TRANS., Ill. State Acad. Sci.
Vol. 67, no. 2, June, 1974

ESKERS OF NORTHERN ILLINOIS

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ABSTRACT

At least twenty-seven eskers and esker groupings occur in northern Illinois. These range in age from early Illinoian to late Wisconsinan. A few are large and conspicuous, but the majority are small. Many of the larger eskers have been extensively modified as a result of quarrying operations.

INTRODUCTION

Among the most interesting of glacial landforms are the eskers. These elevated ridges of sand and gravel, often sinuous in plan view, offer a striking witness to the glacial heritage of a region. Although not as abundant as in some of the glaciated regions of the world, eskers are known in a number of localities within northern Illinois. Some of these eskers have been previously described (Table 2), but the total has never been cataloged.

ORIGIN AND CHARACTERISTICS OF ESKERS

The origin and character of eskers is treated in most works on glacial geology and geomorphology. Some of the more extensive and recent treatments are given by Embleton and King (1968), Fairbridge (1968), and Flint (1971). Some of the salient characteristics of eskers are discussed, particularly as these apply to the eskers of northern Illinois.

Eskers form as the result of deposition of stream-laid glacial deposits - usually sand and gravel - in channels confined by glacial ice. The depositional agent is the meltwater produced as a glacier wastes. The sand and gravel is derived from the load of solid detritus transported by the glacier. The flowing water sorts the naturally heterogeneous load of the glacier, sifting out and removing all but the larger particles. The latter accumulate in the channel and remain as the esker after complete wastage of the glacier.

Eskers channels may be of three distinct types, subglacial, intraglacial, or superglacial. Subglacial channels are probably the most common. These consist of tunnels located at the base of a glacier. Water derived from melting of a glacier works its way down into the glacier through crevasses and other openings in the ice. When the water reaches the base of the glacier its further downward movement is inhibited, and it thereafter tends to move laterally. During this lateral movement tunnels may be opened, which - if later filled with stratified drift - become eskers. Since the flowing water always tends to seek the lowest level, ice tunnels and hence eskers most commonly occur in low areas such as valleys or topographic sags on the subglacial surface. This characteristic is pronounced in several of the eskers in northern

Illinois, notably the Leaf River Esker, Pecatonica Esker System, Wyanet Eskers, Winfield Esker, and Tiedtville Esker.

Intraglacial and superglacial channels differ from subglacial channels in that they are located within and on top of a glacier, respectively. Formation in intraglacial or superglacial channels is most often suggested for eskers which increase in elevation in the downstream direction, or which trend across topographic highs. It is believed that these characteristics are likely to develop only if the drift of the eskers had been let down onto the subglacial surface as the reslut of melting of the intervening ice. However, eskers with the same characteristics could also form in a subglacial channel if the hydrostatic head provided by the water entering the tunnel was sufficient to force the water up and over gentle slopes. Eskers which have been let down through any great elevation should bear evidence of this history in the presence of an unusually large amount of contorted and faulted bedding.

Water flow on or within a glacier is always directed in a general way toward the glacier margin. Hence eskers tend to be aligned with their long axis perpendicular to the ice margin. If deposition in the channel extends completely to the glacier margin, a delta may form where the emerging water flow spreads out and thus loses some of its transporting power. A delta of this type appears to occur on the Kaneville Esker.

Most workers consider that eskers form only under stagnant glaciers, else the moving ice would close the tunnel before deposition could fill it or the deposits would be themselves moved and their form destroyed. If this conclusion is correct, it implies that eskers are only formed late in the history of a particular glacier. Since eskers are less abundant in northern Illinois than in many other glacial terrains, it further implies that the glaciers in Illinois were more active than was the norm.

The sediments of which an esker is composed are similar in lithology to the till and bedrock of the local region. In northern Illinois where dolomite forms the predominant bedrock type, dolomite is the most common rock constituent, at least among the large clasts. Lesser amounts of rock derived from more distal regions are also evident, particularly igneous and metamorphic rocks derived from Canada and the northern Great Lakes region.

Cross-bedding is the most common sedimentary structure seen in the strata of eskers. The cross-bedding is useful for determining the direction of flow of the water which formed the esker. The cross-beds dip in the downstream direction. Other evidences which also assist in determing the direction of flow include cobble imbrication, changes in average grain size of the clasts, morphologic features such as the presence of a delta, and the inferred position of the glacier margin.

Because most eskers are formed within the confines of ice walls, they tend to collapse somewhat when the glacial ice melts. The collapse is manifest by the presence of small tensional faults and slumps located at the sides of eskerine ridges.

Since eskers are developed in channels, the form they possess depends upon the form of the channel as well as the degree to which the channel becomes filled.

Ice tunnels commonly consist of alternating broad expanses, or "rooms", and narrower passageways, similar in character to limestone caverns. When filled this type of tunnel produces a series of knolls marking the position of the rooms and a series of narrower segments marking the position of the passageways. In the extreme case no deposition may occur in the passageways due to the greater velocity of water flow through the narrows. The result is a train of kamic knolls representing just the rooms. Several such examples occur in northern Illinois.

Most eskers display some curvature when seen in plan view. The curvature mirrors the curvature of the channel. Some of the best developed eskers have markedly sinuous patterns much like that seen in meandering streams.

If an ice-channel becomes choked with debris--as it must to produce an esker--an increase in the water flow often can not be accomodated by the restricted channel. The result is that new channels are opened. They may diverge from the initial channel, or run parallel to it. When the new channel becomes filled, a companion esker is left. The process may repeat to the point where very complex eskerine tracts are produced. A particularly complex type of tract occurs where the main ice tunnels diverge into a number of distributary tunnels, such as is seen in the Stillman Valley Eskerine Tract (Figure 2).

If ice blocks become buried in sand and gravel during the formation of an esker deposit, their later melting leaves kettles within the esker. These depressions may then completely or partially fill with foreign material, such as loess, coluvium, or peat.

Dimensions of eskers run a broad gamut. Eskers several tens of miles long are known, although those of lesser length are most common. The longest esker in northern Illinois is the 10-mile long Leaf River Esker. Breadths of eskers range from a matter of feet to a half-mile or more. The wider eskers are generally compound. Relief on eskers may range anywhere upwards of a few feet. Eskers of low relief may be difficult to recognize and their presence revealed only by detailed mapping. Relief is the quality most susceptable to modification once an esker becomes exposed to erosion. Hence, older eskers tend to have less conspicuous relief than newer eskers. The sand and gravel of eskers may extend below the level of the till or other materials which surround the esker. In this case the sand and gravel is thicker than the esker is high.

Eskers commonly occur in association with other glacial landforms. The most abundant associates are kames. In fact, kames may be considered to be part of a continuous spectrum of water-laid glacial landforms which includes the eskers. Eskers also commonly occur on maraines, particularly in the low sags of moraines.

In the late stages of formation, some ice tunnels may have their roofs collapse, leaving the tunnel open to the air. Features formed by deposition in such open channels are termed crevasse fillings rather than eskers. However, the deposits and the morphology of eskers and crevasse fillings are so similar that their distinction is somewhat artificial. It is possible that some of the features herein described as eskers formed in part or in total as crevasse fillings.

AGE OF ESKERS

Unless an esker contains materials which can be dated by the radiocarbon method, the only way in which the origin of an esker can be placed in time is to assume that it formed contemporaneously, or nearly so, with the tills which surround it (Table 1). Although this procedure is generally reliable, in some instances it can lead to error. A few examples are known where an esker is older than the surface till surrounding it. This can occur when a younger glacier overrides an esker, but does not destroy it. Other instances may occur where, through non-deposition or erosion of till next to an esker, the surface till is older than the esker. The procedure also presupposes that the age of the till can be determined. In the following discussion and in Table 2 age assignments are based on the age of the adjacent tills, unless otherise noted.

TIME UNITS			
AGE	SUBAGE	TILL UNITS	YEARS BEFORE PRESENT*
WISCONSINAN		....	13,500
	WOODFORDIAN	Wadsworth-Haeger Tills Yorkville Till Malden Till Tiskilwa Till Esmond Till	
		....	20,000
	ALTONIAN	Argyle Till	
	....	....	75,000
	....	....	125,000
ILLINOIAN	JUBILEEAN		
	MONICAN	Ogle Till	
	LIMAN	Kellerville Till	
	....	....	(?)

TABLE 1. Relationship of time units to till units. Only terms used in text are presented. For complete discussion, see Willman and Frye (1970). (* Dates in radiocarbon years and/or estimates).

				LOCATION					REFERENCES	
NO.	NAME	MAX. HGT. (Ft)	LTH. (Mi)	COUNTY	SECTIONS	TWN	RANGE	TOPO. QUAD	DISCUSSION	MAP
					ILLINOIAN ESKERS					
1	Garden Plain	20	4	Whiteside	20-24	21N	3E	Clinton	27, 35, 38	35
2	Hazelhurst	100	1½	Carroll-Ogle	21-22, 27	23N	7E	Sterling	35	4, 35
3	Leaf River (Adeline)	100	10	Ogle	19-24 19, 28-30	25N 25N	8E 9E	Forreston-Oregon	9, 16, 22 33, 35, 39	4, 35, 40
					ALTONIAN ESKERS					
4	Pectonica	20	1/3**	Stephenson	34-36	27N	8E	Freeport	11, 22, 31, 35	11, 35
5	Irene	80	3½	Boone-DeKalb	19-20, 29-32 5	43N 42N	3E 3E	Kirkland	1, 35	1, 23, 40
					WOODFORDIAN ESKERS (ESMOND TILL)					
6	Stillman Valley	60	2**	Ogle	5, 7-8, 18 35-36	42N 25N	1E 11E	Kings	6, 28, 35	6, 40
7	Holcomb	15	1½	Ogle	3-4	41N	1E	Kings	6	6
8	Grand Detour	30	5½	Lee	14-15 23, 25-26 31 5-6	22N 22N 22N 22N	9E 9E 10E 10E	Dixon	25, 29, 32	32

TABLE 2. Eskers of northern Illinois. Esker numbers are keyed to text discussion and location map (Figure 1). Reference numbers are keyed to LITERATURE CITED. Esker names with asterisks are new names. Double asterisks in the length column indicate the length of the longest ridge in a cluster.

WOODFORDIAN ESKERS (TISKILWA TILL)

9	Wyanet*	70	2½**	Bureau	24-25	16N	7E	Buda	30, 37	37
10	Cortland*	60	5½	DeKalb-Kane	9-10, 15-16	40N	5E	Sycamore	1	1, 21, 40
					22-24	40N	5E			
					19	40N	6E			
11	Kaneland School*	50	8½	Kane-DeKalb	12	39N	5E	Sycamore-Geneva		1, 5, 12, 20
					1-8	39N	6E			
					6	39N	7E			
					31-32	40N	7E			

WOODFORDIAN ESKERS (MALDEN TILL)

12	Little Rock	15	1	DeKalb	5-6	38N	5E	Sycamore	35	1, 4
13	Kaneville	70	7	Kane	25	39N	6E	Geneva	20, 26, 34	4, 5, 12
					30-31	39N	7E		35, 36	20, 35, 36
					5-6, 8-10, 15	38N	7E			40, 42
14	Covel Creek	20	7	LaSalle	4-6	32N	4E	Ottawa	35, 44	40, 44
					1-5	32N	3E			

WOODFORDIAN ESKERS (YORKVILLE TILL)

15	Brookfield*	10	1/5	LaSalle	5,8	32N	5E	Marseilles	44	44
16	Wheatland	15	1/2	Will	19	37N	9E	Normantown	15	15, 42
17	Naperville	15	1	DuPage	26-27	38N	9E	Normantown	15	12, 15, 42
18	Warrenville*	20	1	DuPage	3,10	38N	9E	Naperville	41	12, 41

TABLE 2 (con't).

WOODFORDIAN ESKERS (WADSWORTH AND HAEGER TILLS)

19	Orland Park*	25	1**	Cook	8-9, 18	36N	12E	Tinley Park-Mokena		7, 12, 42
20	Visitation	20	3/4	Cook	19-20	37N	12E	Sag Bridge	8	7, 12, 42
21	Hickory Hills*	25	2/3	Cook	2	37N	12E	Palos Park		7, 42
22	Tiedtville	25	½**	Cook	31 6	38N 37N	12E 12E	Sag Bridge	8	7, 12, 42
23	Oak Brook Terrace*	20	½**	DuPage	23, 27	39N	11E	Hinsdale	8	7, 42
24	Itasca*	30	1½	DuPage	12 7-8	40N 40N	10E 11E	Lombard		12, 42
25	Winfield*	30	½	DuPage	15	39N	9E	Naperville	41	41
26	Halfday*	15	½	Lake	15	43N	11E	Wheeling	8	7, 42
27	Island Lake*	50	1½**	Lake	13-16, 21	44N	9E	Wuaconda		12

TABLE 2 (con't).

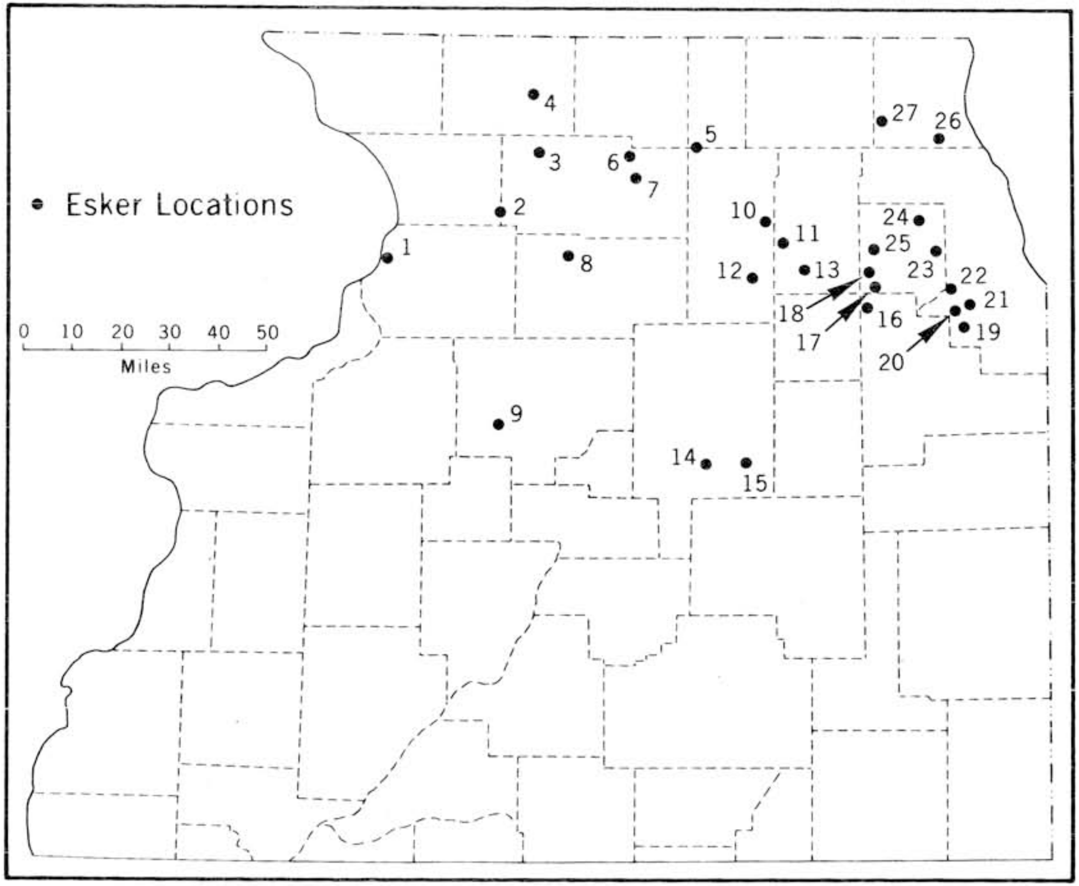

Figure 1. Location of eskers in northern Illinois. Numbers are keyed to text descriptions and to Table 2.

ILLINOIAN ESKERS

Three eskers of probable Illinoian age are known in northern Illinois (Table 2). Each occurs in the northwestern part of the state (Figure 1) where Illinoian drift occurs at the surface (Frye et al, 1969). In spite of their relative antiquity, two of these eskers, the Hazelhurst and Leaf River Eskers, are among the most prominant of the eskers of Illinois.

A linear exposure of sand and gravel located at Elmwood in western Peoria County may represent a fourth Illinoian esker. Thornburn's (1963) map shows the feature as an ice-contact deposit. However, Anderson and Hunter (1965) described it simply as Illinoian outwash. If the feature is indeed an esker, it has suffered extensive erosional modification since it no longer possesses a well-defined ridge-form.

Garden Plain Esker (#1) The Garden Plain Esker is a weakly express, eastward trending ridge located in Garden Plain Township, Whiteside County. Relief on the ridge averages only 5 to 10 feet. Some of the low relief has resulted from partially burial of the ridge by Wisconsinan loess. Leverett (1899) was able to trace the ridge for 2½ miles. Since then the esker has been traced in the subsurface an additional 1½ miles to the east. Quarries located at the west end of the ridge reveal the typical sand and gravel composition of an esker. Cross-bedding indicates a westward direction of flow.

Leverett (1899) initially suggested a possible Illinoian age for the esker. Schaffer (1956) reassigned the esker to an early Woodfordian (Tazewell) age. The most recent mapping has tended to confirm Leverett's assignment: the till adjacent to the esker is the Kellerville Till of Early Illinoian (Liman) age (Willman and Frye, 1970).

Hazelhurst Esker (#2) The Hazelhurst Esker is a short but well-defined ridge located at Hazelhurst on the Carroll-Ogle county line. The main ridge of the esker is traceable without break for about 1½ miles. Several prominant gravel knolls located to the south and east of the main ridge are probably continuations of the esker. If the latter are added, the total length of the esker is about three miles. At the western end the main ridge splays out into a number of digitated fingers, in a pattern similar to that displayed in the Stillman Valley Eskerine Tract (Figure 2). The maximum height of the esker is about 100 feet, with much of the ridge rising 60 to 75 feet. Leverett (1899) reported that a well made on the slope of the esker a short distance west of Hazelhurst penetrated a 100-foot section of sand and gravel before entering bedrock. At other places in the immediate vicinity bedrock occurs either at or very near the surface. Shaffer (1956) described a section of the strata in the esker.

Shaffer (1956) considered the Hazelhurst Esker to have formed in Farmdale (earliest Wisconsinan) time. However, Frye et al (1969) concluded that the surface till in the vicinity of the esker is the Ogle Till, which is assigned to the Monican Subage of Illinoian time (Willman and Frye, 1970).

Leaf River (Adeline) Esker (#3) The Leaf River, or Adeline, Esker was firs noted by Shaw (1873) who mistakenly identified it as a moraine. It was later dis cussed and correctly identified as an esker by Chamberlain (1882), Hershey (1897) and Leverett (1899).

The Leaf River Esker is located in the valley of Leaf River in northwestern Ogle County. It has the distinction of being the longest and one of best-developed eskers in Illinois. Although it has not been mapped in detail, it is at least ten miles in length, extending from a point one mile east of Adeline westward to at least three miles northwest of Forreston. Most of the esker lies immediately north of Leaf River where it rises sharply above the river flats. Near its eastern end, two miles west of Adeline, Leaf River cuts through the esker, placing the ridge south of the river. A second notable gap occurs immediately north of Forreston where a small stream tributary to Leaf River crosses through the esker.

The Leaf River Esker has the uneven, undulating crest line typical of an esker. The highest points slightly exceed 100 feet above the plain bordering Leaf River, but their elevation is no greater than that of the uplands on either side of Leaf River Valley. The lowest points are scarcely 20 feet in height. The esker consists usually of a single ridge, ranging in breadth from 100 feet or less to about 1000 feet. However, at its eastern end the single ridge diverges into a series of poorly defined, nearly parallel ridges and hillocks which cover a breadth of approximately one-half mile and almost fill the valley. At the western end of the ridge there is no delta, or fan-shaped gravel deposit, such as often occurs at the terminus of an esker.

There are a number of quarries in the Leaf River Esker, most of which occur in the western third of the ridge where they have greatly altered the ridge-form character of the esker. The quarries reveal the typical sand and gravel composition of eskers. Shaffer (1956) describes the section in two of these quarries. Cross-bedding in the sands indicates that the flow of water responsible for forming the esker was directed toward the west, or reverse from the direction of flow of modern Leaf River.

Shaffer (1956) assigned the origin of the esker to Farmdale (earliest Wisconsinan) time. However, like the Hazelhurst Esker, the Leaf River Esker has most recently been assigned an Illinoian age on the basis of the occurrence of Illinoian Ogle Till in the surrounding region (Frye et al, 1969).

ALTONIAN ESKERS

Altonian time produced only one prominant esker in northern Illinois, the Irene Esker. However, a number of short ridges collectively referred to as the Pecatonica Esker System probably also represent Altonian eskers. Two Parallel trains of aligned kames mapped by Hunter and Kempton (1967) in southern Boone County may represent still other indistinct eskers.

Pecatonica Esker System (#4) Doyle (1965) interpreted four short ridges located in the Pecatonica River Valley two miles east of Freeport as either eskers or crevasse fillings. The ridges are 10 to 20 feet high, up to a few hundred feet across, and up to one-third mile in length. Three of the ridges lie parallel to one another on a spur of land which extends into the Pecatonica River Valley from the south. The fourth lies to the east on a spur which enters the valley from the north. The local surface till is the Argyle Till of Altonian age (Frye et al, 1969).

The four ridges identified by Doyle are a portion of a much larger belt of eskers which Hershey (1897) thought occurred in the region. Hershey believed that the Pecatonica Esker System extended for a length of nearly 20 miles along the valley of Pecatonica River from eastern Stephenson County westward to beyond Freeport. Hershey also identified two other esker belts in Stephenson County. There were the 20 mile long Cedarville belt, which passed near the community of that name, and the shorter Orangeville belt. Boyle's mapping has cast doubt on the interpretation of these belts as eskerine in orgin. Many of Hershey's localities appear to be either isolated kames or till deposits incorrectly identified as stratified sand and gravel.

Irene Esker (#5) The Irene Esker is a prominant esker located in southwestern Boone and northwestern DeKalb Counties. Its identification is based on the mapping work of Anderson (1964) and Hunter and Kempton (1967) which revealed the sand and gravel composition of the ridge. The main ridge of the esker has a length of two miles. Three isolated gravel knolls located to the north of the of the main ridge produce a cummulative length of about 3½ miles. A fourth knoll located to the west of the main ridge appears to be a spur leading away from the esker proper. Relief is sharp, with the highest portions of the esker rising 80 feet above the surroundings. At its widest the esker spans one-half mile. The surface till of the region is the Argyle Till of Altonian age (Frye et al, 1969).

WOODFORDIAN ESKERS (ESMOND TILL)

Two single-ridge eskers, the Holcomb and Grand Detour Eskers, plus the complex eskerine terrain located at Stillman Valley in Ogle County, have been described from areas where the Esmond Till (earliest Woodfordian) is the surface till (Frye et al, 1969). Although earliest Woodfordian is therefore the most likely time of origin of these eskers, one or more of them may have formed at earlier times. The Esmond Till is thin and has an irregular, patchy surface distribution. It is thus difficult to determine the precise area covered by the Esmond glacier.

Stillman Valley Eskerine Tract (#6) The Stillman Valley Eskerine Tract is notable for its great topographic complexity. The tract consists of three major sub-parallel ridge groups (Figure 2). The central group is dominated by a single long ridge which rises up to 50 feet above the immediate surroundings. The crest of the central ridge is undulatory and varies in altitude with variations in the elevation of the subjacent land. Of the two flanking ridge groups, the western is the most striking. It digitates into not less than thirteen shor spurs, which diverge through 180 degrees (Figure 2). From the south these spurs appear as steep knolls rising above the floor of Stillman Creek Valley. Several of the spurs have knoll-like summits, but it is clear that all are connected as one group of radiating ridges. The eastern ridge group is patterned like the western, but the branching finger-like termini are fewer, longer, and generally not so conspicuous.

All of the ridges consist of sand and gravel, in contrast to the till or bedrock which underlies the adjacent landscape. Several quarries reveal that the depth of sand and gravel is equal to the height of the knolls. The subjacent material is usually till, but at least at one locality gravel rests directly on dolomite bedrock.

The branching distributary network of channels represented by the individual ridges of the Stillman Valley Eskerine Tract is strongly suggestive of the type of distrubutary systems seen on modern alluvial fans and deltas, environments in which large changes in stream competancy and capacity are common. Similar stream changes were probably responsible for forming the Stillman Valley Eskers. A likely hypothesis is that at the start only a single ice tunnel existed. Debris gradually began to fill this tunnel, perhaps stimulated by initial deposition near the mouth of the tunnel where the stream spread out and thus has its velocity checked. This accumulation would have lessened the average slope in the tunnel and promoted further deposition within the tunnel. Eventually deposition must have choked the tunnel, forcing the flow of water to diverge, perhaps into already weakened crevasse lines, to open new tunnels. With repeated choking and establishment of new tunnels, the branching network of the eskerine tract would have resulted.

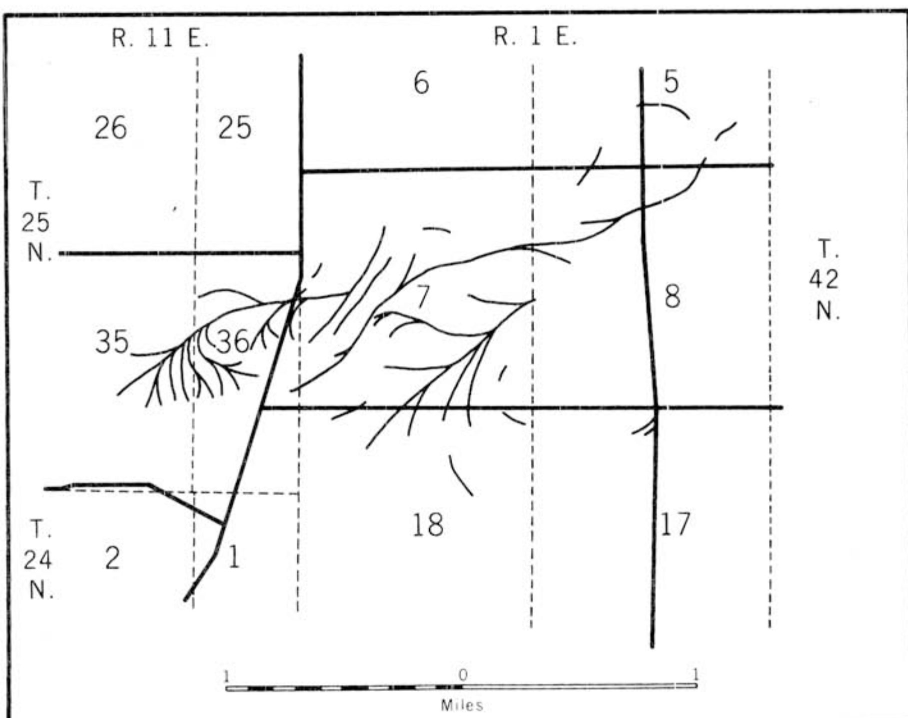

Figure 2. Branching pattern of esker ridges in the Stillman Valley Eskerine Tract (after Bretz, 1923).

Holcomb Esker (#7) The Holcomb Esker, described by Bretz (1923) as a kame tract, is a topographically inconspicuous 1 1/2 mile long ridge located near Holcomb in Ogle County. Although identification of the Holcomb feature as an esker is problematical, its ridge-form and gravelly character tend to support an eskerine origin.

Grand Detour Esker (#8) The Grand Detour Esker, as mapped by Knappen (1926), extends for 5 1/2 miles across Dixon and Nachusa Townships in Lee County. In only a few places is the esker topographically distinct and its extent has been based mainly on the occurrence of sand and gravel on stream divides. These deposits, which have been locally quarried, do suggest an eskerine origin, however, in their linear distribution, in their coarseness, and in their bedding characteristics.

An interesting aspect of the Grand Detour Esker is the role that it may have played in determining the local course of the Rock River. In the vicinity of the esker the Rock River has a large horseshoe-shaped bend, the Grand Detour, which is the source of the name of both the community of Grand Detour and the esker. The presence of the bend adds about five miles to the length of the Rock River. Extending across the neck of the horseshoe bend is a partially drift-filled, half-mile wide and 100 foot deep bedrock valley. The Grand Detour lies athwart the northeast end of this valley. Knappen (1926) suggested that this valley was the course of the Rock River before the Grand Detour Esker was formed. According to Knappen, when the ice under which the esker was formed left the area, the presence of the esker across the old valley blocked the Rock River and caused it to divert into the Grand Detour course. Although this idea is attractive, it may be that factors other than the presence of the esker are actually responsible for the Grand Detour. It is possible that the ice itself, rather than the esker it left, caused the diversion. A second possibility is that the Grand Detour is controlled by zones of weakness in the bedrock. The bedrock is locally deformed as part of the extensive LaSalle Anticlinal belt (Knappen, 1926).

The Grand Detour Esker was considered by Knappen (1926) to be Illinoian in age. However, a roadcut described by Frye et al, (1969, p. 34-35) in the flank of the esker as mapped by Knappen revealed both Esmond Till and Arygle (Altonian) Till beneath the esker. The esker is therefore no older than the Esmond Till.

WOODFORDIAN ESKERS (TISKILWA TILL)

An esker complex, the Wyanet Eskers, and a single-ridge esker, the Cortland Esker, comprise the known eskers on the Tiskilwa Till surface. A third esker, the Kaneland School Esker, which is located on the younger Malden Till surface, was probably also formed by the Tiskilwa glacier.

Wyanet Eskers (#9) The Wyanet Eskers consist of a complex of ridges located two miles southwest of Wyanet in Bureau County. MacClintock and Willi‹ (1959) mapped seven separate ridges, the longest of which is 2 1/2 miles in length. Relief reaches a maximum of 70 feet. The ridges are arrayed along two parallel trends which evidently represent two separate tunnel systems.

The Wyanet Eskers illustrate well the controll exerted on the position of eskers by subglacial topography. The eskers are located on the Bloomington Morainic System at a position where the system crosses the broad Princeton Bedrock Valley. The latter marks the pre-Woodfordian course of the Mississippi River (e.g., Willman and Fry, 1970). The moraines of the Bloomington System are draped across the valley such that their elevations are as much as 200 feet lower than they are immediately outside the valley. The Wyanet Eskers are clustered in this moranic sag. Presumably water from beneath the Bloomington ice flowed out through the lowest available spot, the sag. In the process ice tunnels -- and eventually eskers -- were formed. Significantly, the till in the sag is also atypical of the Tiskilwa Till: it is much more gravelly than is the norm, indicative of a great amount of water movement through the sag. Associated with the gravelly till are a number of kames and kettles, in addition to the eskers.

Cortland Esker (#10) Anderson (1964) mapped a 5 1/2 mile long esker located two miles northeast of Cortland in east-central DeKalb County and adjacent Kane County. This esker is herein named the Cortland Esker for its proximity to the community of that name.

The Cortland Esker consists of two segments. The broad, arcuate northwest section is 2 1/2 miles long and rises to heights of 60 feet above the adjacent till surface. The narrower and straight 2 mile long southeast segment is bordered by valley train outwash, from which it rises a maximum of 30 feet. The valley train deposits, which are younger than the esker, have partially buried and subdued the relief of this segment. The two segments are separated by a one-half mile wide gap evidently cut through the esker by outwash plain streams issuing from the south (Anderson, 1964, plate 1). Although the flow responsible for forming the esker was probably directed toward the northwest, the northwest segment of the esker is higher than the southeast segment by an average of 35 feet.

The till surrounding the northwest segment of the Cortland Esker is the Tiskilwa Till of Woodfordian age (Gross, 1970). The outwash which partially covers the southeast segment was deposited from the Malden glacier, also of Woodfordian age.

Kaneland School Esker (#11) The Kaneland School Esker is comprised of a linear train of kamic hills which extends from three miles southwest of Maple Park in east-central DeKalb County to north of Elburn in west-central Kane County. The kamic train has been mapped by Anderson (1964) in DeKalb County and by Gross (1969) and Block (1960) in Kane County. The name of the esker is derived from Kaneland High School, located one-half mile south of its middle portion.

The Kaneland School kamic train is probably an esker, although it has not been previously identified as such. Its eskerine origin if favored on the basis of both the linear alignment of the individual knolls and the bedding characteristics of the sand and gravel comprising the knolls. The latter consists of low-angle strata with gentle cross-bedding, quite atypical of normal kame deposits.

One of the apparent difficulties with interpreting the Kaneland School kamic train as an esker is that the trend of the train parallels the local moraines (Willman and Frye, 1970). The moraines mark the outer boundary of the Malden Till, which is the local surface till (Gross, 1969 and 1970). This relationship suggests a situation opposite to that normally witnessed with eskers, which tend to be aligned perpendicular to moraines. This difficulty has been resolved in a former exposure located immediately north of Kaneland School. The exposure showed a layer of Malden Till superimposed on the sand and gravel of the esker. The sand and gravel itself was faulted, suggesting that it had been shoved. Evidently the Kaneland School Esker was formed previous to the development of the Malden glacier, probably during the time of the Tiskilwa glacier. The Malden glacier later partially covered, but did not completely destroy the esker.

The individual knolls of the Kaneland School Esker may have formed in "rooms" separated by narrower passages of the overall ice tunnel. Some of the knoll development, however, may have resulted from differential scour as the Malden glacier passed over the esker. The latter hypothesis is favored by the observation that strata in the knolls appear to be erosionally truncated at the knoll margins.

WOODFORDIAN ESKERS (MALDEN TILL)

The Malden Till region contains three known eskers. Two of these, the Little Rock Creek and Covel Creek Eskers, are fairly indistinct. The third, however, is one of the largest and best developed of the eskers in northern Illinois. This is the famous Kaneville Esker.

Portions of the Malden Till region, particularly within eastern DeKalb, central Kane, and southern McHenry Counties, contains an unusually high density of kames (e.g., Anderson, 1964; Block, 1960; Ekblaw, 1964). It is possible that some of the features described as kames are actually parts of eskers.

Little Rock Esker (#12) The Little Rock Esker is a short, low ridge located among Little Rock Creek in southern DeKalb County. The esker was extensively described by Leverett (1899). Although the esker has little elevation, it stands out against the low-relief terrain of the immediate region. Leverett mentioned that the local residents referred to it as the "Devel's Backbone". The western end terminates in a sandy tract covering 80 acres. Leverett thought that this tract may represent a delta. The maximum report thickness of sand and gravel within the esker is 15 feet.

Kaneville Esker (#13) The Kaneville Esker is the best known of the eskers of Illinois. Major discussions of it have been given by Leverett (1899) and Lukert and Winters (1965).

The Kaneville Esker has a total length of about seven miles. It is divisable into three topographically distinct sections. The southeast section was originally composed of several small, somewhat elongate hillocks that rose 20 to 50 feet in height. Quarrying has been extensive in the southeast section with the result that little of the original form remains. The middle section consists of an elongate, irregularly crested ridge that is breached at several points. The ridge rises 40 to 70 feet above the adjacent plain, with increasing relief towards the northwest. The width ranges from 400 feet to more than 600 feet. The northwest section consists of a broad fan-shaped series of knolls which range from 50 to 70 feet in height. At their maximum they span a width of three-quarters of a mile. The northwest section was considered by Leverett (1899) and Leighton et al, (1931) to be a delta.

The materials of which the esker is composed are exposed in numerous quarries located in all three sections. The primary materials are sand and gravel. Dolomite clasts predominate. Locally deposits of silt and peat overlie the sand and gravel. These deposits apparently are fillings of depressions originally present on the esker.

Study of orientation of cobbles and direction of cross-bedding indicates that the flow of water responsible for forming the esker was directed toward the northwest (Lukert and Winters, 1965). This conclusion is reached in spite of the fact that the elevation of the esker increases in the same direction; the delta portion stands as much as 110 feet higher than the hillocks which comprise the southeast section. Apparently hydrostatic pressure was sufficient to drive the water up this slope (Lukert and Winters, 1965). Flow directed toward the northwest is also consistant with interpreting the northwest section as a delta.

Covel Creek Esker (#14) The Covel Creek Esker is located in LaSalle County about 5 miles south of Ottawa. It is a remarkably straight ridge about seven miles long and usually a little less than a quarter of a mile wide. Two gaps occur in the ridge, one near each end. The esker rises from 10 to 20 feet above the surrounding plain and is approximately symmetrical in shape. The crest is undulatory and rises in elevation from east to west through an elevation of about 40 feet. The eastern end of the esker is located on the Lake Ottawa plain, and the western end on the Farm Ridge ground moraine. The portion lying in the Lake Ottawa plain may have been covered at times by the waters of Lake Ottawa.

WOODFORDIAN ESKERS (YORKVILLE TILL)

Four eskers have been described from areas of the Yorkville Till. None of these are very long or topographically distinct. A discontinuous ridge which trends southwestward from near Central in Kendall County into north-central Grundy County may be a fifth Yorkville esker. This ridge was mapped by Culver (1923, Plate II) as "small hills of sand and gravel related to recessional stage of Marseilles ice." Ekblaw and Lamar (1964) also mapped it as either a kame trend or an esker. However, Willman and Payne (1943) and Willman (1970) considered the deposit to be a beach ridge which formed in the region at the margin of a post-Yorkville lake. The latter hypothesis is considered to be the more plausible interpretation. Another possible Yorkville esker consists of two elongate and aligned kamic hills located in western Will County (Sec. 4-5, T36N, R9E). The hills were mapped as kames by Fisher (1925), but their elongation suggests an eskerine origin.

Brookfield Esker (#15) The Brookfield Esker is a very short (1/5 mile) ridge located in Brookfield Township, LaSalle County. Although low and indistinct, the sand and gravel in it is at least 35 feet thick locally. The esker is located near the crest of the Marseilles Morainic System immediately south of the Illinois River Valley. Deep gullies which extend from the moraine into the valley have produced extensive local erosion. This erosion probably accounts for some of the indistinct topographic expression of the esker.

Wheatland Esker (#16) The Wheatland Esker was mapped and described by Fisher (1925). It is a short but conspicuous esker. Quarrying has extensively modified its original shape. The esker is located on the Minooka Moraine.

Naperville Esker (#17) The Naperville Esker has been mapped and described by Fisher (1925). It consists of a series of five ridge segments which extend over a distance of one mile. The relief is low and the width rarely more than 300 feet. The esker is located on the Minooka Ground Moraine.

Warrenville Esker (#18) The Warrenville Esker was originally mapped and described by Trowbridge (1912). Although short and possessing low-relief, the esker has a sharply defined sinuous crest. It is divided into three segments by short gaps. The esker is located on the ground moraine of the Minooka drift.

WOODFORDIAN ESKERS (WADSWORTH AND HAEGER TILLS)

The Wadsworth Till region contains nine probable eskers. All are comparatively short, although several are sharply expressed. The recognition of the less-well expressed eskers is in part a reflection of the degree to which detailed mapping has proceeded in the Wadsworth Till region.

The region of eastern McHenry County and western Lake County contains a large number of kamic hills (e.g., Anderson and Block, 1962). The local till in this region is the Haeger Till (Willman and Frye, 1970), which is at least in part contemporaneous with the Wadsworth Till. Some of these kamic hills may be parts of eskers. The most likely candidate is a ridge of sand and gravel located in the Wonder Lake - Bull Valley lowland in eastern McHenry County (Sec. 24-25, T45N, R7E). The ridge appears to be an erosional remnant of adjacent blanket sand and gravel deposits, and hence not an esker. How, ever, it is associated with some well-developed moulin kames and does possess the undulatory surface typical of an esker (IGS, Guide Leaflet 1952-D).

Orland Park Esker (#19) The Orland Park Esker is a mile long ridge of sand and gravel located at Orland Park in Cook County. Although Bretz (1943) mapped the feature as a ridge-form deposit, in his later work (Bretz, 1955) he did not apply the term esker to the ridge. A short (1/3 mile) sand and gravel ridge located one mile to the southwest of the main ridge may represent a continuation of the esker. Both ridges are located on the Westmont Moraine of the Valparaiso Morainic System (Willman and Frye, 1970).

Visitation Esker (#20) The visitation Esker is located immediately south of the Sag Channel Valley in southwestern Cook County. It is three-fourths of a mile long and sharply expressed, although not very high. The crest is typically undulatory and its trace sinuous. The esker is located on the Clarendon Moraine of the Valparaiso Morainic System (Willman and Frye,1970).

Hickory Hills Esker (#21) The Hickory Hills Esker is a two-thirds of a mile long ridge located in the community of Hickory Hills. As shown on the map of Bretz (1943), the ridge has a sinuous course and relief of up to 25 feet. It is located on the Tinley Moraine. Local relief is high and the esker has evidently suffered considerable erosional modification.

Tiedtville Esker (#22) Bretz (1943; 1955) mapped, named, and described a short esker located north of the Des Plaines River Valley in southwestern Cook County. As described by Bretz, this esker is only a little more than a half-mile long. However, it occurs within a train of elongate kamic hills which extend both to the north and west of the esker. The west end of the kamic train lies within DuPage County. In aggregate the kamic trend extends for a distance of more than four miles. It is possible that the entire train represents a single esker building episode. Relief on the esker and the kame train reaches a maximum of 25 feet. The location of the esker and kamic knolls along the top of the Des Plaines River bluff was cited as evidence for a pre-Valparaiso depression at the position of the valley by Bretz (1955). The esker and knolls are themselves of Valparaiso age.

Oak Brook Terrace Eskers (#23) Two short eskers located within the corporate limits of Oak Brook Terrace in east-central DuPage County have been mapped by Bretz (1943) and later described by Bretz (1955). The larger of the two is only 2500 feet long and has a maximum height of only 15 feet. However, it has a well-defined s-shaped crest trace. The shorter esker, which is located three-quarters of a mile southwest of the longer has a length of about 1800 feet and a relief not exceeding 20 feet. Its ridge-form is indistinct. It is possible that the two ridges are a part of a single esker separated into two segments by a non-depositional gap. The Oak Brook Terrace Eskers are located on the Valparaiso Moraine (Willman and Fry, 1970).

Itasca Esker (#24) A narrow ridge of sand and gravel mapped by Ekblaw and Lamar (1964) at Itasca in northwestern DuPage County is probably an esker. The ridge is located in the valley of Spring Brook at a gap in the Palatine Moraine of the Valparaiso Morainic System (Willman and Frye, 1970). Its length is 1 1/2 miles and maximum height 30 feet.

Winfield Esker (#25) The Winfield Esker is a short esker described by Trowbridge (1912). It lies in the valley or the West Branch of DuPage River one mile west of Winfield. Its maximum height is 30 feet and its width 100 feet. The esker is situated in a sag which crosses the West Chicago Moraine.

Halfday Esker (#25) A half-mile long ridge located at Halfday in southern Lake County has been identified as an esker (Bretz, 1943 and 1955). The ridge has a subdued relief which does not exceed 15 feet. It is located in an area of ground moraine behind the Tinley Moraine. The esker probably formed under the ice which deposited this moraine.

Island Lake Eskers (#27) Two short but well-defined ridges located to the north and east of Island Lake in western Lake County probably represent eskers. Although not mapped in detail, these ridges have the characteristic form of eskers. Gravel pits occur along the esker trend. A number of kamic hills occur nearby (Ekblaw and Lamar, 1964).

The longer of the two ridges extends for about 1 1/2 miles. The shorter ridge, which lies to the east of the longer, has a length of about one mile. If the two are considered as part of a single esker, the total length including the gap between the two is more than three miles. The highest part of the eskers occurs near the western end of the longer ridge. The eskers occur in the area of surficial Haeger Till.

CONSERVATION NOTE

The sand and gravel of which eskers are composed constitute a valuable mineral resource. As a result, many of the eskers of northern Illinois have been or presently are being extensively quarried. The end product of this quarrying is the destruction of the esker. As with other items of natural heritage, eskers are numerically limited. This realization and the attendant desire for at least a modicum of preservation of these features has spurred conservationists in many areas to protect eskers against destructive quarrying by the establishment of nature preserves, parks, and the like. None of the major eskers in Illinois have yet been so treated.

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Received for publication July, 1972.