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Feulner, while mapping the bedrock of Clayton county during the summer of 1951, observed numerous large chert erratics scattered over the landscape west of Strawberry Point. These erratics lie near the edge of the Iowan drift plain just south of the north-facing Niagaran escarpment, which is formed by the erosion of Silurian rocks. (See Figure 1)

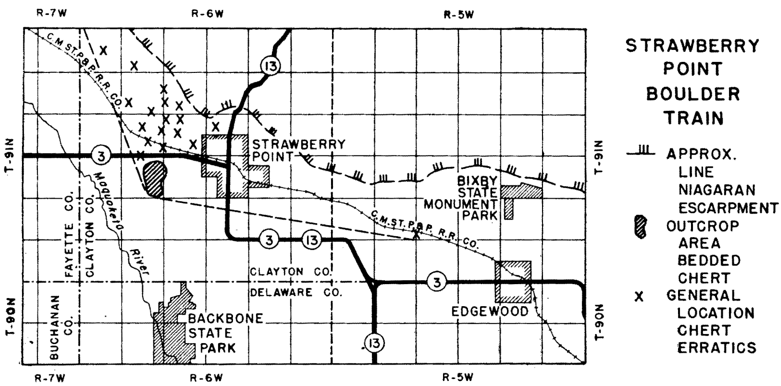

Figure 1. Location of the Strawberry Point boulder train.

The chert in the erratics is generally gray-white in appearance but occasionally a dull pink and brown. The beds are between six and 18 inches thick and, as interpreted from the largest erratics, must occur in stratigraphic units up to four feet in thickness. Many of the erratics are made from a cemented chert breccia, the fragments of which average about an inch in size. Several of the largest erratics are decidedly tabular in shape, the longest dimension of the blocks being parallel to the bedding. The average size of these boulders is about three feet in their longest dimension with the largest ones measured 12 to 15 feet long. On the exposed sur-

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faces of many of the undisturbed boulders considerable wind polish and faint fluting can be seen. Many of these erratics have been moved into fence corners and some have been tipped at different angles, perhaps by frost heaving or by man.

Prior to August, 1955, no massive chert units were known, within a reasonable distance, that could have served as a source of these erratics. Local bedrock in the area underlying the erratics was mapped by Leonard (1905) as Silurian and Feulner (1952) as Alexandrian and Niagaran undifferentiated. Upper Silurian stratigraphy in this section of Iowa includes two units: the Kankakee formation (Alexandrian) below and the Gower-Hopkinton formations (Niagaran) above. Current usage of the Iowa Geological Survey is to designate the yellow or buff dolomite with interbedded chert bands as Kankakee. This chert makes up nearly 40 per cent of the Kankakee but occurs only in thin, discontinuous stringers and nodules. The overlying Hopkinton formation, also a buff dolomite, contains only very small amounts of chert and generally is separated from the Kankakee on the absence of bedded chert, both in the field and on the basis of well-cuttings.

Subsurface identification based on well-cuttings from two wells in Strawberry Point and other wells in Edgewood and Arlington in nearby Fayette county show the bedrock as Kankakee cherty dolomite. Red giest, characteristic of deeply weathered Kankakee was found on several outcrops south of Strawberry Point. No massive chert of the thickness necessary to furnish the erratics has been described from Clayton or adjoining counties (Calvin, 1897 & 1897a; Savage, 1904; Leonard, 1905).

An intensive search was made of known outcrops and quarries, including the good exposures in Backbone State Park, but no chert beds more than three inches thick were found. But finally three general outcrop areas of massive chert, all within the eastern half of Section 20, T91N, R6W, were found. The best exposures can be seen in the sloping banks of a small valley which runs westward just about in the middle of the half-section. Glacially polished outcrops of chert were found in the barnyard of a farm located on Highway 3 in the north part of the half-section and on top of a small knoll east of the farm buildings in the south center of the half-section. (See Figure 1)

Further searching in the vicinity of these outcrops revealed numerous exposures of thin-bedded dolomite without the intermixed chert or the giest which are characteristic of the Kankakee. A quarry in the southeast quarter of Section 18 exposed about 40 feet of Hopkinton dolomite (Feulner, 1952, p. 59). This quarry, the outcrops of massive chert and the small outcrops of dolomite all lie at elevations too high in this vicinity to be Kankakee. The top of the Kankakee in the Strawberry Point well, below 130 feet of drift, is at an elevation of 1,090 feet. At Arlington, in the town well, the top of the Kankakee dolomite is at 1,060 feet below about 90 feet of drift. No Hopkinton appears in either of these wells. The massive chert outcrops and the exposures of thin dolomite have an elevation of 1,210 to 1,220 feet and the top of the dolomite in the quarry is 1,145 feet (Feulner, 1952, p. 135). These relationships allow room for an erosional outlier of the Hopkinton dolomite to lie on top of the Kankakee in this area. Apparently this remnant has been cut off by the Niagaran escarpment on the north and the valley of the Maquoketa River on the south and west. (See also Feulner, 1952, Figure 5)

This general area, Sections 18, 17 and 20, underlies the topographic crest between the cuesta edge and the river valley. Since the regional dip is very slightly southwestward here, these resistant chert beds probably hold up the top of the bedrock high.

The locations of the distinctive chert erratics in relation to their source area show a boulder train pattern when plotted on a map. Their present positions fall within a fan-shaped area lying north, northeast and east of the source outcrops. Such a train is an excellent indication of the local direction of movement of the Iowan glacier (Flint, 1947, p. 119). (See Figure 1)

The postulated Iowan drift border in this vicinity runs generally along the Niagaran escarpment (Leonard, 1905; Alden and Leighton, 1915; Kay, 1943; Feulner, 1952). In this vicinity the ice border tends in a direction parallel to the over all direction of ice movement. However, one would not expect ice to be flowing generally southeastward here in the marginal zone but rather at right angles to the ice margin, or in this case, northeastward. The Strawberry Point boulder train illustrates this situation in that the erratics are scattered mainly in a northeast by north direction. A few have been carried slightly west of north. One found in Section 29 of Lodomillo township had been carried in a direction slightly south of east from the source area nearly to the town of Edgewood.

In comparison with other boulder trains described by Flint (1947, pp. 118-120), this one is extremely wide for the short distance that the boulders have been carried. Three explanations for this may be offered. The direction of movement of the Iowan ice may certainly have changed this much here in the marginal areas and with minor advances and retreats the flow patterns would be considerably altered. Another possible explanation for the width of the boulder train might be that the source area is much larger than we have suggested, extending eastward under the drift. The chert may extend a mile or two along the direction of the strike, parallel to the Niagaran escarpment. If this were the case, the general direction of movement would most probably be northeastward. Doubts have been expressed that the Niagaran escarpment actually represents the terminus of the Iowan glacier in this part of Iowa. If the ice did pass down over the cuesta into the more dissected lowlands to the northeast, subsequent erosion probably removed most of the Iowan drift. This would explain the absence of typical Iowan erratics beyond the escarpment.

Scattered among the prominent chert erratics are numerous granite boulders typical of Iowan drift. Since the nearest known source for granite erratics within the area covered by Iowan ice is in central Minnesota, erratics with very local origins are intermixed with those from quite distant sources.

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