcarenite, flat upper surface, silicified fossils common, coll. 22-5, Pseudo-	

Section 22 contd.

		Thickness (feet)
	<u>schwagerina uddeni</u>	3 1/2
4.	Covered, in part black to blue-gray shale . . .	7
3.	Calcirudite, brown-yellow weathering, pebbles up to 2 inches in diameter, crinoid and productid fragments, coll. 22-3	4
2.	Shale, gray, coll. 22-2	8

Gaptank Formation

1. Limestone, light to medium gray weathering, 6 inch to 3 foot beds, crinoid and other organic fragments dominant, upper 6 feet are a well cemented calcirudite having cobbles up to 3 inches in diameter, light to medium gray, probably from lower portion of unit, coll. 22-1B (from upper 3 feet), <u>Triticites ventricosus</u>, <u>T. uddeni</u>, <u>T. pinguis</u>; coll. 22-1A (from base), <u>Triticites ventricosus</u> 31

Covered below

Section 23

Measured about 300 yards southwest of Section 24 up the south slope of the eastern Wolf Camp Hills.

	Thickness (feet)
Eroded surface at top of ridge	
Gaptank Formation	
7. Limestone, light gray weathering, upper 2 feet massive fine grained and dense; lower 2 feet rubbly, containing fusulinids, coll. 23-7, Triticites ventricosus	4
6. Covered, probably gray shale, this unit thickens and thins over the biohermal unit below	8-12
5. Limestone, yellow-brown weathering, beds 4 to 8 inches thick, crinoid and fusulinid fragments dominant, to the west about 50 feet this unit becomes massive and biohermal and is composed wholly of crinoidal fragments, coll. 23-5B (20 feet above base), Triticites ventricosus, coll. 23-5A (from base), Triticites ventricosus	33
4. Covered, probably shale	23
3. Limestone, brown weathering, dark gray on fresh surface, composed of fragments of corals and brachiopods, the lower bedding surfaces of this unit contain pockets of fusulinids, coll. 23-3.	3

Section 23 contd.

		Thickness (feet)
2.	Covered, probably gray shale	34
1.	Limestone, medium to dark gray, lower 13 feet in 6 inch to 4 foot beds; middle 22 feet of rubbly unevenly bedded limestone, 6 inch beds, poorly exposed; upper 11 feet more massive in 4 foot beds, gradually becoming thinner near top, coll. 23-1 (upper 3 feet), Triticites comptus, T. ventricosus	46

Covered below

Section 24

Measured up the southside of the Wolf Camp Hills about 200 yards west of section 25, in the eastern portion of the area.

Top of ridge

		Thickness (feet)
	Gaptank Formation	
9.	Limestone, medium gray, massive beds, 4 to 6 feet thick, has a 6 inch band of fusulinid and brachiopod hash at base, coll. 24-9, Triticites beedei	12

Section 24 contd.	Thickness (feet)
8. Covered, probably a shale and siltstone interval with some nodular limestone, some brown colors	12
7. Limestone, brown weathering, uneven 6 inch beds, crinoid, fusulinid, and brachiopod hash, coll. 24-7, Triticites primarius, T. ventricosus	8
6. Covered, probably gray shale and a few brown siltstone bands	9
5. Limestone light gray, crinoidal hash, some interbedded brown siltstone, coll. 24-5, Triticites beedei, T. primarius . . .	5
4. Covered, probably brown shale	12
3. Limestone, gray, brown-yellow weathering, indistinct nodular bedding in lower 8 feet, upper 31 feet massive limestone in 2 to 5 foot beds, Coll. 24-3	41
2. Limestone, dark gray, rubble of limestone at base (8 feet), massive ledges 3 to 6 feet, coll. 24-2B (33 feet above base), Triticites ventricosus	74
1. Shale, dark brown, base not exposed, top not exposed, coll. 24-1 (60 feet below top), Smaller Foraminifera, Hollinella	

Section 24 contd.

Thickness (feet)

spp., Kegelites dattonensis? (Harlton), Bairdia spp., Healdia spp., Cavellina sp. . . 125

Covered below.

Section 25

Measured up the southern side of the Wolf Camp Hills to the first saddle at the eastern end, and then east up the small but prominent knoll.

Top of Knoll

Thickness (feet)

Gaptank Formation

16. Limestone, yellow buff weathering, in 6 inch to 1 foot beds, coll. 25-16A, Triticites ventricosus, T. beedei?, coll. 25-16B 20

15. Calcarenite, light yellow weathering, caps bed 14 but intertongues with it to the northwest 5

14. Limestone, nodular, dark gray, weathers white coll. 25-14 . . . . . 5 to 25

13. Limestone, light gray weathering, biohermal hash, in 4 to 5 foot beds coll. 25-13 17

12. Covered, probably soft limestone 27

11. Limestone, gray to brown weathering, unit

Section 25 contd.

	Thickness (feet)
increases in thickness to the east and apparently lies unconformably beneath bed 12, coll. 25-10, Triticites cf. ventricosus, T. cf. primarius	7
9. Covered, probably a weak limestone	5
8. Limestone, gray, weathers a light brown, lower 11 feet are rubbly becoming better bedded into undulating 3 to 4 inch layers; upper 13 feet massive in 3 to 4 foot beds, biohermal limestone composed dominantly of crinoid and brachiopod fragments, coll. 25-8, Triticites ventricosus	24
7. Covered, probably shale	52
6. Limestone, rust weathering, crinoidal fragments dominant, some pockets of fusulinids, upper portion of unit has dark gray limestone pebbles, coll. 25-6, Triticites primarius	8
5. Covered, probably gray shale with a few rust colored siltstone layers	57
4. Limestone, gray to yellow weathering, lower portion in 3 to 4 inch nodular beds, upper portion in unevenly beds 2 to 4 feet thick,	

Section 25 contd. Thickness (feet)

thin bands of interbedded brown shale, coll. 25-4, Triticites beedei 17

3. Covered, probably shale which weathers to a gray brown, coll. 25-3 Triticites beedei, T. primarius 37

2. Limestone, weathers gray to yellow-brown, uneven 6 to 8 inch beds, a shell hash of brachiopod and fusulinid fragments coll. 25-2 (dip 16°) 5 1/2

1. Covered below, probably green-gray shale, base not exposed.

Section 26

This section begins about 2 1/2 miles N 40° E of the Neal ranch house (old Taylor ranch) at the base of the Leonard escarpment. The lower units in the section are poorly exposed in the alluvium at the foot of the escarpment at this locality but are well exposed 1/3 mile SE in section 27.

Top of measured sequence Thickness (feet)

Lenoxhills Formation

26. Calcarenite, brown-orange weathering, . . not measured

25. Covered 42

Section 26 contd.	Thickness (feet)
24. Dolostone, brown-orange weathering, silty, dim outlines of replaced fossils common . . .	4
23. Covered	30
22. Calcarenite, pink-brown weathering, well and thinly laminated	1/2
21. Covered	16
20. Limestone, yellow weathering, outlines of replaced fossils, dolomitic in part and very silty	3
19. Siltstone, light brown weathering, silicified	2
18. Covered	26
17. Shale, brown and green and siltstone, in 6 inch silicified beds	10
16. Siltstone, light brown weathering, siliceous cement, 2 to 3 inch shale or siltstone partings	11
15. Shale, green-gray, poorly exposed	9
14. Sandstone, brown weathering, very fine to fine quartz sand, siliceous cement	2
13. Shale, green-gray, and siltstone, gray, two 6 inch siliceous cemented siltstones near top	10
12. Siltstone, yellow weathering, with pebbles	

Section 26 contd.	Thickness (feet)
of green chert, siliceous cement	2
11. Siltstone, yellow weathering, 1/2 inch diameter pebbles common, some bands of pebble conglomerates, poorly cemented	15
Gaptank Formation	
10. Limestone, light gray weathering, nodular, uneven bedding, 3 to 6 inch beds, coll. 26-10A (3 feet above base), Triticites ventricosus (immature); coll. 26-10B (15 feet above base) T. ventricosus (immature)	38
9. Sandstone, green-gray and yellow, very fine quartz sand, poorly cemented, well sorted, fine 1/16 inch laminations, many worm? castings, 1 to 3 inch beds	36
8. Covered	69
7. Dolostone, yellow-brown weathering, 1 to 3 foot beds	12
6. Covered	14
5. Limestone, gray weathering near base, upper portion a gray-brown weathering dolostone, 2 inch to 4 foot beds	42
4. Covered	29

Section 26 contd.

	Thickness (feet)
3. Limestone, gray weathering, organic fragmental, mostly brachiopod, crinoid, and fusulinid fragments, 4 inch to 1 foot beds, coll. 26-3, Triticites beedei?	9
2. Covered	12
1. Sandstone, yellow weathering, porous, molds of tetracorals, brachiopods, and sponges?	2

Covered below.

Section 27

This section begins at the base of a low escarpment remnant about 2 1/2 miles N 50° E of the Neal (old Taylor) ranch house and continues to the top of it. The beds dip 7° to 10° to the north.

Top of section

	Thickness (feet)
Gaptank Formation	
8. Limestone, light to medium gray, calcilutite for most part, 6 inch to 1 foot beds, coll. 27-8, Triticites ventricosus	6
7. Covered	4

Section 27 contd.

	Thickness (feet)
6. Limestone, gray, organic fragmental, biohermal, algal debris form dominant portion of the rock, massive beds, 5 to 8 feet thick	34
5. Sandstone, green-gray weathering, very silty, irregular upper and lower surfaces . .	1/2
4. Limestone, gray to brown-gray weathering, biohermal shell hash; algal and calcilutite portions form a massive rock, 2 to 3 foot beds, coll. 27-4, Triticites ventricosus.	23
3. Covered	18
2. Limestone, very dark brown weathering, dominantly organic fragmental but with some silt and clay, coll. 27-2, Triticites joensis	15
1. Sandstone, yellow-brown weathering, with interbedded shales and siltstones, coll. 27-1, Triticites beedei	30

Covered below.

Section 28

Measured one-half mile north-northwest of section 29, beginning in a stream gully and extending north about one

quarter of the distance up the escarpment.

Top of measured sequence	Thickness (feet)
Lenoxhills Formation	
16. Dolostone, brown weathering, 6 inch to 1 foot beds	45
15. Covered	18
14. Sandstone, brown to yellow weathering, 3 to 6 inch beds, gray on fresh surface, very fine to fine quartz sand, well sorted, crossbedded, up to 30 percent calcite sand.	27
13. Covered	22
12. Shale, brown to gray weathering, 1 to 3 inch beds of fine friable sandstone	22
11. Sandstone, orange-brown weathering, fine quartz sand, calcareous cement	1
10. Shale, gray, mostly covered	2
9. Sandstone, yellow to gray-brown weathering, fine quartz and calcareous sand	1/2
8. Covered, probably shale	1 1/2
7. Calcarenite, yellow-brown weathering, some gray shades, coral, crinoid, and brachiopod fragments	1
6. Covered	2

Section 28 contd.

		Thickness (feet)
5.	Calcarenite, like unit 7, coll. 28-5, *Triticites beedei* (reworked)	1 1/2
4.	Covered	1

Gaptank Formation

3.	Limestone, light gray, uneven bedding, 3 inch to 1 foot beds	3
2.	Covered	7
1.	Limestone, light gray weathering, massive cliff former, 3 to 20 foot beds, fine organic fragments	51

Covered below.

Section 29

Measured 3 1/4 miles northeast of the Neal (old Taylor) ranch house up the southwestern end of the lower escarpment, across a shallow saddle, and part way up the main escarpment.

Top of measured sequence

		Thickness (feet)

Leonard Formation

31.	Limestone, light brown weathering, 1 to 2 foot beds, thin interbeds of brown shale,	

Section 29 contd.	Thickness (feet)
coll. 29-31, Schwagerina guembeli, S. crassitectoria	38
30. Limestone, medium brown to gray-brown weathering, 6 inch to 3 foot beds, thick interbeds of siltstone and shale, coll. 29-30, Schwagerina guembeli, S. crassitectoria	21

Lenoxhills Formation

29. Covered	6
28. Sandstone, brown weathering, crossbedded . . .	8
27. Covered	7
26. Limestone, brown to orange-brown weathering, 6 inch to 1 foot beds, dolomitic, silty and clayey	8
25. Covered, for most part; green-gray shale and crossbedded sandstone in part	32
24. Sandstone, orange-brown weathering, fossiliferous, pelecypods, brachiopods, algal plates, fusulinids, coll. 29-24, Schwagerina tersa, Nankinella umbilicatus, Staffella? lacunosa	3
23. Covered	12
22. Limestone, light brown weathering, dolomitic,	

Section 29 contd. Thickness (feet)

6 inch to 1 foot beds, a few thin brown shales, partly silicified 22

21. Covered 9

20. Sandstone, green to purple-brown weathering, medium quartz sand, crossbedded, 1 to 3 foot beds, thin interbedded shales and siltstone 35

19. Limestone, light gray to brown weathering, silty, interbedded shales 8

18. Shale, gray; with 1 inch limonitic siltstone beds 14

17. Limestone, light gray, silty and clayey . . . 3

16. Shale, light gray, silty, grades upwards into unit 17 12

15. Calcirudite, many shades of limestone pebbles and cobbles, maximum diameter 10 inches, calcareous matrix weathers light brown-gray, upper portion badly covered 127

Gaptank Formation

14. Covered 4

13. Limestone, medium to light gray, poorly cemented near base, organic fragmental. . . 2 1/2

Section 29 contd.	Thickness (feet)
12. Covered	5
11. Limestone, light gray, massive, very fine organic fragmental	28
10. Covered in part, probably a poorly cemented organic fragmental limestone, unit weathers gray-brown	23
9. Limestone, light gray, massive organic fragmental, 6 inch zone poorly cemented near middle	12
8. Covered	14
7. Limestone, medium gray, fine grained organic fragmental, coll. 29-7, Triticites primarius	8
6. Covered	15
5. Sandstone, yellow-orange weathering, 3 to 8 inch beds, even bedding, well sorted, fine quartz sand	53
4. Shale, gray, few thin beds of gray siltstone and very fine quartz sandstone near base, gradational with unit 5 in upper 20 feet . .	139
3. Sandstone, yellow-brown weathering, poorly sorted quartz and calcite sand, many crinoid fragments	3
2. Shale, gray, badly covered	7

Section 29 contd. Thickness (feet)

1. Limestone, light gray weathering, organic fragmental, lower 14 feet massive, upper 5 feet massive, coll. 29-1, Triticites beedei, T. comptus, T. primarius, T. ventricosus 22

Covered below.

Section 30

This section begins 2.9 miles N 75° W of the Montgomery ranch house (old Dessie ranch) on the lower slope of the low escarpment and continues generally northward across a saddle and to the top of the northern most knob.

Top of section Thickness (feet)

Gaptank Formation

22. Limestone, like unit 19 21
21. Sandstone, green-yellow weathering, very fine quartz sand, calcite cement 4
20. Limestone, like unit 19 7
19. Limestone, gray to brown-gray weathering, organic fragmental, coll. 30-19, Triticites ventricosus 12

Section 30 contd.	Thickness (feet)
18. Covered, probably continuation of unit 17 . .	15
17. Sandstone, yellow weathering, fine quartz sand, abundant fusulinids, 1 foot beds or less, coll. 30-17, Triticites milleri?	16
16. Shale, gray	9
15. Shale, gray, grading upwards into calcarenite, orange-brown weathering, upper 3 inches of calcarenite is well sorted and laminated with up to 25 percent quartz sand	5
14. Calcarenite, yellow to orange-brown weathering, up to 50 percent fine quartz sand in some lamellae	2 1/2
13. Shale, light gray weathering, become silty and sandy upwards, abundant fusulinids in upper 3 feet, coll. 30-13, Triticites primarius, T. beedei	18
12. Limestone, weathers mottled gray and gray-brown, organic fragmental, crinoid columnals, bryozoans, and brachiopods dominant, 3 to 6 inches of gray shale at base, top bed weathers brown, 1/4 to 6 inch beds	15

Section 30 contd.	Thickness (feet)
11. Limestone, light gray weathering, massive, fine grained organic fragmental, ledge former	15
10. Limestone, blue-gray, mottled weathering to light gray and dark gray, very fine organic hashes intermixed, 1 to 8 inch beds	22
9. Covered	17
8. Limestone, light gray to light brown weathering, fine organic fragments dominate rock, 2 to 6 inch beds, uneven bedding or pseudobedding surfaces, not well cemented, coll. 30-8, Triticites beedei	23
7. Limestone, blue-gray weathering, massive, fine grained organic fragmental, brachiopod fragments common	4
6. Calcarenite, gray weathering, fine sand size, quite silty, 1 to 6 inch beds, irregular bedding surfaces, coll. 30-6	15
5. Covered, probably gray shale	27
4. Sandstone, light yellow to orange weathering, 6 to 12 inch beds	34
3. Limestone, dark gray weathering, black and fetid on fresh surface, organic fragmental coll. 30-3 .	1

Section 30 contd.

	Thickness (feet)
2. Covered	11
1. Limestone, dark gray weathering, massive, upper part contains limestone pebbles, maximum diameter 1 inch	8

Base of measured section.

Section 31

Measured north up Hill 4752, 2 1/2 miles N 70° W of the Montgomery ranch house (old Dessie ranch). This is approximately the same location as section 27 of King (1930).

Top of measured sequence, top of ridge

	Thickness (feet)
Lenoxhills Formation	
18. Calcirudite, cementing limestone weathers yellow-gray, limestone cobbles of maximum diameter 10 inches, a few chert cobbles of maximum diameter 3 inches, 3 to 6 foot beds	45
17. Limestone, yellow-brown weathering, badly covered, 5 to 8 inch beds	28
16. Calcirudite, gray colors, pebbles of maximum diameter 2 inches, chert pebbles of maximum diameter 1/2 inch but only 5-10	

Section 31 contd.	Thickness (feet)
percent of the rock, upper 1 foot is coarse organic fragmental	9
15. Covered, dark red shale in part, coll. 31-15	7
14. Sandstone, orange to yellow-brown weathering, fine quartz sand, 3 to 6 inch beds	3 1/2
Gaptank Formation	
13. Limestone, dark gray, organic fragmental, upper 3 feet in 8 to 12 inch beds, lower 9 feet massive, weathers to irregularly pitted smooth masses, coll. 31-13	12
12. Limestone, dark gray, 3 inch beds, very silt and clay rich in bedding planes, uneven bedding surfaces	1 1/2
11. Limestone, dark gray, organic fragmental, blocks of cemented organic fragments common, 3 to 4 inches diameter, massive, coll. 31-11, Triticites beedei . . .	5 1/2
10. Covered	40
9. Shale, brown-gray; and thin calcarenites, calcarenites become very fine pebble conglomerates in upper portion of the unit, badly covered	58
8. Limestone, dark gray, organic fragmental,	

Section 31 contd.

		Thickness (feet)
	lower portion very unevenly bedded, rest with 3 to 5 feet of relief on truncated edges of unit, coll. 31-8, *Triticites primarius*	11
7.	Sandstone, light orange-brown weatherings, cross bedded, poorly sorted quartz sand, fluvitile deposition?, 6 inch to 3 foot beds	21
6.	Covered	28
5.	Limestone, black to dark gray, organic fragmental	1 1/2
4.	Covered	12
3.	Limestone, yellow weathering, dark gray on fresh surface, organic fragmental, coll. 31-3	1
2.	Covered	20
1.	Limestone, dark gray, organic fragmental, mainly fragments of brachiopods and crinoids, coll. 31-1.	25

Covered below.

Section 32

Measured up the lower escarpment about one and one-quarter miles southwest of the Brooks ranch house, down the

dip slop of unit 14, northwest across a stream channel, and over a small ridge into a wider valley.

Top of measured sequence, covered above	Thickness (feet)
Lenoxhills Formation	
21. Calcirudite, many shades of limestone cobbles of maximum diameter 8 inches, pebbles of white and black chert	110
Gaptank Formation	
20. Covered	16
19. Calcarenite, pink to brown weathering, uneven bedding, 8 inch to 1 foot beds, coll. 32-19 (from lower part), Triticites beedei	12
18. Covered	10
17. Calcirudite, cobbles about same color, gray weathering, 3 to 5 foot beds, poorly bedded	16
16. Limestone, light green-gray, nodular, uneven bedding, somewhat porous, coll. 32-16	7
15. Covered, probably green-gray shale	7
14. Limestone, light brown weathering, massive, 2 to 15 foot beds, cliff former . . .	53
13. Covered, probably similar to unit 12	8

dip slop of unit 14, northwest across a stream channel, and over a small ridge into a wider valley.

Top of measured sequence, covered above	Thickness (feet)
Lenoxhills Formation	
21. Calcirudite, many shades of limestone cobbles of maximum diameter 8 inches, pebbles of white and black chert	110
Gaptank Formation	
20. Covered	16
19. Calcarenite, pink to brown weathering, uneven bedding, 8 inch to 1 foot beds, coll. 32-19 (from lower part), Triticites beedei	12
18. Covered	10
17. Calcirudite, cobbles about same color, gray weathering, 3 to 5 foot beds, poorly bedded	16
16. Limestone, light green-gray, nodular, uneven bedding, somewhat porous, coll. 32-16	7
15. Covered, probably green-gray shale	7
14. Limestone, light brown weathering, massive, 2 to 15 foot beds, cliff former . . .	53
13. Covered, probably similar to unit 12	8

Section 32 contd.

		Thickness (feet)
12.	Limestone, gray weathering, massive beds, many large blocks of limestone, well rounded, 6 inches to 8 foot beds	32
11.	Covered, probably blue-gray shale, one bed of silty limestone, Coll. 32-11	23
10.	Sandstone, light brown weathering, upper 3 feet gradational with unit 11, 6 inches to 2 foot beds	19
9.	Shale, like unit 7, becomes sandy near top . .	46
8.	Sandstone, orange-brown weathering, very fine quartz sand, silty, 2 to 3 inch beds, fragments of wood, crinoids, and brachiopods	3
7.	Shale, green-gray, a few thin beds of very fine sandstone and siltstone, Coll. 32-7	27
6.	Sandstone, orange-brown weathering, fine quartz sand with calcareous cement, a few wood fragments, lower 1 foot weathers green-gray	8
5.	Shale, gray to blue-green, several 1 inch sandstone beds	10
4.	Sandstone, orange-brown weatherings, medium quartz sand, pebbles are siltstone, maximum diameter 1/2 inch, brachiopods,	

Section 32 contd.	Thickness (feet)
cephalopods, crinoid columnals, and wood fragments	2
3. Shale, light gray, several 2 inch sandstone beds, coll. 32-3	28
2. Covered	83
1. Limestone, dark gray weathering, not well exposed, coll 32-1	5

Covered below.

Section 33

This section is part of Udden's section 8 (1917, p. 35, 36) and was also used by King (1930, Section 28, p. 146). It "begins at the foot of the escarpment, where there is a small water tank, and from where a wagon road leads past some dwelling places up the face of the escarpment and northward." (Udden, 1917, p. 35). Section 34 was measured about 100 yards east of this section.

Top of examined sequence	Thickness (feet)

Leonard Formation

28. Limestone, medium gray, very fine texture, containing fusulinids, coll. 33-28,

Section 33 contd.		Thickness (feet)
	Schwagerina guembeli	38
	Lenoxhills Formation	
27.	Shale, gray	11
26.	Sandstone, gray, fine grained	5
25.	Shale, gray	40
24.	Limestone, yellow, sandy, coll. 33-24, Schwagerina, guembeli ?	1
23.	Shale, green with streaks of red, calcareous	55
22.	Sandstone, gray, cross-bedded	17
21.	Sandstone and shale, gray	16
20.	Sandstone, gray	12
19.	Limestone, yellow	1
18.	Shale, blue; with some layers of red shale	17
17.	Sandstone, gray, cross-bedded	24
16.	Limestone, yellow	2
15.	Shale, in part reddish	18
14.	Limestone, yellow	1
13.	Shale	16
12.	Limestone, yellow	1
11.	Shale	11
10.	Limestone, yellow	3

Section 33 contd.	Thickness (feet)
9. Shale	4
8. Limestone, yellow	1
7. Shale, reddish and yellow, a clay shale	14
6. Limestone, yellow	1
5. Marl, gray	6
4. Shale, greenish, clay shale	2
3. Shale, red	6
2. Limestone, marly	11
1. Calcirudite, rounded limestone cobbles (This is the same as unit 16, section 34).	

Gaptank Formation below.

Section 34

Lower portion of section was measured about one-quarter of one mile west of the Brooks ranch road in the low escarpment at the foot of the Glass Mountains. The part above unit 6 was measured north from the point where the ranch road enters behind this low escarpment.

Top of measured sequence	Thickness (feet)
Lenoxhills Formation	
16. Calcirudite, limestone cobbles of various	

Section 34 contd. Thickness (feet)

shades of gray and of maximum diameter 3 inches 7

Gaptank Formation

15. Limestone, light gray, uneven beds 6 inches to 1 foot, fine to very fine organic fragmental, coll. 34-15, Triticites ventricosus 24

14. Limestone, light green-gray, very clay rich and sandy, a few scattered fusulinids 4

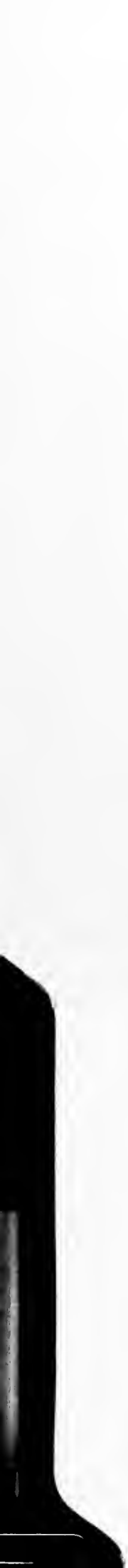
13. Shale, red-brown, very silty; and thin algal limestones, 8 inches or less 28

12. Limestone, medium gray, mostly a medium grained calcarenite, indistinct bedding, uneven solution pseudobedding, weathers to a sharp pitted surface, lower beds are 90 percent crinoid columnal fragments 22

11. Limestone, like unit 12, but thinly bedded, 4 to 8 inch beds, break in slope. . . 8

10. Limestone, light gray, massive, 2 to 6 foot beds, calcilutite matrix with large connected crinoid columnals 21

9. Covered, probably a clay rich limestone . . . 26



Section 34 contd.	Thickness (feet)
8. Limestone, light gray, calcilutite with some small fossil fragments	5
7. Covered, stream gully	12
6. Limestone, medium to light gray, massive, crinoid fragments and a few broken brachiopod valves	44
5. Limestone, gray mottled, irregular bedding, 3 to 8 inch beds, silty	18
4. Covered	55
3. Limestone, light tan to yellow weathering, silty and sandy, brachiopods, fusulinids, and bryozoans common, 3 to 6 inch beds, uneven bedding surfaces, coll. 34-3, Triticites milleri, T. beedei	29
2. Shale, gray to brown weathering, two 1 foot beds like unit 1	17
1. Sandstone, light orange-brown weathering, with a few calcite sand grains but mostly fine quartz sand, 6 inch to 3 foot beds . . .	38

Covered below.

Section 35

Measured up a stream gully about 100 yards east of the

prominent limestone cliff just east of the Brooks ranch house.

		Thickness (feet)
Top of section, badly covered.		
	Lenoxhills Formation	
16.	Shale and siltstone, red	15 exposed
15.	Calcirudite, light gray	15
	Gaptank Formation	
14.	Limestone, yellow-gray	10
13.	Siltstone and shale, limey	12
12.	Shale, green-gray	8
11.	Covered	9
10.	Limestone, medium gray, abundant fusulinids . .	2
9.	Limestone, very clay rich, fusulinids	15
8.	Shale, green-gray; and sandstone and siltstone, orange-brown, many crinoid columnals.	18
7.	Limestone and clay rich limestones, 3 inch beds, becomes dominantly siltstone near base of unit.	47
6.	Limestone, medium gray, clary rich, uneven bedding, 3 to 6 inch beds	18
5.	Shale, gray	10
4.	Sandstone, orange-red weathering	3
3.	Sandstone, orange and gray weathering, friable with one or two resistent beds . . .	30

Section 35. Contd.

	Thickness (feet)
2. Sandstone, dark orange-brown weathering, very resistent, crossbedded	14
1. Sandstone, green-brown weathering, green primarily in the finer fractions, friable. .	12

Covered below.

Section 36

Measured about three-eighths of one mile west of the ranch road which leads to the high pasture on the Moore ranch. This is about 200 yards east of the last ledge forming limestone outcrop.

Top of low ridge

	Thickness (feet)
Lenoxhills Formation	
9. Calcirudite, light gray to light brown-gray weathering, cobbles of maximum diameter 6 inches, small amount of chert pebbles	15
Gaptank Formation	
8. Limestone, light gray with some yellow tints, an organic fragmental calcarenite, 6 to 8 inch beds	0-20

Section 36 contd.	Thickness (feet)
7. Limestone, light pink weathering, massive . . .	0-9
50 yards west of this section, unit 9 rests directly on unit 6, and units 7 and 8 are truncated	
6. Covered	15
5. Sandstone, orange-brown weathering, green-gray on fresh surface, very fine to fine quartz sand.	1 1/2
4. Covered, probably more marly continuation of unit 3 below	11
3. Limestone, green-gray, organic fragments in a limey shale matrix	27
2. Sandstone, light green-gray to brown-orange weathering, very fine quartz sand for most part, a few pebble conglomerate beds	4
1. Covered, probably a siltstone and shale interval, base of unit covered by alluvium	10 plus

Section 37

This section starts about 50 yards west of the ranch road which leads to the high pasture on the Moore ranch at the

base of the low escarpment and proceeds due north as high as unit 27. Unit 28 and higher strata were measured along the ranch road to the top of the higher escarpment.

Top of ridge

Thickness (feet)

Leonard Formation

36. Limestone, drab gray weathering, medium brown-gray on fresh surface, a dirty, fine grained calcarenite, 2 foot beds, abundant fusulinids and gastropods, coll. 37-36 (near top), Schwagerina crassitectoria 15

35. Shale, green and olive drab 6

34. Limestone, yellow-gray weathering, green-gray on fresher surfaces, 1 to 4 foot beds, essentially a calcarenite with much silt, bedding uneven with conchoidal fracture, fauna of fusulinids, gastropods, and other fossil fragments, partings are dark green-brown siltstones, all beds are lenticular . . 27

~~Lenoxhills Formation~~

33. Limestone, yellow weathering, and siltstone, yellow-brown weathering, gradational lithologies, limestones are dark brown on fresh surface, siltstones have abundant fusulinids,

Section 37 contd.

	Thickness (feet)
top of unit drawn arbitrarily at an irregular zone about 1 foot thick, coll. 37-33A (at base), Schwagerina crassitectoria, coll. 37-33B (3 feet above base), S. guembeli, Bairdia spp., Bairdiacypris? sp., Cavellina? sp.	33

→ Lenox Hills Formation ←

32.	Shale, green-gray; and sandstone, green- to brown-gray weathering, very lenticular, crossbedded, flowcasts	25
31.	Sandstone, yellow-brown weathering, dark brown on fresh surface, a fairly persistent unit	2
30.	Shale, varicolored, mostly red and gray	21
29.	Sandstone, yellow to brown weathering, persistent bed	3
28.	Shale, varicolored; and sandstone, green-gray, lenticular, and crossbedded; these two lithologies alternate about every 5 to 10 feet	37
27.	Sandstone, green-gray, crossbedded; transfer bed carried about 200 yards to the east	16
26.	Limestone, like unit 15	1

Section 37 contd.	Thickness (feet)
25. Covered	12
24. Sandstone, gray, crossbedded	11
23. Limestone, like unit 15	2
22. Covered	3
21. Limestone, like unit 15	2
20. Covered	8
19. Limestone, like unit 15, dip 20° N 20° W . . .	3
18. Covered	4
17. Sandstone, gray to brown, medium quartz sand, crossbedded, 1 to 2 foot beds	5
16. Covered	2
15. Limestone, light brown-yellow weathering, light gray on fresh surface, beds split vertically, 6 to 10 inch beds, dip 70° N20° W	8
14. Covered, green-gray shale in part	47
13. Calcirudite, light gray limestone cobbles up to 8 inches in diameter, thickness is very irregular	35
Gaptank Formation	
12. Limestone, yellow-gray weathering, organic fragmental, 8 inch bed with brachiopods, crinoid columnals, tetracorals, and fusulinids, coll. 37-12	6

Section 37 contd. Thickness (feet)

11. Limestone, medium gray, very fine grained calcarenite, 3 inch beds with orange-brown patches which are probably locally dolostone, crinoid columnals, fusulinids, coll. 37-11 18

10. Calcarenite, light yellow-gray, very silty near base, grades upward into very coarse sand size near top, poorly sorted, crossbedded, coll. 37-10 11

9. Limestone, very light gray to white, massive, organic fragmental, brachiopod, crinoid fragments, and fusulinids, coll. 37-9 43

8. Covered, probably mostly shale at least in lower part 88

7. Limestone, dark gray, 3 to 6 inch beds, organic fragmental, brachiopod and crinoid fragments common, also fusulinids, coll. 37-7 11

6. Shale, green to gray, very lenticular 0-2

5. Calcirudite, dark limestone cobbles of maximum diameter 4 inches, red-orange sand matrix, well cemented, coll. 37-5 4

4. Covered, shale in part at base 52

3. Sandstone, orange-brown weathering, very fine to fine quartz and calcite sand, well

Section 37 contd. Thickness (feet)

sorted, 8 to 12 inch beds, ferruginous cement 1

2. Covered, green-gray shale in part, Coll. 37-2 37

1. Limestone, dark gray, with layered and irregular patches of orange-brown sandstone, 1 to 2 foot beds, many brachiopod fragments, Coll. 37-1 14

Covered below.

Section 38

Measured about one-half mile east of the ranch road which leads to the high pasture on the Moore ranch. This section begins in some low mounds out in front of the lower escarpment and continues up an arroyo to the foot of the escarpment and then up the hill on the eastern side of the arroyo.

Top of measured sequence Thickness (feet)

Lenoxhills Formation

28. Calcirudite, limestone cobbles of maximum diameter 6 inches, small pebbles of chert in a few beds, 2 to 4 foot beds . . . Thickness not measured

Section 38 contd.

		Thickness (feet)
	Gaptank Formation	
27.	Covered	16
26.	Limestone, light gray to tan on fresh surface, weathers with an irregular pseudobedding phenomenon, orange limonitic coating and dendrites on weathered surfaces, poorly exposed	3
25.	Covered	12
24.	Limestone, light gray, massive, 6 inch to 6 foot beds, thinner bedded part near middle of the unit.	52
23.	Sandstone, tan to brown weathering, very fine to fine quartz sand, calcareous cement, 6 inch to 1 foot beds, well sort and crossbedded near top of unit	18
22.	Covered for most part, lower 10 feet are green-gray shale	105
21.	Limestone, dark gray, massive, upper portion is limestone conglomerate and organic fragments	21
20.	Limestone, dark gray, with pebbles of clay and crinoid columnals, lenticular beds 0-8 inches thick, having green and yellow shale and siltstone	

Section 38 contd.	Thickness (feet)
interbeds	5
19. Shale, gray to green, some ferruginous silty zones 1 inch thick, coll. 38-19, Bryozoa, Smaller Foraminifera, Kegelites adjunctio (Cooper), Amphissites sp., Seminolites? sp.	24
18. Covered	94
17. Shale, green-gray, fairly silty	5
16. Shale, and sandy siltstone; green shale, brown weathering siltstone, ferruginous cement	1/2
15. Covered	41
14. Shale, like unit 12	15
13. Covered	17
12. Shale, green-gray	15
11. Calcarenite, yellow to orange-brown weathering, mostly organic fragmental, 4 to 6 inch beds	2 1/2
10. Shale, green-gray, with some siltstone and very fine sandstone bands	47
9. Siltstone, orange-brown, 3 inch beds, abundant fossil fragments	1/4
8. Shale, green-gray, some orange-brown siltstone in upper portion, evenly bedded. .	14

Section 38 contd.

		Thickness (feet)
7.	Sandstone, brown to orange weathering, fine sand size, well sorted, lamellar bedding in 2 to 6 inch beds	2
6.	Covered	8
5.	Sandstone, orange-brown to tan weathering, contains many pieces of broken shells and petrified wood	3
4.	Covered	12
3.	Sandstone, brown to tan weathering, medium quartz sand, calcareous cement, crossbedded, 3 inch to 1 foot beds	9
2.	Sandstone, orange-brown weathering, medium quartz sand, ferruginous and calcareous cement, 8 inch beds, a few shell fragments	6
1.	Sandstone, brown-tan weathering, fine quartz sand, calcareous cement, 6 to 8 inch beds.	5

Covered below.

Section 39

Measured about 300 yards east of Section 38 along the east side of a canyon.

Top of major conglomeratic sequence	Thickness (feet)
Lenoxhills Formation	
20. Calcirudite, light to medium gray weathering, cobbles of maximum diameter 10 inches	8
19. Covered, red soil indicates probably a red shale	12
18. Calcirudite, light gray weathering, boulders up to 12 inches in diameter, 2 to 8 foot beds	36
17. Covered, probably red shale	18
16. Conglomerate, mostly dark gray limestone pebbles, but some beds have mainly chert pebbles, finer material is red sandy clay.	2
15. Covered, probably red shale	15
14. Conglomerate, mostly chert pebbles near base grading up into beds with some limestone boulders near top of unit, several beds of lenticular sandstone	16
13. Sandstone, light brown to tan weathering, several beds of fine pebble conglomerate 3 to 12 inch beds	6
Gaptank Formation	

Section 39 contd.	Thickness (feet)
12. Dolostone, brown weathering, locally the beds are unaltered limestone, 6 to 12 inch beds	36
11. Calcirudite, variety of limestone pebbles, 2 to 3 inches in diameter	4
10. Shale, dark gray, lenticular, poorly exposed	0-2
9. Limestone, medium to light gray, massive, composed of shell fragments of sand and silt sizes, 1 to 6 foot beds, in part dolomitized forming brown patches	21
8. Limestone, medium gray, large percentage of quartz and dolomite sand grains and silt, more easily weathered than units above and below	12
7. Limestone, medium to light gray; lower part is shaley, in beds 6 to 10 inches thick with uneven, wavy bedding surfaces; upper part is massive; organic fragmental	18
6. Shale, brown, much silt and very fine sand, this unit thickens and thins along out crop	0-7

Section 39 contd.

		Thickness (feet)
5.	Sandstone, light green to orange-brown, 1/2 to 4 inch beds, brown spots scattered in rock, uneven bedding	8
4.	Shale, green-gray (some blue tinted beds	21
3.	Limestone, light orange to yellow brown weathering, rich in clay but mainly a shell hash, abundant fusulinids, beds 3 to 6 inches thick, uneven bedding surfaces	2
2.	Covered	13
1.	Limestone, dark gray, organic fragmental, massive beds up to 4 feet thick, becomes thinner near the top	12

Covered below.

Section 40

Measured north along the Allison-Moore boundary fence, about one mile west of Gap Tank, to the top of the first low ridge, then unit 5 was traced eastward 200 yards across a stream and the section proceeds up to unit 45 by piecing the section together from both sides of the stream gully. Allowance is made for a north trending fault which crosses this area.

Top of section		Thickness (feet)
	Leonard Formation	
45.	Limestone, brown-gray weathering, 4 to 8 inch beds; 2 inch shale partings, lenticular and darker brown, Staffella, Schwagerina common	112
	Lenoxhills Formation	
44.	Covered, probably light gray to brown shale	42
43.	Sandstone, deep orange-brown weathering, very fine sand, much silt, very fine laminations, crinkled	1 1/2
42.	Sandstone, light green-gray weathering, medium quartz sand, crossbedded, very lenticular; siltstone and shale, varicolored, red, and green, 4 to 8 foot beds	107
41.	Covered, probably like unit 42	42
40.	Sandstone, light gray, crossbedded	15
39.	Covered	85
38.	Sandstone, light cream to light brown weathering, medium quartz sand, crossbedded, 6 inch to 1 foot beds	18
37.	Shale, red	6

Section 40 contd.	Thickness (feet)
36. Calcirudite, 1/2 to 6 inch pebbles and cobbles, red shale and silt matrix, *Triticites ventricosus* in pebbles	23
35. Calcirudite, medium gray, some black chert and limestone pebble, calcareous cement and matrix	15
34. Covered, probably red siltstone and shale . .	23
33. Calcirudite, medium gray, calcareous cement . .	6
32. Covered	25
31. Conglomerate, brown weathering, mostly non-limestone pebbles, grading upwards from a quartz sandstone at base of unit . .	19
30. Conglomerate, like unit 31.	28
29. Covered	34
28. Conglomerate, like unit 31.	13
Nealranch Formation?	
27. Sandstone, brown weathering, medium quartz sand, some chert pebbles, 1/4 to 1/2 inch in diameter, massive	3
26. Covered	36
Gaptank Formation	
25. Limestone, orange-brown weathering, red-brown chert nodules	9

Section 40 contd.	Thickness (feet)
24. Covered	20
23. Limestone, brown-gray weathering, dark gray on fresh surface, 2 to 6 inch beds, coll. 40-23, Triticites joensis, T. beedei, T. pinguis?, T. ventricosus . . .	12
22. Covered	9
21. Limestone, brown-gray weathering, light gray on fresh surface, solution pseudo-bedding, calcilutite, coll. 40-21, Triticites beedei	31
20. Covered for the most part, coll. 40-20 Triticites primarius	45
19. Limestone, medium brown-gray weathering, white specks, uneven bedding 1 inch to 2 foot thick, upper portion becomes very quartz sand rich and friable, a few chert and quartzite pebbles in the lower portion coll. 40-19	55
18. Covered	21
17. Limestone, gray-brown weathering, algal limestone, 1 to 2 foot beds	7
16. Covered, probably like unit 15, to the east this unit becomes gray-green shale, coll. 40-16 . . .	38
15. Limestone, medium gray weathering, fine	

40-19,20 = D3130

Section 40 contd. Thickness (feet)

grained calcarenite for most part, silicified brachiopods coll. 40-15 6

14. Covered 22

13. Sandstone, orange-brown weathering, fine quartz sand 1/2

12. Covered 13

11. Limestone, orange-brown weathering, fresh surface is brown to dark gray, organic fragmental, 6 inch to 1 foot beds, coll. 40-11 . . . 4

10. Covered 10

9. Calcarenite and quartz sandstone, light gray weathering, dark gray on fresh surface, 2 to 6 inch beds, coll. 40-9 . . . . . 3 1/2

8. Covered 13

7. Limestone, dark gray, large amounts of orange-brown quartz sandstone between irregular limestone masses, coll. 40-7 8

6. Covered 66

5. Limestone, dark gray weathering, organic fragmental, 3 inch to 2 foot beds coll. 40-5 61

4. Covered for most part, two or three beds of brown-orange sandstone, 6 inches thick, coll. 40-4 (from ant hill), Triticites ohioensis 34

Section 40 contd.

	Thickness (feet)
3. Sandstone, brown-orange weathering, medium quartz sand, 3 inch to 1 foot beds, evenly laminated, some organic fragments alined on bedding planes. coll. 40-3	12
2. Covered	21
1. Limestone, brown-yellow weathering, organic fragmental, brachiopods, crinoids, Mollusca, Bryozoa, and fusulinids. 40-1	5 1/2

Covered below.

Section 41

Section begins about 300 yards south of Gap Tank at the top of unit 17, Section 43. It extends northeast across several small faults. Units 6 through 10 were measured just north of the old Fort Stockton road.

Top of section

	Thickness (feet)

Lenoxhills Formation

10. Calcarenite, orange-brown weathering, increasing percentage of quartz sand upwards, upper portion of unit becomes a calcirudite, chert and quartzite pebbles locally dominate.	24

Section 41 contd.

		Thickness (feet)
	Nealranch Formation	
9.	Covered	13
8.	Calcarenite, like unit 6, coll. 41-8, Schwagerina compacta, S. gracilitatis, Pseudoschwagerina robusta, Parafusulina? linearis?	4
7.	Covered	5
6.	Calcarenite, orange-brown weathering, very silty, many small shell fragments, coll. 41-6, Schwagerina nelsoni, S. gracilitatis, S. diversiformis, Pseudoschwagerina robusta? . . . . . Fault having stratigraphic displacement of about 30 feet.	1 1/2
5.	Covered	33
4.	Calcarenite, orange-brown weathering, dark gray on fresh surface, very fine quartz sand matrix, 4 inch to 2 foot beds, coll. 41-4, Schwagerina compacta, S. gracilitatis, Paraschwagerina acuminata, Triticites koschmanni	9
3.	Covered	19
2.	Conglomerate, chert, quartzite, and limestone pebbles up to 3 inches in diameter,	

Section 41 contd.

	Thickness (feet)
orange-brown weathering, coll. 41-2, *Schwagerina gracilitatis*, *Paraschwagerina acuminata*, *Triticites koschmanni*	8
1. Covered	3

Limestone, light gray, massive, unit 17, Section 43 of the Gaptank formation below.

Section 42

This section begins on the lower slope of a ridge about one-half mile south of the Allison ranch house and continues northward to a small gully just south of the next ridge. The units above are silty, yellow weathering limestones which are very dolomitic and have a few casts of gastropods.

Top of measured sequence

	Thickness (feet)
Leonard Formation	
7. Limestone, dark brown to gray weathering, 1 to 2 foot beds, thick shale interbeds, coll. 42-7 (near base), *Schwagerina guembeli*, [*S. hessensis*?]	42
Lenoxhills Formation	

Section 42 contd.

	Thickness (feet)
6. Covered	152
5. Conglomerate, light gray weathering, nearly a pure calcirudite, boulders up to 10 inches in diameter	8
4. Covered	25
Gaptank Formation	
3. Limestone, orange-brown weathering, organic fragmental, 6 inch to 1 foot beds; shale, light gray interbeds	44
2. Covered, probably mostly shale with a few quartz rich calcarenites	105
1. Calcarenite, dark orange-brown weathering, quartz sand common in upper part, wood fragments	1

Covered below.

Section 43

Redescription of the type section of the Gaptank formation, south and southwest of Gap Tank (measurements in part after King, 1931, p. 44-45).

Top of measured sequence.

Thickness (feet)

Gaptank Formation

17. Limestone, light to medium gray weathering, fine grained organic fragmental, 1 to 4 foot beds, coll. 43-17, Triticites ohioensis 75

16. Sandstone, brown weathering; and shale, blue-gray, covered for most part 124

15. Limestone, medium gray to light brown weathering, fine grained organic fragmental and calcarenite in part, 2 to 3 foot beds, coll. 43-15, Triticites joensis 40

14. Sandstone, light brown weathering, beds composed of well sorted quartz sand, 3 inch to 2 foot beds, coll. 43-14 (near top of unit), Triticites joensis 230

13. Limestone, medium to dark gray weathering, organic fragmental and calcarenitic, green silt common in large percentage locally, 6 inch to 1 foot beds, coll. 43-13, Triticites ohioensis 55

12. Sandstone, brown-yellow weathering, and shale, light brown weathering, much of unit covered 120

Section 43 contd. Thickness (feet)

11. Calcarenite, light gray, weathers dark gray, coarse to medium sand size calcite grains in silt matrix, 3 inch to 1 foot beds, coll. 43-11, Triticites joensis 40

10. Sandstone, brown weathering; with a few calcarenite beds near middle of unit, 2 inch to 1 foot beds, coll. 43-10 (from calcarenite), Triticites kawensis, T. burgessae 195

9. Conglomerate, dark gray weathering, composed of limestone and chert cobbles and pebbles up to 8 inches in diameter, 3 to 6 foot beds, grades upwards into a well sorted calcarenite 4 feet thick, coll. 43-9 (from calcarenite), Triticites ohioensis, T. burgessae 15

8. Covered, probably mostly brown sandstones and shales 125

7. Conglomerate, orange-brown weathering, cobbles and pebbles are dominantly silicified limestone and crinoid columnals, 3 to 5 foot beds 15

6. Sandstone, light brown weathering, mainly

Section 43 contd. Thickness (feet)

fine quartz sand, 2 inch to 1 foot beds, cross-bedded in part, friable and largely covered 97

5. Conglomerate, medium to dark gray weathering, composed of silicified limestone and chert cobbles and pebbles up to 8 inches in diameter, large scale cross-bedding 25

4. Sandstone, light orange-brown weathering, with interbeds of shale, gray-green; 3 inch to 1 foot beds, coll. 43-4, Smaller Foraminifera, Moorites? sp., Kegelites dattonensis?, Bairda sp., Bairdiacypris? sp., Healdia spp. 80

3. Conglomerate, medium gray weathering, silicified limestone and chert cobbles up to 10 inches in diameter, 4 foot beds. . 40

2. Sandstone, brown to orange-brown weathering; and shale, gray to green-gray weathering; 2 to 3 foot beds 80

1. Conglomerate, medium to light gray weathering, limestone and chert pebbles and cobbles up to 4 inches in diameter, 1 to 2 foot beds, coll. 43-1B 40

Section 43 contd. Thickness (feet)

Limestones, shales, and sandstones of the upper member of the Haymond formation below.

for 1-2 see front of book

4. Gaptank formation, 4.0 miles west of Marathon, road-cut by Highway 90, sandstone in nose of north plunging anticline; Triticites comptus, T. ventricosus.

5. Gaptank formation, 400 yards east of the base of Section 7, orange-brown sandstone; Triticites milleri.

6. Gaptank formation, northeast side of Leonard Mt., just below dike, includes Cooper's 705f; Triticites joensis.

7. Gaptank formation, Leonard Mt., 0.65 miles N 62° E of BM 5860, slump block, Cooper's locality 704w; Triticites beedei, T. primarius.

8. Gaptank formation, Wolf Camp Hills, Hill 5060, 30 feet above base of "grey limestone"; Triticites ventricosus.

9. Gaptank formation, Wolf Camp Hills, at notch in Hill 5060, middle of "grey limestone" (65 feet above base); Triticites ventricosus, T. comptus.

10. Gaptank formation, west side of Hill 5060, near top, about 20 feet below a 7 foot brown weathering dolostone; Triticites comptus, T. ventricosus.

11. Nealranch formation, base of Lenox Hills, 2.1 miles N 47° W of Decie ranch house and 75 yards south of the base of Section 7; Schwagerina emaciata, S. pugunculus, Triticites ventricosus, T. uddeni.

12. Nealranch formation, base of Lenox Hills, 200 yards S 30° E of the base of Section 7; Schwagerina gracilitatis, S. pugunculus, Paraschwagerina gigantea.

13. Nealranch formation, base of Lenox Hills, 180 yards S 30° E of the base of Section 7, from limestone; Pseudoschwagerina uddeni, Paraschwagerina gigantea, Schwagerina pugunculus.

14. Lenoxhills formation, Dugout Mt., 0.4 miles N 83° W of the base of Section 1; Schwagerina compacta, S. nelsoni?, S. tersa.

15. Lenoxhills formation, Dugout Mt., about 200 yards N 30° E of Section 2, talus from near middle of formation; Parafusulina linearis.

16. Lenoxhills formation, Dugout Mt., 250 yards N. 30° E of Section 2, 80 feet below top of formation, sandstone and shale; Parafusulina linearis, Schwagerina nelsoni.

17. Lenoxhills formation, Dugout Mt., 400 yards S 30° W of Section 3, biohermal limestone; Pseudoschwagerina tumidosus, Schwagerina nelsoni, S. diversiformis.

18. Lenoxhills formation, Dugout Mt., loose specimens 1 to 10 feet above locality 17; Schwagerina bellula, S. diversiformis, S. crebrisepta, S. hawkensi, S. lineanoda.

19. Lenoxhills formation, hill west of Iron Mt., southside of knob at northeast end, elevation 4800 feet, Cooper's locality 708h; Schwagerina nelsoni.

20. Lenoxhills formation, Hess ranch horst, 0.4 miles S 45° W of Hill 5578, just above main conglomerate unit; Schwagerina diversiformis.

21. Lenoxhills formation, Hess ranch horst, 0.55 miles S 85° W of Hill 5816, in shale slope; Schwagerina compacta, S. extumida, S. laxissima, S. crebrisepta, S. diversiformis.

22. Lenoxhills formation, Hess ranch horst, 0.5 miles S 65° W of Hill 5816, includes Cooper's locality 706j; Schwagerina compacta, S. extumida, S. hessensis, Parafusulina linearis.

C3763 23. Lenoxhills formation, excarpment north of Wolf Camp Hills, Cooper's locality 703n; Schwagerina knighti, S. hessensis.

C3764 24. Leonard formation, 0.8 miles west of the base of Section 1, loose specimens from the top of a tightly folded anticline in the Gaptank formation; Schwagerina guembeli, S. hessensis.

C3765 25. 25. Leonard formation, 0.5 miles S 30° W of Hill 5021, north end of Lenox Hills, from slump block, Cooper's localities 708i and 708f; Schwagerina compacta, S. hessensis, S. diversiformis.

26. Leonard formation, Glass Mts. escarpment, 2.6 miles west of Hill 5060 (Wolf Camp Hills), one-third the distance up from the base, ant hill in King's bed 5, section 23, Schwagerina guembeli.

27. Leonard formation, Glass Mts., escarpment, about 200 feet above locality 26, King's bed 7, section 23; Parafusulina bösei, Schwagerina compacta?.

28. Leonard formation, Glass Mts. escarpment, about 60 feet above locality 27, King's bed 8, section 23; Schwagerina franklinensis, S. tersa.

29. Leonard formation, near top of Glass Mts. escarpment, 2.8 miles N 78° W of Hill 5060 (Wolf Camp Hills), 3 feet above sponge bed, King's bed 13, section 23; Schwagerina sp.

30. Leonard formation, basal part, Hess ranch horst, top of Hill 5578 in shale and limestone; Schwagerina guembeli, S. knighti.

31. Leonard formation, Hess ranch horst, basal gray limestone at top of ridge, 0.3 miles west of Hill 5816; Schwagerina compacta, S. diversiformis.

32. Leonard formation, in valley south of Hess ranch horst, ant hill about 15 feet below the top of the ridge SE of intrusive, 50 yards WSW of summit; Schwagerina guembeli (large form), S. tersa.

33. Leonard formation, Glass Mts. escarpment, 1.8 miles NW of Wolf Camp Hills, in double ledge of King (1931), Dunbar's locality 7-5-2; Schwagerina franklinensis, S. knighti?.

34. Leonard formation, Glass Mts. escarpment, 150 feet above locality 33, Dunbar's locality 7-5-3; Schwagerina knighti?, S. hessensis.

35. Leonard formation, lower Glass Mts. escarpment, 1.1

miles north of Hill 5060 (Wolf Camp Hills); Schwagerina guembeli.

36. Leonard formation, eastern Glass Mountains, Moore ranch area, 0.5 miles south of Hill 5072; Schwagerina franklinensis, Parafusulina bösei.

37. Leonard formation, eastern Glass Mts., Moore ranch area, 0.5 miles SSW of Hill 5072; Schwagerina franklinensis, Parafusulina schucherti.

C3797 38. Leonard formation, eastern Glass Mts., Moore ranch area, 0.4 miles NW of Hill 5072; Parafusulina schucherti.

39. Word formation, 1.6 miles N 10° W of Hess ranch house, King's number 3 limestone, west side of Hess Canyon; Parafusulina bösei.

40. Word formation, Hill 2.5 miles east of Sullivan Peak; Parafusulina bösei.

C3773 41. Word formation, in Hill 4627, 5.0 Miles N 10° E of Brooks' ranch house, 20 feet above basal conglomerate; ~~Schwagerina tersa~~?.

42. Uddenites shale, west side of Geologists Canyon, Wolf Camp Hills.

43. Uddenites shale, kno,l just east of Geologists Canyon, Wolf Camp Hills.

44. Uddenites shale just below Gray limestone in Hill 5060 Wolf Camp Hills.

45. Gaptank formation, Wolf Camp Hills, south base of outlier, 100 feet below Gray ls. mbr.

46. Gaptank formation, Wolf Camp Hills, near base outlier, on south side, at base of Uddenites shales, 10 feet above locality 45.

47. Lower limestone, Gaptank formation as exposed on the east side of Geologists Canyon, Wolf Camp Hills.

48. Gray limestone ("bed 2") Gaptank formation, base of Hill 5060, Wolf Camp Hills.

49. Gray limestone, "bed 2" of King, Outlier, Wolf Camp Hills.

50. Gaptank formation, 2 miles S.W. of Brooks Ranch house, in arroyo at entrance to low hills.

51. Gray limestone, base of "bed 2" west end of Hill 5060, Wolf Camp Hills, Gaptank formation.

52. Uddenites shale, Gaptank formation, west side of Geologists Canyon, Wolf Camp Hills.

53. Leonard formation, 1 mile N5°E of Hill 5060.

54. Gray limestone ("bed 2" of King), 60 feet below top of Hill 5060, Wolf Camp Hills.

55. Gray limestone (bed 2 of King), near base of bed near west end of Hill 5060, Wolf Camp Hills.

70. Pebble from Lenox Hills formation, Hess Ranch horst.

71. Lower Leonard limestone ("Hess ledge"), 1/2 mile N.E. of Section 8 of Ross.

72. 50 feet below 2nd limestone of Leonard, 300 yards north of northern face of Dugout Mt.

73. Lenox Hills fm., western end of Hess Ranch horst, at top of hill.

74. Saddle, N.E. end of Leonard Mt., Leonard formation.

75. Leonard formation, top of north eastern most knoll of Leonard Mt.

76. Lenox Hills formation, 1/2 mile south of Ross' Section 3, Dugout Mountain.

77. Lenox Hills formation, S.W. ridge of Dugout Mountain, 100 yards N.E. of Ross' Section 2.

78. Lenox Hills formation, western end of Hess Ranch horst, near top of ridge.

79. Boulder, above basal Leonard limestone, "Hess ledge", Dugout Mt.: Float.

80. Leonard formation, 7 feet above unconformity between bed 3 and 4, King's section 23, Hess escarpment.

81. Bed 8 of King's Section 23, Hess escarpment, Leonard formation.

82. Leonard formation, bed 7, King's section 23, Hess Ranch Horst area, north side of the ridge forming Hess escarpment.

83. 20 feet above basal Leonard limestone, "Hess ledge", 1/2 mile north of section 8 of Ross.

84. Leonard formation, 25 feet above base of the "first Leonard ls." C3315 of King, above Ross' Section 8, Lenox Hills.

C3220 85. Float on Gaptank formation, in folded strata 1/2 mile W.S.W. of base of Ross' Section 1.

86. Leonard formation, Hess Ranch horst, S.E. side of intrusive, 15 feet C3211 below highest limestone on ridge, W. of highest point.

87. Gaptank formation, fold belt, 50 yards S.W. of Wind Mill, C3222 1 3/4 miles North of Decie Ranch house.

88. Lenox Hills fm., Hess Ranch horst, light gray limestone at top C3223 of ridge, just east of the main saddle.

89. Neal Ranch fm., 40 feet below bed 7-5 on S.W. side of C3274 gully; Lenox Hills. = Loc. 11.

90. Lenox Hills formation, Hess Ranch horst, shaly slope 200 yards C3225 N.E. of main saddle.

91. Gaptank formation, float, 75 feet below Lenox Hills basal C3326 conglo., Leonard Mt., east face.

92. Gaptank formation, 200 feet below Lenox Hills conglomerate, C3821 east face of Leonard Mt.; float.

93. Haymond or Gaptank formation, Payne Hills, 200 yards N.W. C3626 of King's ammonite locality.

94. Gaptank formation, S.W. end of Dugout Mt., 1/2 mile W.S.W. C3821 of base of Section 1 of Ross.

95. Gaptank formation (?), 1/4 mile south of Ross' section 1, Dugout Mt.

C3930