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A drive around Pictland: wheeled transport on Pictish carved stones

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ABSTRACT

A damaged carving of a two-wheeled horse-drawn vehicle appears on the Pictish cross-slab from Skinnet Chapel, Halkirk, Caithness (Skinnet 1). In this paper the vehicle's original design is partly re-created, with details of the pair of horses yoked to it. The slab, now in Thurso Museum, was surveyed in 2015 and 2017 by the use of RTI (Reflectance Transformation Imaging), a computer-based enhancement process. Resulting augmentation of surface relief in the processed images allows multiple overlays to be drawn/traced from various light vectors to create a composite final image. The restored components of the vehicle – cart or chariot – are discussed, with relevance to its possible role. Atypical physical features carved on the facing horse of the horse pair may hint at some ceremonial motive for their presence. After a short survey of known evidence for Pictish vehicles, direct derivation of design from antecedent archaeological finds of Iron Age chariots are assessed as unlikely due to the wide time gap. Possible construction influence (in both cultural directions) from wheels found in Scottish Roman sites is noted. The common format of wheels and vehicles on the Skinnet 1 stone and Irish High Cross illustrations of 'chariots' are described and mapped, with the appearance of the latter in early medieval times attributed to Pictish traditions of cartwrighting.

CURRENT EVIDENCE FOR PICTISH WHEELED VEHICLES

THE SKINNET CHAPEL 1 TWO-WHEELED VEHICLE

The sole 'hard' evidence for driving[1] in Pictish times is a damaged carving in low relief on the Pictish cross-slab from Skinnet Chapel, Halkirk (Canmore ID 318992: 'Skinnet 1'), which is now in Caithness Horizons Museum in Thurso.

The presence of at least one horse on the stone has been known since 1903, from the date of original publication of *The Early Christian Monuments of Scotland* (reprinted 1993), vol 2: 32, fig 29 (*ECMS*). A pair of horses was later detected, and traces of both the near wheel and the driver (Illus 6: Canmore ID 318992, drawing by John Borland). The outfit is treated in detail below.

PREVIOUS EVIDENCE FOR DRIVING IN PICTLAND[2]

ARCHAEOLOGICAL REMAINS

There are no remains known to us of any horse-drawn vehicles or significant fittings datable to Pictish times; that is, approximately between AD 400 and AD 850. But evidence for Pictish driving has come through to us at intriguingly different levels of information.

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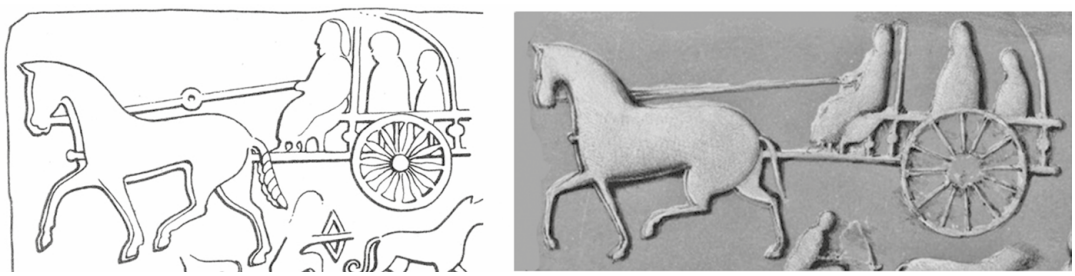
THE NEWTYLE 'CAIRT'

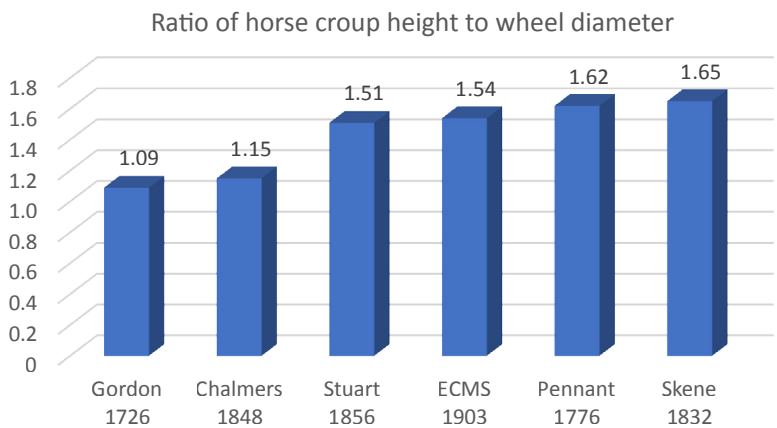
A vehicle was described in the 16th century by Henry Sinclair, Dean of Glasgow.[3] Carvings on a 'stain' from 'Newtylde' (likely Newtyle, near Meigle, Angus) included a cross by a 'goddes' in a two-horse cart, horsemen, men on foot, dogs, hawks and snakes. On the west side was another cross. Unfortunately there are no illustrations and the stone itself is missing.

THE MEIGLE 10 ARCHITECTURAL PANEL

More recent information comes from 18th- and 19th-century authors, with illustrations, two of which are shown in Illus 1. First documented from 1726, the stone is now untraceable (Canmore ID 30839). In works by various authors of this period a two-wheeled horse-drawn vehicle is shown topped with a curved canopy. It is unknown which of the authors' pictures of this lost stone are more accurate than the others, if at all. To gauge the variation, Illus 2 calculates the



Illus 1 Two versions of the (lost) panel Meigle 10. Left: line drawing in *ECMS* vol 2: 331, fig 344, probably a composite of the illustrations in Stuart (1856) and Chalmers (1848). Right: the Meigle 10 panel in Chalmers (1848). Note the different sizes of the wheel, the different total lengths of pole and carriage, and the end of the pole projecting in front of the horses' chests. (Image by Catriona and Duncan McArdle)



Illus 2 Comparative wheel sizes: Meigle 10. The chart measures the height of the near horse's croup versus the wheel diameter, calculated as a ratio. Sources as shown. As the wheel size is depicted as smaller than the croup height, the column number in the chart increases. If both croup height and wheel were shown as the same size, the ratio would read 1.0; that is, 1:1, so Gordon's wheel is illustrated as much larger than the relatively small wheel in Skene. (Image by Catriona and Duncan McArdle)

wheel diameter proportionate to the near horse's croup height.

The various illustrators may either have been drawing from life (one at least was)[4] or working from the authors' sketches as a primary source, so the variation shown in the chart must be taken with caution about any conclusions of scale calculated from one preferred version over another.

In the earliest and most sketchy engraving (Gordon 1726 reproduced in Canmore ID 30839, illustration 2, 2) the wheel is shown with eight straight-sided spokes; in all other illustrations 12 spokes are present. In Stuart (1856) the spokes are shown as swelling at the centre; in other authors they are straight-sided. The *ECMS* line drawing (Illus 1) follows Stuart's version. Until the stone is rediscovered the tapered-spoke issue cannot be settled, but see below regarding the wheel finds at Roman sites.

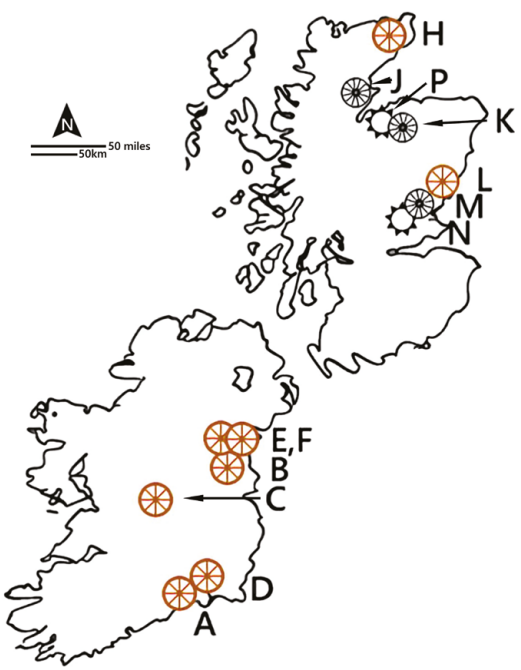
In details of the vehicle body the book plates differ. Side spindles support a horizontal rail, similar to the modern 'spring cart'. In the later three publications these vertical side-rails are shown with knobs at the centre; they are plain in the earlier authors.

Three out of six authors show a ring or similar object part-way along the reins. If a terret (a sub-circular ring fastened to the harness to guide the reins), its position is puzzling, as in use it should be placed over the horses' withers. In both Stuart (1856) and Pennant (1776) the object is over the horses' loins, which may be carver inaccuracy, but rings part-way along reins occur also in Pictish ridden harness, on the Inchbraoch 1 (Canmore ID 36230) and St Madoes (Canmore ID 28201) slabs and the St Andrews sarcophagus or shrine (Canmore ID 319320). The double rings on the last two slabs can be identified as a sliding/locking device, which might be termed a 'Pictish martingale' as the feature seems to be unknown from elsewhere, to control the horse's action, but as this system requires double reins at the driver's hands it becomes unwieldy and of doubtful function with a pair of driving horses (McArdle & McArdle in preparation). A terret, badly placed, seems the only explanation.

The tip of a pole projects forward from the horses' chests (Illus 1), the normal position when connected to a collar, but not when attached to a yoke. As neither yoke nor collar can be detected in any of the illustrations, the position of the pole cannot be explained.

THE BALLINDALLOCH VEHICLE

In 1829 a likely vehicle burial was uncovered 'about a mile from Ballindalloch' in Moray (Illus 3). The finds are described by Daniel Wilson (1863: 153ff). He only illustrates an iron shield boss (ibid, fig 124), for which Hunter (in Carter et al 2010: 57) draws parallels with Germanic Iron Age examples, thus late, possibly post-Iron Age, in date. Wilson (1863: 154–5), like Proudfoot &



Illus 3 Distribution of early medieval illustrations of wheels/wheeled vehicles/vehicle burial. Irish crosses – A: Ahenny; B: Kells; C: Clonmacnois; D: Killamery; E, F: Monasterboice. Pictish slabs – H: Skinnet 1; J: Ardjachie; P: Ballindalloch; K: Knockando; L: Kinblethmont; M: Meigle 10; N: Newtyle. Symbols: brown wheel = eight spokes; black wheel = twelve spokes; black open starred circle = wheels with no spoke details. (Map by Catriona and Duncan McArdle)

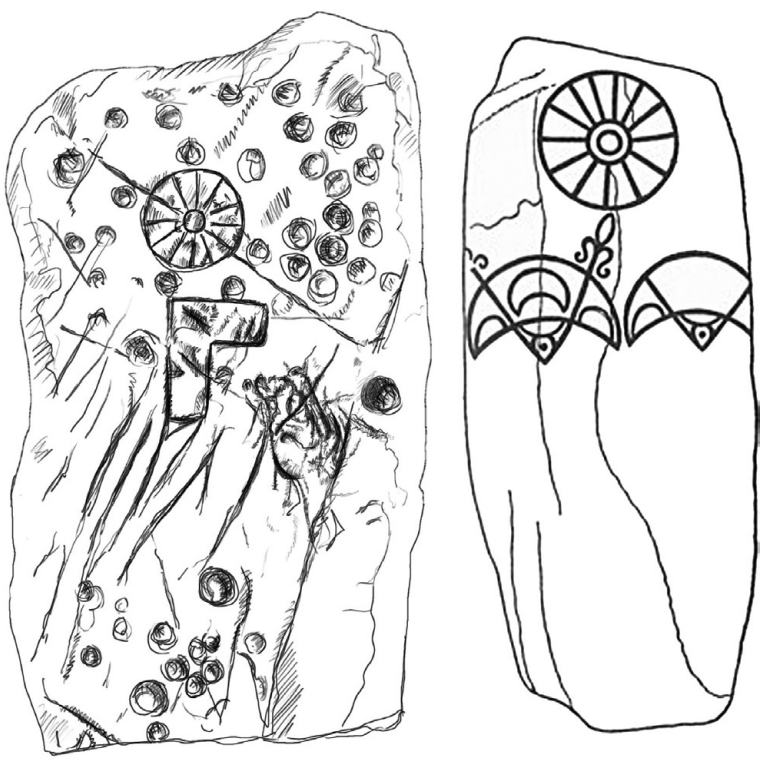
Aliaga-Kelly (1996: 3–4, referred to in Hunter ibid), suggests an Anglo-Saxon appearance for the boss, implying an early medieval date. Other finds were a human skeleton, the skull and bones of a horse, a bridle bit of iron and bronze, bronze rings (possibly terrets) and fragmentary wooden iron-tyred wheels ('bits of iron, one of them like a great hoop': Wilson 1863: 154). Hunter doubts an early medieval date due to the negative evidence of no other known Pictish vehicle burials, but concedes the iconographic evidence for wheeled transport at the time.

LOOSE WHEELS

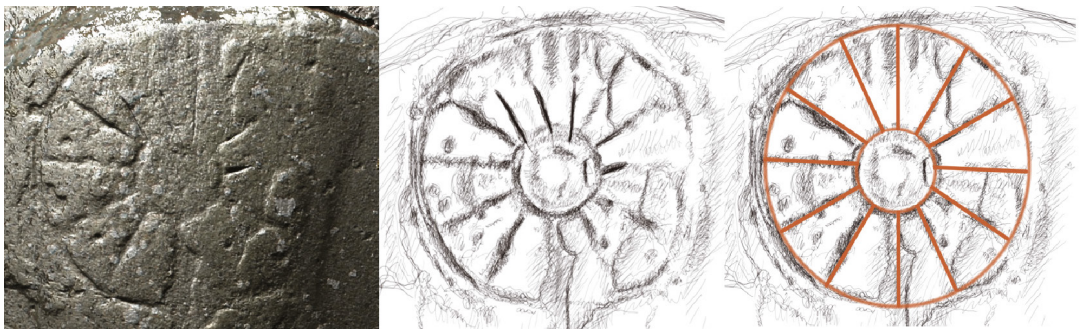
To supplement the above evidence for Pictish wheeled vehicles, three carvings on Pictish carved stones can be reassessed. The descriptions of the carvings are:

(1) 'a "wheel"-like disc with central hub and twelve spokes' (Canmore ID 14736): Class I stone at Ardjachie (Illus 4, left).[5]
(2) 'a rayed disc symbol … a circle with a smaller concentric circle in the centre, the intermediate space being ornamented with radial lines' (Canmore ID 16043): the stone at Knockando 1 (Illus 4, right and Illus 5).[6]
(3) A 'wheel design' on the stone from Kinblethmont (Canmore ID 35444). This shakily incised wheel appears to be a secondary addition on the edge, with an irregular arrangement of eight spokes, so its reliability is doubtful.

We interpret these first two carvings as wheels, whether 'symbols' or not.[7]



Illus 4 Ardjachie and Knockando 1 wheels. Left: stone from Ardjachie, Tain Museum. Right: stone from Knockando 1, Moray, after *ECMS* vol 2: 127, fig 132; with incorrect 13 spokes (see Illus 5). (RTI scan by Catriona and Duncan McArdle, 2021)



Illus 5 Wheel from Knockando 1, Moray. Left: lit from single vector. Centre: 11 outline overlays, stone surface removed – note the hard-edged grooves of the secondary engraving. Right: brown overlay of original 12 spokes and wheel rim, secondary engraving removed. (RTI scan by Catriona and Duncan McArdle, 2021)

THE SKINNET CHAPEL, HALKIRK, CROSS-SLAB (SKINNET 1), THURSO MUSEUM (ILLUS 6)

Allen (*ECMS* vol 2: 31) describes the finding of the slab in 1861 in a seemingly complete state partly embedded in the west-end wall of St Thomas's Chapel. Between then and its removal to Thurso Museum, where he saw it in 1890, the sandstone slab had been broken into several pieces, with other fragments lost, but it is now reassembled with all four faces open to view.

On the front of the slab a pair of curly-tailed *hippocamps*/seahorses[8] are intertwined with the cross, below which, full width, is the horse team and vehicle. On the back, below an interlaced cross, the originally scroll-filled triple-oval Pictish symbol sits above a decorated crescent-and-V-rod. Traces of two standing human figures and vertical animal bodies appear either side of the cross.

THE RTI SURVEY RESULTS

Two visits to the stone in Thurso were made, in 2015 and 2017, as part of a Pictish equestrianism survey (McArdle & McArdle in preparation), to carry out RTI sessions on the horse and vehicle. Using some 100-plus flash scans each time, results appear sequentially in the graphics below (Illus 7, 8 & 9).[9]

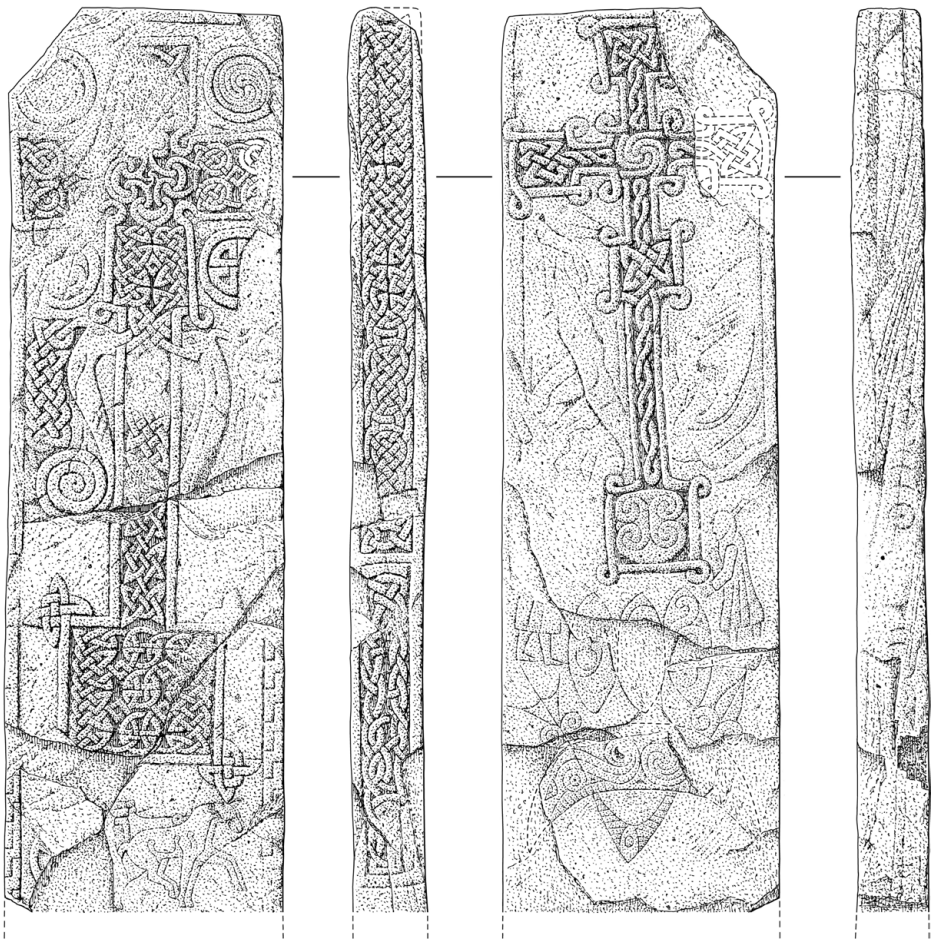
There are several cup marks, two or three with rings, on and around the horses. The largest is above the horses' withers.

The lower legs of a human figure are identifiable, from mid-thigh to feet, knees bent, the feet placed on the near horse's rump. The sleeved forearms of the driver are resting on the apparently trousered bent knees with the fists holding an incised single rein. The driver's body is missing, but projecting the thighs rearward dictates that the driver is sitting at a level well above the horses' backs.

From the clenched hands the single curved line of the rein(s) passes through the cup-and-ring above the horse's withers. Splitting to double, the nearer rein is traceable alongside the near horse's neck. A small cup-and-ring is on the neck but as the rein does not pass through this it is presumably not a harness ring.

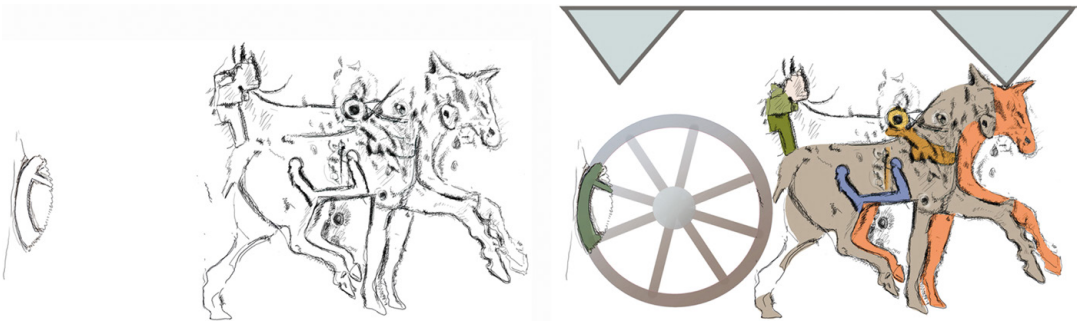
The inner, loose end of the rein is shown as curling below the driver's fists, with the remains of a whip stock projecting upwards from the hands.

The near horse. The animal has a high head carriage, but nearly all of its head and throat are missing; its nose, showing a nostril, remains. The gait is trotting, the extended front left leg leading, with a projection or lump carved on the horse's front left knee, a deliberate feature and not the result of damage to or intrusion in the stone. Further down the same leg a swelling

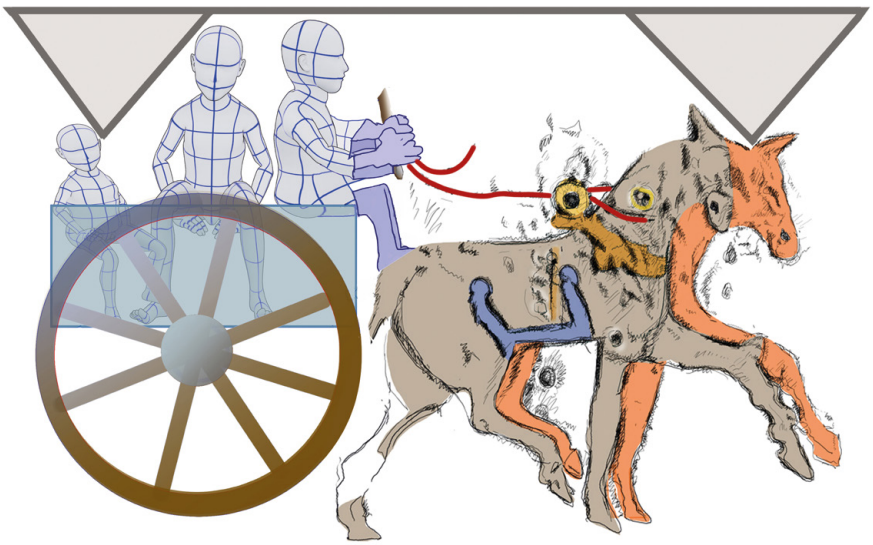


Illus 6 Pictish slab from the Skinnet Chapel, Halkirk, Caithness (Skinnet 1). (Drawing by John Borland, Canmore SC-1359074 © Crown Copyright: HES)

Illus 7 Skinnet 1 cross-slab. Left: RTI computer image, light from a single vector. Right: outline overlays tracing all surface relief, drawn from 11 different light vectors. (RTI scan by Catriona and Duncan McArdle, 2021)



Illus 8 Skinnet 1 cross-slab, salient features. Left: Extraneous surface relief and damage removed. Right: The same with (restored) wheel in place, our colours added. Green: remaining wheel rim and spokes; olive: driver's clothing; pink: driver's hands; mid-brown: harness and girth; blue: body scroll; gold: terret; grey: schematic outline of the base of the cross. (Image by Catriona and Duncan McArdle)



Illus 9 Skinnet 1 cross-slab, the vehicle restored. Hypothetical estimate of the size of the vehicle and occupants (pale blue wire-frame), whose bodily scale is based on the proportions of the driver's remains (mid-blue). Other colours – greenish-blue: vehicle body; red: reins; purple/blue: body scrolls; brown: neck harness and girth; gold: terret. (Image by Catriona and Duncan McArdle)

on the cannon bone shows clearly on the scans. A double engraved scroll is incised on the horse's side; its tail has been broken at mid-haunch.

The far horse is mostly hidden, apart from its outline. Its head and front of neck are in view with its sharp ear pricked forward. The straight profile of its head, including some forelock, is visible down to its rounded muzzle but with little surface detail remaining.

Clear signs of a neck/shoulder harness remain.[10] From the Skinnet 1 front horse's withers a low-relief moulding angles towards its lower neck, with several curved lobes attached to its left edge, possibly decorated harness or the end padding of a yoke. Continuing from the lower end of this moulding a diffuse, apparently padded or woven, strip runs towards the upper chest/lower neck of the horse, with the trace of

a similar neck band, for that is what it seems to be, also detectable on what little area of the rear horse's neck is on view. From this an engraved line parallel to the horse's chest profile may indicate a strap to join the neck harness with the girth, passing between the horse's front legs. To the left side of the withers, partly obscured by the scroll, an engraved line indicates the back edge of a girth. Abutting its rear edge are indistinct heavily weathered traces of three regularly spaced lobes or sub-circles, which suggest either scalloped-edged harness or perhaps painted or clipped body decoration.

We infer that the cup-and-ring above the horses' withers is the carver's schematic depiction of a terret. These objects rarely occur in datable contexts, distributed mainly in the north-east of Scotland and particularly Aberdeenshire (Kilbride-Jones 1935: 449, fig 2). Continental and Roman models are suggested as inspiration for local craft production ('Donside terrets') dating into post-Roman times (Laing & Laing 1986: 212). A Donside terret design on the Class I Pictish stone from Walton, Fife (Thomas 1961: 39, plate II) brings the use into our orbit. Another bronze terret found near Rhynie, Aberdeenshire (Canmore ID 18571) was part of a hoard containing a knobbed spear-butt. These spear butts 'were in use from the third to fifth or sixth centuries AD' (Hall et al 2020: 12). Although of no definable type, identification of the Skinnet carving as a terret is hardly in question.

Above the terret there is a roughly semi-circular spread of indistinct shallow engraved lines, sited where there might originally have been decorative plumes, supported from the terret(s) by means of holes in the top or from side loops holding metal wires. These occur on, respectively, the terret from Shellagreen and another with small side-ring from Rhynie (both in Aberdeenshire; see Ralston & Inglis 1984: 41–2). Such decoration is mooted by Hunter (in Carter et al 2010: 53) on the terrets for the very much earlier Newbridge chariot.

Breakage of the stone has removed all trace of the vehicle's body behind the rear end of the horse team.

In the bottom left corner of the stone, the curvature of the remaining piece of the wheel rim allows reconstruction by graphically overlaying circles of varying sizes to align with the curves of the rim, a familiar technique with broken pottery. The inside and outside faces of the wheel rim are not exactly parallel and when projected into circles, give different centres slightly offset from each other. This does not affect the estimate of the wheel's size, and is corrected by using projections from the two fragmentary spokes (see below).

This restored wheel rim can now be overlaid onto the whole outfit (Illus 8) and its diameter is found to be slightly more than the height of the horses' croups from their respective ground lines.

Two spokes of the original wheel remain, the upper a short stub but its full width, the lower with only a remnant of its eroded inner edge at the rim. Allowing for surface damage, the angular spacing between the estimated spoke centre lines measures just over 43.5°. Although not a regular multiple of 360° (45° would give eight spokes exactly), the resulting figure of 8.275 spokes, an obvious impossibility, allows a rounding-down to eight. The restoration in Illus 8 reflects this inconsistency with unequal gaps between the spokes, unlikely in its original state of manufacture, with the original Skinnet 1 wheel thus assessed to have been constructed with eight evenly spaced spokes.

THE HORSE BEFORE THE CART

A search of the available literature (Table 1) establishes that despite the wide range of heights depicted on Pictish carved stones, the withers height of horses available across Western Europe in early medieval times was limited to what today covers the popular definition of a pony: that is, up to 147cm (14.2hh or 14½ hands).[11]

The withers height estimates stem from osteological studies using generally accepted formulae to assess equine bone remains. The mean withers height for an early medieval horse across this North European area shown in Table 1 was 134.7cm or 13¼ hands – a range from 124.5cm

(12½hh) up to, in rare cases, 147.3cm (14½hh). This is important when comparing the scale of the vehicle wheels with the horse teams to which they are attached. The croup height of a modern native pony is the same as, or even slightly higher than, its height at the withers. Applying this mean croup height to the Skinnet horse(s) as 130–140cm, the diameter of the Skinnet 1 wheel can now be estimated at around 1.30–1.40m.

If this now provides an estimate of the diameter, looking at what evidence remains for other Pictish wheels, the number of spokes in the Skinnet 1 wheel is not what would have been expected, with Meigle 10 numbering 12 spokes, repeated on the Ardjachie and Knockando stones. While eight spokes might be rationalised as carver eccentricity, there is good evidence for near-contemporary vehicles with eight-spoked wheels at a similar scale to that at Skinnet 1, and that is on the Irish High Crosses.

The restoration of the outfit in Illus 9 is hypothetical, created to give an idea of the scale of the vehicle and its contents within the limited area available to the carver. Note that the position of the wheel, thus restored, is close to the rear end of the horses; the small remaining space between the wheel and the left edge of the stone must dictate an originally short vehicle body. The contrast with the Meigle 10 vehicle's overall length is noticeable (see above, Illus 1).

Even if limited in number to a single remaining carving, and that damaged, restoration of the features allows us to assign the Skinnet 1 vehicle a height manifestly exceeding that of Iron Age chariots. The associated Christian iconography must denote a date some time after its introduction in the late 6th century.

COMPARATIVE MATERIAL

PRE-ROMAN IRON AGE

In southern Scotland the Newbridge burial with its wheeled vehicle is dated to the 5th century BC (Carter et al 2010: 65). The similar Iron Age chariot graves in the north of England are around the 3rd century BC (Stead 1979; Jay et al 2012: 170–1). The right wheel at Newbridge had 12 spokes, the left wheel 12 or 13, but the figures from the later Yorkshire graves vary (Carter et al 2010: 55).

ROMAN

Roman reports of horse-drawn vehicles among their adversaries occur from an early date. The chariot was not a weapon system in use in the Roman army. The iconography of harness and vehicles in the Roman Empire of the first four centuries AD is widespread across Europe but scanty in Britain (see for example Raepsaet 1997: passim, and fig 3.2). A type of 'baluster' spoke similar to some illustrations of Meigle 10 occurs at the Roman sites of Newstead (Pit XXIII) and Bar Hill (Curle 1911: 292–3, plate LXIX, 2). Eleven such double-tapered spokes are noted on the wheels from both sites, with single-felloe rims of maximum diameter 3ft (91.5cm) (ibid). On the face of it the context for the finds might suggest a Roman primary influence on the native wheel styles. But Curle finds it tempting to reverse such an argument and assign the wheels to 'native workmanship. That this is so is more than probable', and further that they may have come from captured Caledonian vehicles (Curle 1911: 293). By contrast, the larger coarser wheel of later date at Newstead (Pit LXX) of 3ft 5in (104cm) diameter had 12 straight spokes and a composite six-felloe rim (Curle 1911: 293), more comparable to the early medieval style at Skinnet 1 and in Ireland.[12]

ANGLO-SAXON ENGLAND

Little information exists on vehicular transport, despite the incidence of horse/human burials in southern England (Fern 2005, 2007, 2010). Anglo-Saxon horse sizes follow a familiar early medieval span at such sites as West Stow, Ashville, Gussage All Saints, Hamwih and Ramsbury. Withers heights range from 102cm (10hh) to 145cm (14hh), again, as elsewhere at this era, with a mean of around 133cm or 13hh (Crabtree 1989).

TABLE 1
Horse withers heights, northern Europe (SD: standard deviation)

Place	*Date*	*No, in sample*	*Horse height range (cm)*			*Horse height range (hands)*				
			Minimum	*Mean*	*Maximum*	*Minimum*	*Mean*	*Maximum*	*Source*	*Comments*
South-East England, IA/R-British	Period II (1st century BC–1st century AD)	13	118.7	**133.3**	147.9	11¾	**13**	14½	Albarella et al (2008: table 3)	Ibid: table 4 'no change'
	Period III (1st–2nd century AD)	7	123	**136.25**	149.5	12	**13½**	14¾		'increase'
	Period IV–V (3rd–4th century AD)	14	122.1	**134.4**	146.7	12	**13¼**	14½		'no change'
	Period V–VI (4th–5th century AD)	8	126.6	**135.8**	145	12½	**13¼**	14¼		'slight decrease' (per period)
West Stow, all Anglo-Saxon features	5th century–late 6th/7th century AD		117.9	**128.55**	139.2	11½	**12¾**	13¾	Crabtree (1989: table 37)	Mean height 137.6, SD 6.9cm
Baronstown, Ireland	5th–10th century AD	17	120.5	**128.45**	136.4	11¾	**12¾**	13½	Linnane & Kinsella (2007)	
Early Christian rural Ireland			117	**131**	145	11½	**13**	14¼	McCormick (2007: 88, table 2)	'all 137cm> on … royal sites'
Illerup Ådal, Denmark	Early 3rd century AD	4	123.7	**128.35**	133	12¼	**12¾**	13	Dobat et al (2015: chart)	
			138.5	**141.35**	144.2	13¾	**14**	14¼		
			130.2	**134.9**	139.6	12¾	**13¼**	13¾		
			128.8	**133.95**	139.1	12¾	**13¼**	13¾		
Poland				**132**		0	**13**	0	Wyczółkowski & Makowiecki (2009: fig 6, 300)	
Nowinka, northern Poland	'Late Migration Period'		125	**129**	133	12¼	**12¾**	13	Kontny et al (2009: 169)	
Lithuania	3rd–9th century AD		129	**132.5**	136	12¾	**13**	13½	Bliujienė et al (2017: 693 fig 9)	
Finnestorp, Westergotland, Sweden	AD 320–540 (C14 dates)					0	**0**	0		

TABLE 1
Continued

Place	*Date*	*No, in sample*	*Horse height range (cm)*			*Horse height range (hands)*				
			Minimum	*Mean*	*Maximum*	*Minimum*	*Mean*	*Maximum*	*Source*	*Comments*
East Sweden	'Vendel' AD 550–800		130	**135**	140	12¾	**13¼**	13¾	Sten & Vretemark (1998)	'about 130–140 cm in height'
Northern Gaul	Merovingian 6th–7th century AD		139	**141**	143	13¾	**14**	14	Baillif-Ducros & Yvinec (2015)	
Beckum, Westfalen, Germany	*c* AD 600	12	131	**138.25**	145.5	13	**13½**	14¼	Brieske (2010)	princely grave
Wulfsen, Kreis Harburg, Germany	AD 700–800	3	130	**135**	140	12¾	**13¼**	13¾		
Rullstorf, Lüneburg, N Germany	7th/8th century AD	42	132.0	**140.0**	148.0	13	**13¾**	14½	Becker (2007: 9, table 5)	SD @ 95% = 139><143
Oseberg ship, Norway	Viking 9th century AD	14	136	**140.5**	145	13½	**13¾**	14¼	Nobis (1961: 135)	ship burial
Gokstad ship, Norway	Viking *c* AD 900	12	130.5	**139.5**	148.5	12¾	**13¾**	14½	Nobis (1961: 135)	ship burial
Iceland	Settler era AD 900+>		124	**133.55**	143.1	12¼	**13¼**	14	Nobis (1961: 135)	
	2021 (range of heights)	∞	125	**135**	145	12¼	**13¼**	14¼	FEIF Fengur website Iceland (https://www.feif.org/breeding-dept/documents)	'Average mares 136, stallions 138cm'
Average				**134.68**						

IRELAND

The similar Christian background of freestanding Irish High Crosses and Pictish cross-slabs allow comparisons even though the format of display is rarely common to both. Harbison (1992) in his wide survey of the Irish crosses records around seven 'chariots' in the carvings, but chooses to separate both these and the mounted hunts from the predominantly biblical scenes and further, those from the cycle illustrating events from the lives of Saint Paul and Saint Anthony (Harbison 1992, vol 1: 302).

The figures for horse sizes in early medieval Europe shown in Table 1 include the 7th-century horse remains from Baronstown in Ireland, with a withers height of approximately 130cm (corrected from the mean figure in Table 1 (128.45cm) due to the bias of several outlying small individual sizes) (Linnane & Kinsella 2007). McCormick's figures for rural Early Christian Ireland are similar (McCormick 2007: fig 2), from 117cm to 145cm, the mean at 131cm (13hh). We take this as a constant for early medieval horse sizes in Ireland.

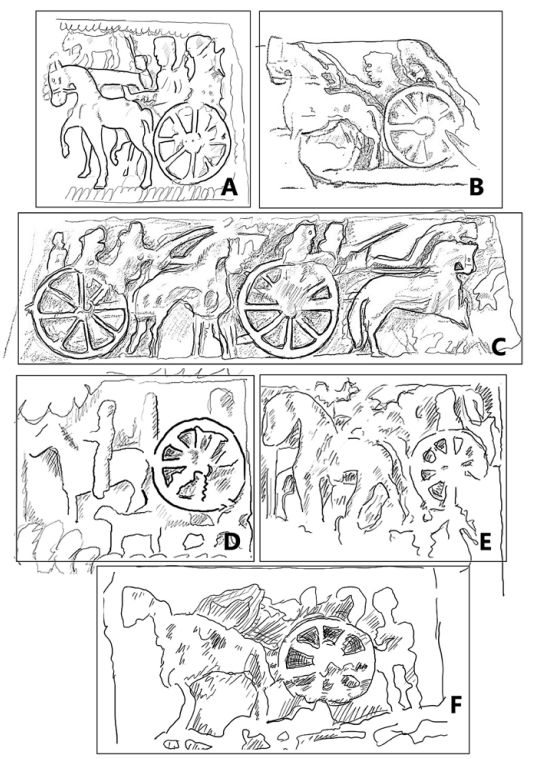
The horse-drawn vehicles described in Irish early medieval tales and literature are in translation normally called 'chariots' (Irish *carpat*), a term suggestive to us of vehicles with relatively small wheels and thus beds low to the ground. In this regard an important factor is the size of wheel which determines the scale of the whole outfit.[13]

The Irish crosses: wheel sizes and numbers of spokes

We know of no RTI surveys of any of the crosses in Ireland depicting wheeled vehicles, and so wheel features in Illus 10 are sketched schematically after internet photos in the public domain adjusted by reference to printed sources.

Ahenny North Cross (Illus 10a): Monastic site (Kilclispeen), Co. Tipperary. On the cross base, the vehicle wheel's diameter is shown as a little less than the height of the horse's croup. It is likely that the available photos are more reliable than Françoise Henry's *Irish High Crosses* (1964), where the drawing shows a wheel which has unaccountably shrunk. Eight spokes are shown with an estimated wheel diameter of 1.20m. Harbison (1992, vol 1: 382) comments that 'most of the Ahenny group are of a type scarcely earlier than the ninth century', and that the date of construction 'may be no earlier than the middle of the ninth century' (Harbison 1994: 15).

Kells, Co. Meath (Illus 10b): Cross of Saints Patrick and Columba, west face. On the base 'a chariot with rider and charioteer proceed to the left, preceded by two horsemen' (Harbison 1994: 75). The wheel diameter exceeds the height of the horse's croup from their common ground line, thus an estimated 1.40m. The indistinct



Illus 10 Horse-drawn vehicles on Irish crosses: (a) Ahenny; (b) Kells; (c) Clonmacnois Scripture Cross; (d) Killamery; (e) Monasterboice Muiredach's Cross; (f) Monasterboice Tall Cross. (Image by Catriona and Duncan McArdle. Tracings/ sketches after internet photos in public domain. Not to scale)

eight spokes in Harbison's available-light photos (Harbison 1971, 1992) are confirmed by the 3D *sketchfab* model.[14]

Clonmacnois Scripture Cross (Illus 10c), Co. Offaly. On the base, east face, two horse-drawn two-wheeled vehicles are carved, shown going left to right. This inscribed cross was erected by the high king Flann Sinna (AD 842–916), ruling from 877, so a later 9th-century/early 10th century date is likely (Kelly 1992: 73).

The left outfit is shown with an eight-spoked wheel,[15] which, compared to the horse's withers height, is estimated at around 1.30m. The right outfit's wheel is also carved to show eight spokes, set within a larger estimated wheel rim diameter of 1.40–1.50m.

Killamery Cross, Co. Kilkenny (Illus 10d). The west face; on the right arm of the head (Harbison 1992, vol 1: 123) an eight-spoked wheel is illustrated (but now heavily weathered), similar in its relative scale to the horse team as in the other Irish crosses.

Muiredach's Cross, Monasterboice, Co. Louth (Illus 10e). On the south face of this cross its upper base illustrates 'a chariot procession' (Harbison 1994: 88), where an eight-spoked wheel is shown, of approximately 1.30m diameter. The possible Muiredach of the inscription on the cross died in AD 844; another abbot of the same name in AD 944 (Kelly 1992: 74). If either date applies to its erection, the cross cannot be earlier than the 9th century.

The Tall Cross, Monasterboice, Co. Louth (Illus 10f). On the east face 'Elijah ascends to heaven in his chariot' (Harbison 1992, vol 1: 147, 224; 1994: 92), which is shown with a wheel of eight spokes and an estimated 1.30m diameter. A less exact attribution for the indistinct scene is suggested by O'Neill (1916: 28): 'sixth panel, a chariot, with the driver and person driven; the wheels are very high'. For further discussion of the biblical interpretation, see de Leeuw (2008: 10).

Summary: Irish vehicles

Taking a mean early medieval Irish horse size as a comparator for the wheels, the crosses reveal an estimated wheel diameter from 1.20m to 1.50m. 'The wheels were spoked and were from three [0.89m] to four and a half feet [1.37m] high as we see by several delineations of chariots on the high crosses' (Joyce 1906: ch XXIV, 2). Joyce's estimates are lower than those postulated above, but they are larger than mean Iron Age examples and confirm a taller vehicle in use. Despite Wood-Martin's dismissal of the visual evidence, it seems reasonable to take these illustrations at face value:

> [O]n the early sculptured crosses, chariots and horses are frequently depicted. In representations, sculptured on Irish crosses, of chariots of a later date, the wheels appear then to have been greatly increased in size, to have been, in fact, higher than an ordinary horse. This may, however, be the fault of the sculptor, who was, doubtless, ignorant of correct ideas of proportion. (Wood-Martin 1895: 247)

This dismissal of the carvers' accuracy seems to have affected the judgement of many later scholars on Irish vehicles' proportions.

What may be concluded from the Irish connection, as shown on the map in Illus 3, concerning the vehicle formats and similar eight-spoked wheel construction?

In Ireland, to explain the wide time gap between the era of Iron Age chariots and their fittings and the appearance of early medieval 'chariots' in the Tales and on High Crosses, Karl (2003: 23) proposes in effect that no such discontinuity exists, only created by our 'disciplinary separatism' and 'the odds of such an independent development are, given the functional, technological and terminological similarities shown in this paper, extremely low'.

From the perspective of the Skinnet 1 vehicle, we would present a different thread of reasoning to follow, which weaves its way through the evidence in a general timeline:

(1) The physical remains of Iron Age chariots show the type of vehicle in use and provide absolute dates, pre-Roman.
(2) Roman written evidence exists for the contemporary observed use of chariots, likely of Iron Age type, as a weapon system in

northern Europe, including their Caledonian adversaries.

(3) In Scotland the chariot-based, 'champion versus champion', style of fighting, faced with the regimental organisation of the Roman army, led to chariot warfare being supplanted by the use of cavalry. This is illustrated on the back of the Aberlemno 2 slab, where Pictish mounted troops are backed by organised ranks in the style of the later medieval schiltrom. It is logical that such tactical change was progressive, as a result of Roman occupation and military action as it spread, with less need to change fighting style further away from the action.

(4) As seen above in the Pictish carvings and descriptions of the post-Roman era, horse-drawn vehicles remained at least as high-status transport and for ceremonial occasions. We can compare today's technologically anachronistic use of a gun-carriage drawn by horses or military personnel for top-status burial ritual.

(5) The cartwrighting change to a taller vehicle in process through the finds at Bar Hill, Newstead and Meigle 10 has its culmination in the style of a larger eight-spoked wheel depicted at Skinnet 1.

(6) A Caithness-to-Ireland transfer accounts for the presence of this similar format on the crosses there. Scholars have assumed the source of the 'chariots' in the Irish early medieval literature must necessarily be through local development by 'jumping the gap' from the smaller Iron Age style. But the stones on both sides of the Irish Sea show clearly the emergence of a larger vehicle, with their depiction on the Irish crosses carved at earliest in the 9th or possibly 10th century (see above), in line with the suggested 'late ninth to tenth century' date of the Skinnet 1 slab (Canmore ID 318992). We suggest that the continuing tradition of cartwrighting seen on the Pictish side provides a basis for the adoption of such a vehicle in Ireland, to follow other influences noted in art-historical studies (Henderson & Henderson 2004: passim), counter to the paradigm of Irish 'colonialism' in past scholarly works (Campbell 2001: 286).

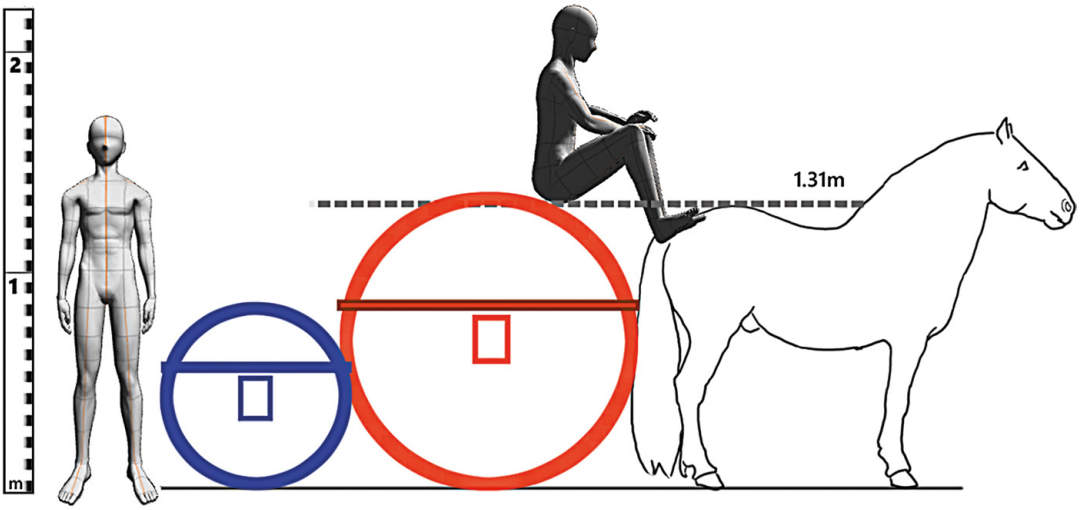
In short, the vehicles found on the Irish High Crosses show a similar wheel size to the Skinnet Chapel 1 example – that is, the top of the wheel rim is often shown higher than the croup height of the horse team.

THE VEHICLE IN USE: WAIST-HEIGHT STEP-UP (ILLUS 11)

The Irish medieval literary sources have been exhaustively mined for information on horse-drawn vehicles (*inter alia* Harbison 1971, 1992; Greene 1972; Mallory 1998; Karl 2003; Stifter 2007). Gaelic terms for vehicle fittings elucidate the vehicles' use and components. Then, surprisingly, restorations such as that in Mallory (1998: 453, fig 1-a, repeating Greene's 1972: fig 16 illustration by Liam de Paor) picture a low outfit in Iron Age style. By contrast, the vehicles on the crosses, and at Skinnet, are clearly a taller conveyance, whether used in a similar role or not.

Real-life use is where the factor of vehicle size comes into play (see Illus 11). A person of 5ft 7½in height[16] can with little effort step up into a vehicle whose wheels of 85cm diameter dictate a minimum height of the vehicle bed of 60–65cm: not much higher than the person's kneecap. But the minimum height of the floor of the Skinnet vehicle and Irish 'chariots' cannot have been less than 85cm: the height of a man's hip joint (Illus 11); furthermore, any vehicle body-suspension system must create extra height for the floor (Stifter 2007).

Visualised in domestic terms, the usual height of a dining table is around 30in (76cm), a kitchen worktop 36in (90cm). Trying to jump or even climb from the floor onto either surface may be beyond the comfortable capacity of the average person; perhaps easier for the nimble Cú Chulainn with his 'salmon-leap' abilities (de Leeuw 2008: 18). An intermediate step built into the body, probably the rear of the vehicle, would be a simple solution.



Illus 11 Comparative sizes of Iron Age versus early medieval wheels. Blue (Iron Age): mean wheel diameter North-East England and Newbridge chariot burials. Red (early medieval): Skinnet 1 cross-slab and Irish Crosses. The graphic shows the rim diameter, estimated axle cross-section, and minimum height of the floor of the vehicle from the ground. The position of the driver = Skinnet 1 slab. Height of both human figures based on an approximate 1.7m/5ft 7½in person. Dotted line: mean withers height of Baronstown horses 131cm/13hh (Linnane & Kinsella 2007; McCormick 2007, fig 2). Horse's outline after photo of the Highland pony stallion Glenbruar scaled to a 131cm (13hh) withers height (photographer unknown, *c* 1907). Metre scale on left. (Image by Catriona and Duncan McArdle)

Although we are uncomfortable with 'chariot' for all two-wheeled vehicles from the archaeological past, no widely used term for a taller outfit and pair falls readily to mind apart from 'cart', which in recent times has normally been of much heavier construction, for use in agriculture.

THE SKINNET 1 OUTFIT, EVERYDAY OR CEREMONIAL: DISCUSSION

The depiction of a horses-and-vehicle outfit on Pictish carved stones is rare but, as shown, not exceptional. Returning to the Newtyle stone, the question arises as to how and why the Dean identified a 'goddess' – a pagan divinity – among the Christian crosses of his own religion. The same duality of two styles of symbolic presentation occurs on the Skinnet cross-slab: Pictish symbols and crosses on both front and back mix Christian and contemporary or older pagan lore. Faced with apparently inexplicable pagan items, it cannot be enough for the scholar to fall back on mere recording as their only task, without some kind of deductive reasoning of the carver's motives. Isabel Henderson's use of Joseph Anderson's 'pithy saying' in her Introduction to the reprint of *ECMS* (vol 1: 25) encapsulates the need for analysis: 'It may be admitted that no one ever carved a mirror and comb upon a monument merely as a picture of the object.' In the case of the Skinnet outfit, with scant evidence remaining for the vehicle itself, one can turn to atypical features of the near horse to examine the dynamic that may have motivated the carver.

Decorative scrolls feature on animal bodies across Pictish iconography from pre-Christian times. For example, the Grantown red deer stag (Canmore ID 15737), the Knocknagael boar Canmore ID 13507), the Leslie wolf (Canmore ID 18163), the bulls from Burghead (*ECMS* vol 2: 120), and here the horse at Skinnet. While the scroll perhaps originated in hair-pattern whorls

(McArdle & McArdle in preparation) the design thereafter, so frequent across the carved stones, must imply some added or symbolic meaning. Why otherwise are some animals in unfilled outline – for example, the stags from Kirriemuir 2 (Canmore ID 32300) or Shandwick (Canmore ID 15278) – but others have scrolls added? The horses carved on Pictish stones (the main target of the writers' RTI survey: McArdle & McArdle in preparation), elicit two comments: 1. horses under saddle are not shown with scrolls on the body, and 2. where scrolls do occur on horses, apart from Skinnet 1 under harness, the animals appear as lone individuals, standing (Inverurie 4, Canmore ID 191750) or recumbent: the Ulbster foal (Canmore ID 8431) and the Meigle 26 probable foal (Canmore ID 30856). This would seem to denote the commonplace or everyday on the one hand versus some added meaningful status on the other.[17] With no 'goddess' to deify the Skinnet 1 vehicle, some internal rationale may be detected through the unusual features depicted on the near, right-hand horse. It could imply that what is being shown is not just a picture of an ordinary outfit.

Four unusual features may be noted on the near horse of the pair. Firstly, as above, the double scroll on its body, clearly a creation of the carver. Secondly, the cup-and-ring marks on its neck and shoulder and maybe other marks or designs mentioned above behind the girth. The cup-and-ring marks are of uncertain origin. They may be prehistoric, or contemporary, introduced to denote brands, painted body decoration or a code for the animal's importance, but do not look like representation of a dappled coat. More importantly, the swellings on the knee on its front left leg and on its cannon bone immediately suggest to a horse-user that the horse was at some time not sound. The lump on the knee is typical of a bursitis, caused through injury or some disease, leading in either case to at least temporary lameness which, if not crippling the horse, would have materially affected its action for a time. The swelling on the cannon bone may be due to damage or stress to the splint bone or tendon; if the horse continues in work this typically leads to the development of a similar bony growth (ossification). Although both injuries may create only temporary unsoundness, ossification will leave its visible trace as an unsightly permanent lump or swelling. We observe that the carver has thought fit, or been instructed, to show such defects.

These factors deserve enquiry into why a lame or at least obviously blemished horse with decorated body, yoked in a vehicle, should be brought to view on a notable public monument.[18] As the right-hand horse, traditionally the lead, its role in ceremonies elsewhere has been noted.[19] It thus seems reasonable to conclude that, even though blemished, the horse at Skinnet was likely the more important of the pair.[20]

CONCLUSION

In this paper our survey using RTI has revealed significant details of the horses and harness carved on the Skinnet 1 cross-slab. In addition, scanning of the remaining vehicle components behind the horse team has allowed re-creation of the shape and size of the whole outfit, of a scale notably taller than those depicted in previous studies. Comparison has been made with the horse-drawn vehicles excavated in Iron Age burials, with reports of other outfits on Pictish carved stones, and with similarly proportioned 'chariots' on Irish High Crosses, resulting in a timeline of development for Pictish horse-drawn vehicles and wheelwrighting technique. What has emerged is close, possibly ancestral, links from the Skinnet cross-slab to the Irish crosses. The right-hand horse in the Skinnet team, with its decorated body and blemished leg, has led us to suggest that, as evinced in wide-ranging descriptions of the place of horses in ritual, there may have been some ceremonial role behind its appearance on this cross-slab. Its coded presentation, significant enough to be depicted in public, sets the outfit in a hazy pagan backdrop with some now-lost meaningful message for its contemporary viewer. We conclude that it may be taken as part of an expression through symbols, animal depictions and mythical beasts in a Pictish framework of iconography and message

similar to that of 'Insular texts' (Henderson & Henderson 2004: 180). If we have read it aright, in its older continents-wide inheritance, it surely embraces more than simply Classical or Judaeo-Christian iconography.

ACKNOWLEDGEMENTS

This survey would not have been possible without free access to the RTI software provided by Cultural Heritage Imaging (a non-profit organisation: 'Helping Humanity save History') https://culturalheritageimaging.org/, and we offer our appreciative thanks to all the team. The then Caithness Horizons Museum in Thurso (now the North Coast Visitor Centre, housed in the same building) allowed us most helpful and friendly access during our two visits in 2015 and 2017 to scan the Skinnet and Ulbster Pictish carved stones. Joanne Howden, the curator, and all the staff are due especial thanks for tolerating the blitz of flashes around the stones when lighting was juggled around to suit our requests. Discursive contacts with colleagues over the years can keep ideas on the 'straight-and-narrow': corrective and sagacious input is most valued from Kirsty Blackmore, Penelope Baker, Ian Ralston and especially Anna Ritchie.

NOTES

1 The term 'driving' as used today in equestrian sporting competitions and private carriage work.

2 'Pictland' is here used as a convenient term for the area of Scotland from north of the Forth–Clyde isthmus and excluding the area known as Dál Riata.

3 John Pinkerton came across notes dated 'about 1560' in the handwriting of Henry Sinclair, Dean of Glasgow, in the Panmure Manuscripts. Pinkerton (1814, vol 1: ix) states that Sinclair describes 'some curious carved stones near Newtyle, not far from Cupar in Angus'. Stuart (1856, vol 1: 22) prints Sinclair's full entry dated 1569:

> At Newtylde thair (is) ane Stain, callit be sum the Thane Stone, iii eln of heicht, v quarteris braid, ane quarter thik and mair, with ane cors at the heid of it, and ane goddes next that in ane cairt, and twa hors drawand hir, and horsmen under that, and fuitmen and dogges, halkis and serpentis: on the west side of it, ane cors curiouslie grauit; bot all is maid of ane auld fassane of schap. It is allegit that the Thane of Glammis set thir tua stanis quhen that cuntrey wes all ane greit forrest.

A Scotch ell ('eln') = 37 inches. Ritchie (1995: note 1) comments that this description does not fit any stone at Meigle, 'although the former existence nearby of another chariot/cart carving comparable to that at Meigle is a reassuring confirmation of the latter, otherwise unique, depiction'.

4 Note the Chalmers (1848: plate xviii) illustration signed by P A Jastrzębski as 'Drawn from nature and on stone'. P A J also worked for the family firm of Gibb; see *Dunnicaer* entry in Canmore. Pennant was not confident about previous illustrations: 'Mr. Gordon has engraved all I saw, one excepted; however I venture to cause them to be engraved again from the drawings of my servant; for notwithstanding I allow Mr. Gordon to possess great merit as a writer, yet his sketches are less accurate than I could wish' (Pennant 1776: 177).

5 Canmore ID (14736) states this is 7th century. RTI enhancement (McArdle & McArdle in preparation) and the 3D illustration (Canmore ID 14736) show an infill of curved lines at least across the right-angle joint. This hints at a later date.

6 How many spokes? Counting the spokes 'around the clock', the spokes at 11 o'clock to 12 o'clock now appear as three spokes – numbers 11, 12 and 13. These last three have been cut into the stone as later incisions over the now-faded (but still visible) original two spokes. The cuts are V-shaped in cross-section and hard-edged, not wide, shallow, eroded grooves. This happened before the *ECMS* drawing was done and Stuart's (1856, vol 2: plate CV) illustration, as both show 13 spokes. Similar 'freshening' of the

(original) spokes at 2 and 3 o'clock reveal hard-edged cuts at their bases. As all the other original upper spokes counter-line-up with the less-eroded lower spokes, it is clear that originally this wheel was carved with 12 spokes, before the busybody's efforts in the ?19th century.

7 Wheels as symbols? The prominent position on the stone, above two more common Pictish symbols, suggests a similar status – maybe even a shorthand for the entire vehicle, but here (*pace* Thomas 1963: 53 and fig 5) we assume the straightforward 'wheel' identification. The wheel has a long history of use as a solar and mythical cult symbol, as for example in the La Tène-era Gundestrup cauldron, itself with contemporary vehicles as a source for the iconography of a wheel.

8 Hippocamps: classical origins for illustrations of these creatures is not a given, as assumed in many earlier publications. Recent work (Garrick-Maidment 2007) corrects the notion that the seahorse (*Hippocampus* sp) was only southern (that is, non-British Isles) in its distribution: 'around the British Isles and Ireland … sightings had occurred right back to 1799, in fact sightings 40 to 50 years ago were more common than the 10 years prior to the start of the survey, why this is, is not fully understood but could be due to the public perception of seahorses and where they come from. It is often difficult to get people to believe there are seahorses in the world let alone 2 species of seahorses in British waters' (Garrick-Maidment 2007: 4–5).

9 See Cultural Heritage Imaging.org: https://culturalheritageimaging.org/Technologies/RTI/: 'RTI is a computational photographic method that captures a subject's surface shape and color and enables the interactive re-lighting of the subject from any direction. RTI also permits the mathematical enhancement of the subject's surface shape and color attributes. The enhancement functions of RTI reveal surface information that is not disclosed under direct empirical examination of the physical object.' The most striking effects of RTI enhancement are best seen on a computer screen through the ability to move the source of illumination around the target object – not possible in print. To record new features thus appearing but in static form, the writers have chosen to use a system of graphical overlays where a 'round-the-clock' sequence of views is overlaid in 'layers' one on the other (similar to drawings on stacked sheets of glass). Each layer shows the enhanced target feature side-lit from one direction, with the entire object and its salient points of interest illustrated by hatching or shading – which will be slightly different from the next layer. A built-up sequence of such overlays into a composite view is intended to give a more objective representation of often very worn features rather than using a single bold outline, definite and clear-cut though this latter may be.

10 The different positions of early harness and the longstanding arguments on this topic are dealt with by Brownrigg & Crouwel (2017) and summed up graphically in their fig 1 (ibid: 198).

11 One hand (4 inches) was the unit basis of traditional equine measurement in the British Isles pre-metrication and its use still occurs. Since metrication, horse withers heights are usually expressed in centimetres rather than metres: thus, for example 131cm.

12 The use of a single-piece rim, with its variation of spoke numbers (Hunter in Carter et al 2010: 55) gave way to a rim of several felloes. The change had two outcomes. Firstly, the rim could be more substantial – heated timber has a limit on the thickness that can be bent and conveniently handled. Secondly, each felloe requires spokes for support either side of its joints, giving an even number of spokes in the wheel.

13 '[T]he height of the axle would necessitate a corresponding and inconvenient height in the rider's seat … the total height of the wheels of two-wheeled vehicles is usually made to vary from three feet to four feet six inches [0.91m to 1.37m] … But on the same road and with an equal load, the high wheel

is that which requires the smallest amount of power to turn it' (Adams 1837: 142). In Ireland a road system suitable for wheeled vehicles existed (Karl 2003: 22) but any such in Caithness is unknown. Further south the legacy of Roman roads may have allowed comfortable wheeled traffic.

14 https://sketchfab.com/3d-models/the-cross-of-st-patrick-and-st-columba-kells-b5837a15765f4e97b0865abf9d6b91fa

15 Wood-Martin's 1895 illustration (Wood-Martin 1895: 247, fig 50) has a six-spoked wheel on the left 'chariot', which is clearly incorrect.

16 We have taken the calculated 5ft 6in to 5ft 9in height of the body buried at Rosemarkie in the Black Isle as a reference point (Birch et al 2018: 124–7) and have used 5ft 7½in (rounded down to 1.7m) as a notional average.

17 Unharnessed or recumbent horses and single foals with body scrolls appear on several Pictish slabs. The writers intend to expand this line of thought elsewhere.

18 The association of lame animals with aspects of myth or shamanism is noted by Piggott (1992: 118) and may offer some rationale, as it would seem given that a sound animal should logically appear in such a context.

Lame animals are not acceptable in an Old Testament context: 'When you present a blind animal for sacrifice, is it not wrong? And when you present a lame or sick animal, is it not wrong? … You bring stolen, lame, or sick animals. You bring this as an offering! Am I to accept that from your hands?' (Malachi 1: 8, 13). No Christian context is known to us. Znamenski (2003: 251) records the fairy tale of a deceptive and corrupt shaman magically condemned to be a worn-out horse, punished by the gods.

The damaged leg calls to mind Balder's foal in the Second Merseburg Charm, the 10th-century Old High German pagan prophylactic chant to assist healing of equine leg strains. Likely reflecting an origin in the 8th century, the charm thus is of the era of the Skinnet stone; and in its persistent format still extant, now Christianised, in Shetland, over a thousand years later. The Second Merseburg Charm:

> Phol and Wodan rode into the woods, there Balder's foal sprained its foot.
> it was charmed by Sinthgunt, her sister Sunna;
> it was charmed by Frija, her sister Volla;
> it was charmed by Wodan, as he well knew how:
> bone-sprain, like blood-sprain, like limb-sprain:
> bone to bone; blood to blood;
> limb to limb as they were glued.
>
> (trans Agapkina et al 2013)

Grimm (1875: 1233) repeats a Christian version from Shetland: 'Those who cannot believe in the faithful preservation of what is entrusted to popular memory, have here an example extending from the 10th cent., to the 19th over Germany, Scotland and Scandinavia.'

19 The Skinnet 1 animal is the right-hand horse of the team. Note this ceremony from Classical times: 'The Roman October Equus ritual had been compared with the aśvamedha as early as 1925 (Keith 1989: 346). In this, a chariot race is held on the Campus Martius … The right hand horse of the winning team has loaves of bread tied to its head and is then sacrificed with a spear' (Fickett-Wilbar 2012: 317).

A directional role features in the Irish Life of St Molaise of Devenish (Betha Mholaise Daiminise). When the king's 'chariot' horses are freed from their incapacity by the oak tree, to move on they must have their heads turned clockwise to the east and southwards, that is, the right-hand horse must turn and lead off *deiseal* to its right. Again, in *Lebor na hUidhre* Medb's charioteer makes a 'clockwise turn before setting off, to invoke the sun for their safe return' (4507–9; in Fickett-Wilbar 2012: 331–2). Selection of the right-hand horse 'without its match under the right-side yoke' strengthens the relevance of this position in the team for an animal's importance in ritual (Fickett-Wilbar 2012: 316).

20 The horse can take its part in the supernatural, as in the *Táin Bó Regamna* where Cú Chullain meets the war-goddess Morrígan who is riding in a:

> … chariot before them. A single red horse under it, and a single leg under the just-mentioned, and the shaft of the chariot through the horse, so that a wedge went through it till the surface of its forehead from the front. (translation Stempel et al Texas Liberal Arts https://lrc.la.utexas.edu/eieol/iriol/20)

In this regard, the much-discussed episode of ritual horse-killing noted by Waddell (2018: 6) records the 'intriguing parallel' of Hindu aśvamedha to the horse sacrifice/marriage in Giraldus Cambrensis's 12th-century *Topography of Ireland* by the Cenél Conaill in Donegal. The important role of the horse in kingship rituals is further discussed by Doherty (2018).

ABBREVIATIONS

ECMS: *The Early Christian Monuments of Scotland*, 2 vols. Ed. J R Allen & J Anderson. 1993. Balgavies, Angus: The Pinkfoot Press. (Reprinted from *The Early Christian Monuments of Scotland: A classified, illustrated, descriptive list of the monuments with an analysis of their symbolism and ornamentation.* Ed. J R Allen & J Anderson. 1903. Edinburgh: Printed for the Society of Antiquaries of Scotland.)

RTI: Reflectance Transformation Imaging

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