SOME OBSERVATIONS ON A COLLECTION OF FOX SKULLS FROM NORTH-EAST IRELAND

J. S. FAIRLEY

Department of Zoology, University College, Galway

T. BRUTON

Department of Botany and Zoology, Ulster Museum, Belfast

Fairley (1970a) published a summary of the body weights and external dimensions of a collection of foxes killed in Northern Ireland. The heads of many of these animals were deep-frozen, the skulls have gradually been cleaned at the Ulster Museum, and are now in the collections there (Day Book No. 563 1968). In this short paper we present the results of measurements made on this material; we will show that there are differences between skulls from Counties Antrim and Down, and that fox skulls in north-east Ireland are bigger than those in southern Britain.

Altogether 253 skulls from adults killed in 1966-67 were measured, all but three (which were from Co Tyrone) from localities widespread over Co Antrim and Co Down north of the Mourne Mountains. Damage had sometimes been sustained when the animals were killed and two were, in fact, represented only by lower jaws. This accounts for the discrepancies in the numbers of the different measurements below. Cubs are born from late February to early April (Fairley 1970a) and distinguishing between adults and yearlings on external features becomes increasingly difficult from the end of September. In fact we did not attempt any such separation from October onwards, and so 'adult' refers here to individuals that were killed, at the earliest, in their first October.

The following measurements were made on the skulls to the nearest 0.01 cm with calipers: greatest length (GL), condylobasal length (CL), occipitonasal length (OL), palatal length (PA), mastoid width (MA), zygomatic width (ZY), width of post-orbital constriction (PO), width of occipital condyles (OC), length of upper tooth row (TR), height of braincase (HB) and length of mandible (LM). Corbet (in Southern 1964) has defined all of these except OC, which is the greatest measurement across the condyles, and HB, which is the height measured vertically from the lowest point of the tympanic bullae.

A line was drawn on a map of Co Antrim separating the Antrim Plateau from the remainder of the county and all the Antrim skulls assigned to one of the two areas. Possible differences were investigated for each sex for each pair of means with a t test. Of the 22 tests only one showed significance at the 5% level (HB for males $P<0.05>0.02$)—and one difference at the level would be expected ($0.05 \times 22 = 1.1$). Data from Antrim were therefore pooled and compared with those from Co Down, again by means of t tests. The results are given in Table 1.

Evidently there are slight but significant differences between the skulls from the two counties. Skulls of dog foxes from Antrim were generally broader, all four transverse measurements being significantly greater. For vixens the palate is slightly but significantly shorter in Antrim, though the overall significance of this result is somewhat diminished in the presence of ten other measurements.

Young foxes may move considerable distances in autumn and early winter before establishing a home range and Fairley (1969a, 1970b) measured 18 such movements in N. Ireland, of which six exceeded 10km and three 30km. This would result in regular substantial dilution of the gene pool in each county. However, there is, in fact, no reason for believing that the disparites between the skull dimensions in Antrim and Down arose genetically. Huson and Page (1980b) also detected differences in such measurements between six counties in Wales by multivariate analysis, and considered that they were best explained in terms of environmental factors. What such environmental factors might be is at present only a fruitful field for inconclusive speculation.

Table 1. Mean values for skull dimensions of foxes from Counties Antrim and Down ± standard deviation, with significant differences indicated. A key to abbreviations is given in the text. *indicates that this result approaches significance at the 5% level

Dimension	GL	CL	OL	PA	MA	ZY	PO	OC	TR	HB	LM
Males											
Antrim n	83	88	84	90	78	76	91	86	84	86	90
mean	15.498	14.643	13.730	7.573	4.998	8.331	2.260	2.628	7.786	5.048	11.319
S.D.	0.449	0.421	0.423	0.260	0.184	0.285	0.126	0.093	0.292	0.138	0.376
Down n	18	19	16	22	18	16	21	22	21	20	24
mean	15.403	14.493	13.703	7.604	4.883	8.176	2.156	2.572	7.815	5.003	11.229
S.D.	0.462	0.441	0.451	0.276	0.147	0.289	0.103	0.106	0.360	0.121	0.396
P<					0.05	0.05*	0.001	0.05			
Females											
Antrim n	68	86	80	88	80	77	87	87	70	82	84
mean	14.505	13.777	12.825	7.153	4.786	7.883	2.302	2.552	7.371	4.860	10.618
S.D.	0.418	0.392	0.389	0.236	0.143	0.233	0.128	0.075	0.213	0.128	0.332
Down n	14	14	13	17	13	10	15	16	17	13	17
mean	14.544	13.810	12.985	7.283	4.728	7.866	2.264	2.560	7.439	4.852	10.622
S.D.	0.534	0.477	0.494	0.287	0.190	0.341	0.180	0.082	0.282	0.104	0.398
P<				0.05							

Table 2. Mean values for skull dimensions from N.E. Ireland and for seven dimensions for skulls from Wales. ± standard deviations with significant differences indicated. A key to abbreviations is given in the text. n = 165 for males and 214 for females from Wales.

Dimension	GL	CL	OL	PA	MA	ZY	PO	OC	TR	HB	LM
Males											
N.E. Ireland n	103	109	102	114	97	93	113	110	107	108	116
mean	15.487	14.621	13.731	7.580	4.976	8.305	2.241	2.617	7.792	5.039	11.305
S.D.	0.449	0.424	0.424	0.260	0.182	0.288	0.129	0.097	0.302	0.134	0.380
Wales mean	15.16	14.54	13.66	7.52	4.96	8.15	2.18				
S.D.	0.539	0.507	0.497	0.309	0.166	0.268	0.123				
P<	10^{-7}					10^{-4}	10^{-4}				
Females											
N.E. Ireland n	83	101	94	106	94	88	103	104	88	96	102
mean	14.513	13.783	12.849	7.176	4.778	7,876	2.294	2.553	7.385	4.858	10.618
S.D.	0.434	0.400	0.404	0.248	0.150	0.249	0.137	0.076	0.227	0.124	0.340
Wales mean	14.19	13.67	12.75	7.09	4.73	7.61	2.20				
S.D.	0.430	0.388	0.785	0.241	0.154	0.263	0.149				
P<	10^{-8}	0.02		0.01	0.02	10^{-9}	10^{-7}				

Combined data for north-east Ireland are given in Table 2. In all dimensions save one the mean for dog foxes exceeds that for vixens significantly (the normal statistic d is at least 6.11 $P<10^{-9}$) with only PO larger in females (d = 2.93 $P<0.01$). There is no doubt, of course, that dog foxes *are* generally larger than vixens.

Huson and Page (1979) compared skulls from south-east England and Wales using seven different measurements (given in Table 2). They too found that means for males were the greater, except for PO. It was also clear that the skulls from Wales were bigger. Although some dimensions tend to increase with age, even in adults (Huson and Page 1980a), these two widely-separated populations were quite comparable as they had much the same age distribution: the ages of individuals were obtained from incremental annuli in the tooth cementum. Although the individual ages of our skulls were not determined, the proportion of adult foxes < one year old in the population in N. Ireland at the time was estimated as 50% — mid-way between the values for Wales and south-east England and Wales — and the postulated proportions of the other age classes derived from this result were a close reflection of the populations in Britain (Fairley 1969b). So comparison is valid. Results against the Welsh foxes are shown in Table 2. It is evident that the Irish skulls are generally larger, the differences being particularly marked for GL, ZY and PO for both sexes. The means from the foxes from south-east England are all significantly lower than those from the Irish material (d at least 3.29 $P<0.001$, except MA for females d = 2.77 $P<0.01$) save MA for males (d = 0.98 $P<0.33$).

These results are interesting in confirming part of the findings of Kolb and Hewson (1974) in their examination of body size of foxes in the British Isles, including data from England, northern Scotland and N. Ireland (from Fairley 1970a) — from the animals in the present study. They showed that the Scottish and Irish foxes were heaviest and had the greatest head and body lengths.

A full list of the measurements has been deposited in the Ulster Museum, Belfast.

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INSECTS IMPORTED INTO IRELAND 6. RECORDS OF ORTHOPTERA, DERMAPTERA, LEPIDOPTERA AND COLEOPTERA

J. P. O'CONNOR

National Museum of Ireland, Dublin 2

R. NASH

Ulster Museum, Belfast BT9 5AB

This paper deals with seven species not previously recorded in this series; several of these could become established in Ireland. Voucher specimens are deposited in the National Museum and the Ulster Museum.

Gryllodes sigillatus (Walker), (Orthoptera: Gryllidae) (Det. J. A. Marshall).

Mr H. Hume of the Department of Agriculture submitted several specimens of the tropical house-cricket to the National Museum for identification. He had discovered huge numbers (''thousands'') amongst a large cargo of Nigerian mahogany which had arrived at Dublin Docks on 23 June 1983. The timber had been diverted from London due to a dock strike there. The specimens were hiding under bark and when disturbed, leaped ''2-3 feet'' in the air. *G. sigillatus* is found throughout the warmer parts of the world and is occasionally brought into Great Britain on imported goods. It once became established in the Royal Botanic Gardens at Kew, but has not occurred there for some years now (Ragge 1965).

The crickets were accompanied by numerous other insects. Large numbers of live adults of the longhorn beetle *Cordylomera spinicornis* (Fabricius) were hiding under the mahogany logs, facing inwards into the shade. They appeared sluggish. Mr Hume collected several specimens for NMI. Numerous live larvae had already been found inhabiting the bark by Messrs W. McGarry, D. Molloy and P. Walsh of the Department and some of these were also presented to the Museum. The species was determined by Mr R. D. Pope. *C. spinicornis* has been previously dealt with in this series (O'Connor and Nash 1979). To-date, only one of the other accompanying species has been determined (see below).