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Author(s): T. F. Finch and M. Walsh

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DRUMLINS OF COUNTY CLARE

By T. F. FINCH and M. WALSH

National Soil Survey, An Foras Talúntais, Ireland

(Communicated by P. Ryan, M.R.I.A.)

PLATES XVIII-XX

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ABSTRACT

There are approximately 1,250 drumlins in Co. Clare. Their occurrence and orientation is largely controlled by topography. Many of the drumlins occur as ridges of glacial till elongated in the direction of ice-movement but with little or no development of the "classical" stoss end. Drumlins may be composed of tills of varying geological composition or of stratified drift material. This suggests either the mixing of till material before final deposition or the building of drumlins by successive applications of drift material.

Introduction

The present study of drumlins was undertaken during the course of the soil survey of Co. Clare (Finch 1972). There are approximately 1,250 drumlins and numerous other drumlin-like features in the county. The drumlins are usually about 500 to 600 metres long and one third as broad. Height normally varies from 5 to 30 metres. Only some drumlins possess the classical shape with a prominent stoss or steep end facing the source of ice movement (Pl. XVIII), while most occur as smooth ridges mainly composed of glacial till.

It was decided to apply the term "drumlin" in Co. Clare to drift or rock hills, within the above dimensions, which were elongated in the direction of ice-movement.

The drumlins generally occur in swarms or concentrations in the lowlands and in the valleys and are rarely found above 600 feet (200 metres approx.) O.D.

The formation and mode of formation of drumlins has given rise to widespread comment over the past fifty years. Although nothing has been published on the drumlins in Co. Clare, they have been mentioned by Farrington (1965) and by Synge and Stephens (1960). Linton (1963) ascribes the rock forms in Clare to ice moulding and mentions the drumlin fields. In Ireland, Wright (1912) has presented an account of the drumlin topography of Co. Donegal. More recently Vernon (1966) and Charlesworth (1967) have each dealt separately with drumlin directions in Co. Down. Hill (1971) has written on the composition and structure of drumlins in north Down and south Antrim.

On a world scale Grovenor (1953) has given a broad outline of drumlin formation prior to 1953 in his "Origin of Drumlins". Hoppe (1951) gives his opinion that the drumlins in north Sweden were laid down in caverns within the ice mass, but Wright (1957) argues from stone orientation studies that the drumlins were not formed by squeezing till upwards into crevasses. Lomke (1963) mentions that the drumlins in north Dakota are frequently stratified and may contain fluvio-glacial materials.

Drumlin Concentrations

There are four main drumlin concentrations in Co. Clare: (1) Crusheen, (2) Scarriff-Sixmilebridge, (3) Ogonnelloe-Limerick and (4) west Clare (Fig. 1).

A small concentration of drumlins and kame-like drumlins occurs in the Whitegate-Mountshannon area.

Very small drumlins occurring in groups of six to twelve are common in the Scarriff-Whitegate area and southwest of Slieve Elva. Composed of glacial till they can be referred to as mini-drumlins because of their small size, being generally less than 100 metres in length with other measurements in proportion.

CRUSHEEN

The Crusheen drumlin concentration occurs mainly in the lowlands in the centre of the county. It extends from the limestone lowland of Co. Galway in the north to the Shannon estuary in the south (Fig. 1).

Alignment varies from northeast-southwest around Crusheen, to almost due north-south, south of Ennis and east of Shannon Airport. The mountains and valleys of the northwest have a pronounced effect on drumlin alignment. The northeast-facing valleys in the Ballyvaughan (M 22.08)* area govern the direction of the drumlins within them, while at the mouths of the valleys and on the southern coastline of Galway Bay the drumlins are aligned almost east-west. Gleninagh mountain near Black Head apparently influenced the ice direction causing the drumlins on the nearby coast to be aligned northwest-southeast.

Drumlin alignment is generally controlled by pre-existing topographic features. Some drumlins occurring north and south of Doomore (M 32.02), however, are apparently unaffected by relatively minor pre-existing features.

The drumlins in the northern area and south of Ennis are smooth streamlined ridges with neither end higher or steeper than the other. Thus, there is no stoss end development here.

Drumlins between Ennis and Crusheen have a pronounced stoss end facing the source of ice-movement, but three drumlins south of Ballyallia Lough (R 34.80) provide exception with the stoss end at the lee side of the drumlin (Pl. XIX).

Some drumlins occurring against the leeward face of topographic obstacles display only the typical drumlin crest, flanks and tails. These drumlins

*National Grid Reference. Places not indicated on Fig. 1 are given Grid References.

resemble crag-and-tail features. One such drumlin occurs northwest of the settlement of Croagh (M 20.05), and another southwest of Turlough Hill (M 29.05).

Gullies, 1.5 to 2 metres deep, occur on some drumlins in the north. A drumlin, which lies against the steep slope of the southern edge of the Carron (R 34.98) depression, is deeply incised by gullies. These gullies result from the post-glacial erosion of steep drumlin slopes.

A rock-drumlin occurs near Ballycorick Bridge (R 28.65) on the western side of the Fergus estuary. This form was probably a rock ridge which was shaped by flowing and abrading ice.

SCARRIFF-SIXMILEBRIDGE

The Scarriff-Sixmilebridge drumlin concentration occurs in the limestone corridor between Scarriff and Tulla (R 49.80) and continues to Sixmilebridge where it merges with the Crusheen concentration (Fig. 1).

Drumlin alignment is east-west at Scarriff changing rapidly to northeast-southwest around Tulla and almost north-south around Sixmilebridge. North of Broadford are eleven drumlins aligned north-south at variance with the general northeast-southwest direction. These drumlins suggest an ice-flow into Glenomra.

The drumlins generally show a more classical outline than those of the Crusheen concentration. The stoss end is developed facing the source of ice-movement on many drumlins. Others, however, display no stoss end development and consist of ridges of drift of fairly uniform height.

OGONNELLOE-LIMERICK

The Ogonnelloe-Limerick drumlin concentration is bounded on the east by Lough Derg and the river Shannon and on the west by the Slieve Bernagh range (Fig. 1).

The concentration consists mainly of three groups of drumlins. One group occurs south of Ogonnelloe, another south of Killaloe and the third between Knockaphunta (R 55.69) and Limerick city. Five drumlins aligned eastwest to northeast-southwest lie to the west of the third group. These represent a division of the lower, drumlin forming ice into two divergent streams to the north of Woodcock Hill. The upper layers of the ice continued southward, apparently undivided, over the top of Woodcock Hill as is shown by the striae on its crest.

The three groups of drumlins are separated by ridges of higher ground (Fig. 1) and occur on the leeward side of these higher altitudes which lay in the path of the ice-flow. The significance of this is not fully understood, but the obstacles appear to have caused the formation of the drumlins by impeding ice flow.

The drumlins in this region generally consist of long ridges which do not display stoss ends.

WEST CLARE

The west Clare drumlin concentration stretches in a broad belt from Corofin westwards to the coast. (Fig. 1).

Drumlin alignment is generally northeast-southwest. It parallels the trend of the contours in the narrow Corofin-Kilfenora-Liscannor lowland. The obstacles of Slievecurry and Slieve Callan caused some of the nearby drumlins in the Inagh (R 20.81) – Connolly (R 20.76) area, to be aligned from northeast-southwest to east-west. The drumlins here are circular and hence wider in proportion than those in the rest of the concentration. The particular shape probably results from ice movement being slowed down by Slievecurry and Slieve Callan.

Most of the drumlins in this region are relatively narrow streamlined ridges and do not have distinct ends.

A few drumlins, completely or in part composed of rock, occur in the shale lands north of Lisdoonvarna.

OTHER CONCENTRATIONS

A concentration of drumlins and kame-like drumlins occurs in the neighbourhood of Whitegate and Mountshannon (Fig. 1). Two main directions of alignment, north-south and east-west, are evident. Drumlins and kame-like drumlins with east-west alignment also occur north of Scarriff. Drumlins with north-south alignment are mainly evident along the shore of Lough Derg; but two drumlins with east-west alignment occur among them, east of Mountshannon. This situation suggests that ice which deposits and shapes drumlins in one direction may, coming from a different direction, deposit and shape drumlins almost at right angles to the previously existing drumlins, without greatly altering the shape of the latter.

A similar situation with drumlins aligned almost at right angles to each other occurs in the valley (R 57.89) south of Lough Graney. This was probably caused by an ice-sheet flowing southwestwards from the Slieve Aughtys across Graney valley and Maghera mountain (R 52.91) and forming drumlins in a transverse position in the valley. On waning, the ice-sheet may have become a valley glacier which flowed southeastwards and thus formed drumlins in the Graney valley at right-angles to those already existing.

Glacial features, composed of till, which are generally smaller than the drumlins but are elongated in the direction of ice movement occur in groups of six to twelve. They are especially prevalent in the Scarriff-Whitegate area of the northeast, and southeast of Slieve Elva in the northwest of the county. (Earlier in this discussion these have been dubbed "mini-drumlins".)

Drumlins, aligned northwest-southeast, at the foot of the northern slopes of Gleninagh mountain appear to indicate an ice-movement at variance with the general ice-movement as indicated by the drumlins aligned northeast-southwest, at the foot of the western slopes of the same mountain. Thus, it appears that the lower ice was directed northwestwards along the northern slopes of Gleninagh mountain which are ice scoured and polished. The upper ice continued southwestwards over the mountain. Farrington described a similar situation in Bantry Bay, Co. Cork (Farrington 1936).

Drumlin Composition

Intensive soil survey in several areas in Co. Clare has revealed that many till drumlins carry more than one soil type, and that this is a reflection of the fact that the till of the drumlin is of varying composition. Either the englacial content of the ice stream varied with time and the drumlin was built up intermittently, or else the englacial material varied from one part of the ice stream to another. Ice from various sources may have been united into a combined stream. Other drumlins are clearly stratified such as that at Tulla (M 36.02) crossroads in the Burren (Pl. XX). The latter consists of three distinct layers—relatively boulder-free till at the base sharply demarcated from an overlying layer of extremely bouldery drift which is capped by a layer of stoney till. It appears that this drumlin may have been built in at least three stages (Pl. XIX).

Drumlins near Leamanegh Castle, east of Kilfenora, are examples of the variability of composition of the till (Fig. 2). The drumlins overlie shale bedrock and the majority of the till comprising them is derived from this

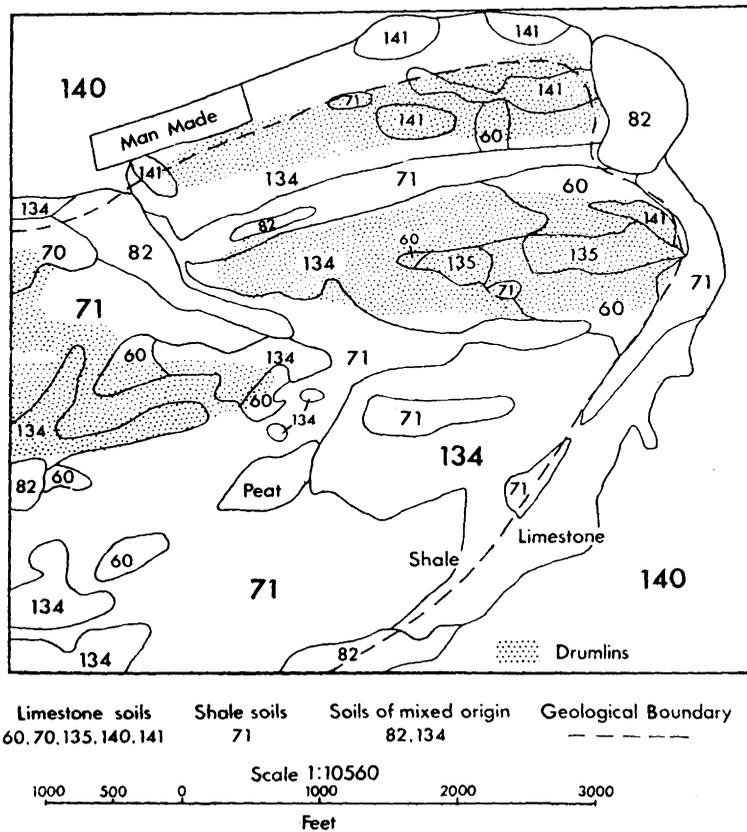


FIG. 2—Soil map of drumlin area east and south of Laemanegh Castle, near Kilfenora, Co. Clare. Soil numbers are those used in the Soil Survey of Co. Clare (Finch 1972).

source. Both extremities of the long axis of the drumlins including the summits at one extremity are, however, occupied by limestone till. Thus the shale till appears to be sandwiched between two deposits of limestone till (Table I).

TABLE I—Stone counts of materials from base of soil pits 4ft deep
(% of total count)

	Limestone	Shale	Sandstone	Chert/Quartz
Limestone till on drumlin summit	93	4	4	1
Mixed limestone, shale till on drumlin flank 20 metres south of first pit	51	39	—	10

Drumlins comprised of varying tills also occur near O'Brien's Big Lough (R 40.82) northeast of Ennis. They occur within the Carboniferous limestone area about a mile from the boundary with the Old Red Sandstone series.

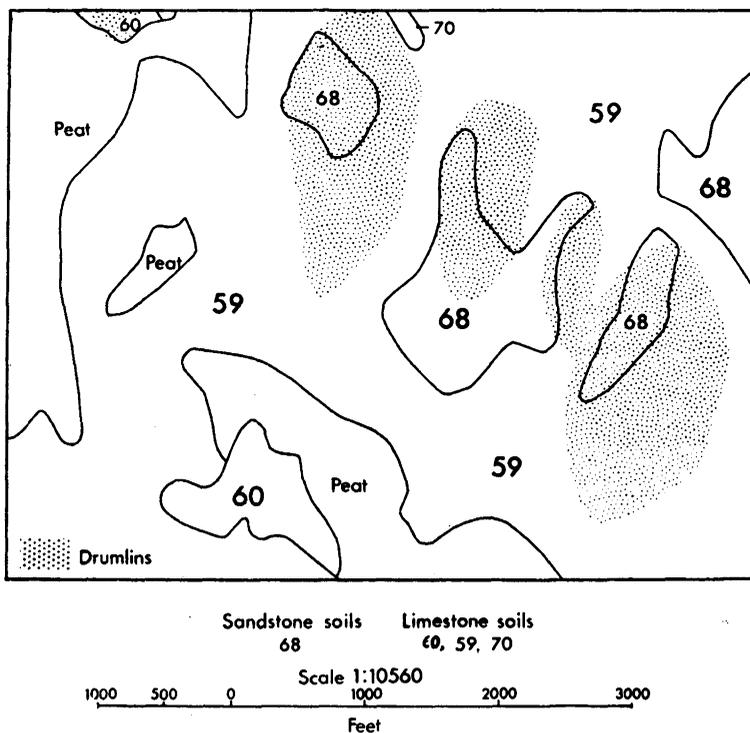


FIG. 3—Soil map of drumlins east of O'Brien's Big Lough, Co. Clare. Soil numbers are those used in the Soil Survey of Co. Clare (Finch 1972).

Detailed soil survey has shown a carry-over, extending from one third to one half-mile, of till (composed dominantly of sandstone), from the Old Red Sandstone on to the limestone area. Further away from the Old Red Sandstone area the dominantly sandstone till occurs only as isolated patches in the dominantly limestone till. Gleyed Old Red Sandstone till occurs on the summit and western flank of each of the four drumlins near O'Brien's Big Lough (Fig. 3). Moderately well-drained limestone till, however, forms the bigger proportion of each of the drumlins. The Old Red Sandstone till often continues from the drumlin into interdrumlin areas.

Although many drumlins, including those of heterogenous till composition and of stratified till, may have resulted from one deposition process, the nature of the latter drumlins also suggest that they may have been built by successive applications of till either from the same or from different sources.

The first deposit of till may have acted as a nucleus for other deposits resulting in the gradual building of drumlins. The small, kame-like drumlins in the Scarriff-Whitegate area may represent the beginning stages of such drumlin formation.

The majority of the drumlins are composed of till of uniform composition but a few are composed in part or completely of rock. The rock-drumlins of Co. Clare occur exclusively on Carboniferous shales.

Drumlin Occurrence and Nature of Bedrock

Few drumlins occur on the massive bedded limestone of the Burren area but they are abundant on the adjoining Upper Carboniferous Shales. Drumlins are plentiful, however, in limestone valleys which were covered by great depths of ice and over the Old Red Sandstone. They are generally scarce over the Silurian shales (Table II).

The predominance of drumlins on the Upper Carboniferous Shales may be due to their more easily weathered, fissile structure and to the heavier texture of the glacial till which is derived from them.

TABLE II—Occurrence of drumlins and nature of bedrock

Occurrence	Bedrock	Nature of Bedrock
Frequent	Upper Carboniferous Shale and Sandstone	Soft, easily weathered
Frequent	Devonian Old Red Sandstone	Hard, with many joint and bedding planes
Common	Silurian Shale	Fissile, resistant to mechanical weathering
Few (common in deeper valleys)	Carboniferous Limestone	Massive, resistant to mechanical weathering

Conclusion

Drumlins are numerous in Co. Clare and generally occur in well-defined concentrations in the lowlands. They may, exceptionally, be found above the 600ft contour. One example occurs between 700 and 800 ft contour at Balliny on the western slopes of Slieve Elva.

Some drumlins exhibit the classical drumlin shape with a prominent stoss end facing the source of ice movement. The majority of the drumlins, however, exhibit no prominent stoss end and appear as long smooth ridges. Other drumlins are somewhat circular but slightly elongated in the direction of ice movement (Chorley 1959).

In general drumlin alignment strongly suggests that the movement of the ice, up to a thickness of about 1,000ft, was largely controlled by topography, at least in the late Weichsel drumlin-forming glaciation.

Apart from a very few rock-drumlins the majority are composed of glacial till of uniform geological composition. Some drumlins, however, are composed of varying layers of till and of tills of varying geological composition. It is suggested that layered drumlins may have been formed by intermittent deposits of till over a period of time and some other drumlins may also have developed in separate stages.

The distribution of drumlins indicates an obvious concentration of drumlin formation in the Upper Carboniferous Shale area. These shales are the most easily weathered rocks in the county and produce the heaviest-textured glacial tills.

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Drumlin landscape north of Slieve Bernagh near Bodyke.



Stoss end at southern end of drumlins south of Ballyallia Lough.



Stratification in drumlin cross-section at Tulla Crossroads, northwest Clare.