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Appendix: Wool fibre terminology and definitions

Mammals have hair, and the wool of sheep is a kind of hair. But wool biologists divide 'wool' into three types of fibre: short, thick *kemps*; long, less-coarse *hairs*; and finer, true *wool* (which itself can be coarse, medium or fine). Kemp and hair are collectively referred to as 'hairy fibres'. The coat of wild and Neolithic sheep had only very coarse kemp and very fine wool. Such 'hairy' sheep are best described as 'non-fleeced' to distinguish them from woolly, fleeced sheep. Fleeces are primarily composed of wool, but many have varying, smaller proportions of kemp and hair, depending on the fleece type.

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The last teasel factory in Britain, and some observations on teasel (*Dipsacus fullonum* L. and *D. sativus* (L.) Honckeny) remains from archaeological deposits

The last teasel factory in Britain

I came to hear of the existence of a factory processing the flower heads of fullers' teasel by a rather circuitous route and arranged to visit the factory in suburban Huddersfield, West Yorkshire, with Philippa Tomlinson late in 1989. We were shown round by the manager of Edmund Taylor (Teazle) Ltd., Mr T. J. Ledger. This firm, founded in 1849, is the only one of its kind surviving in Britain and supplies all the needs of the home industries in which teasels are used.

The teasels processed by Taylor's are both home-grown and imported. The British crop currently comes from five farms in Somerset and one in Kent, each supplier sowing about 0.5 acres (0.2 ha); Taylor's is the sole buyer. These teasels come in bunches cut in the field and have to be trimmed and graded in Huddersfield. The foreign crop is Spanish, the growers there sending the heads ready trimmed and graded.

Taylor's supply teasels to the British market and to Australia, the United States of America, Canada and India, but not to the rest of Europe, who are supplied by firms in Spain. The main market is the woollen industry where wire 'teasing' mechanisms—though now widely used—have never proved entirely satisfactory for the final raising of a nap in the finishing of woollen cloth. Teasels are also used in the paper industry and in the manufacture of felt, and a modern outlet (especially in the United States) is the decorative use of heads as ornamental 'hedghogs'.

At the factory, the teasels for the cloth industry are sorted by machine for length and diameter, though their quality is judged by hand. Quality varies depending on the source and the season of the crop, British teasels (it is said) usually being superior to imported ones.

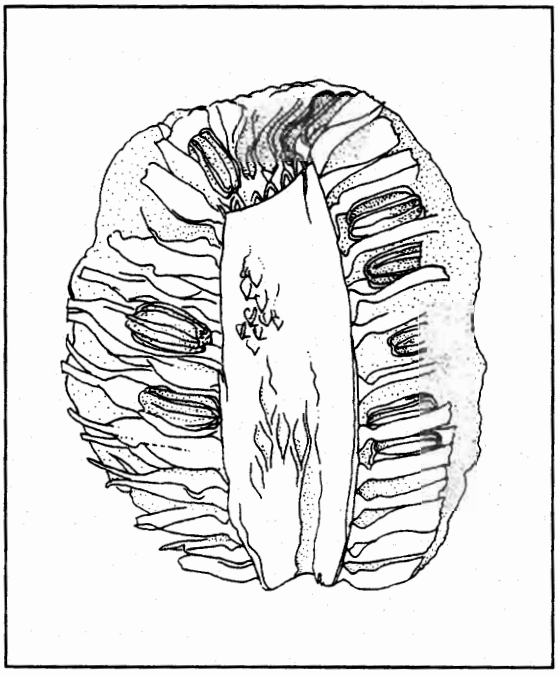

Figure 2. A half-head of Dipsacus sativus *from twelfth century deposits (layer 185) at Eastgate, Beverley, N. Humberside (site code BE84). Magnification approximately x2.*

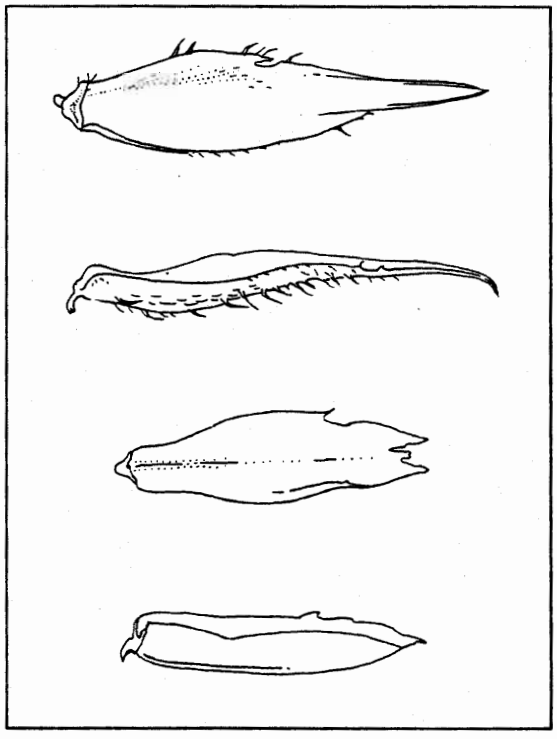

Figure 3. Receptacular bracts from modern reference specimens of Dipsacus sativus *(above) and* D. fullonum *(below), after boiling in dilute hydrochloric acid. Magnification x3*

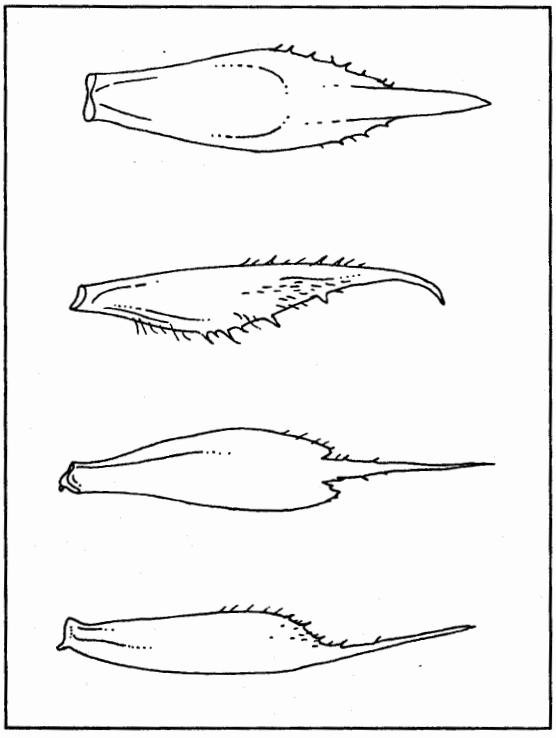

Figure 4. Untreated receptacular bracts from modern heads of Dipsacus sativus *(above) and* D. fullonum *(below). Magnification x3.*

Trimming of the stalks and basal (involucral) bracts is done largely by hand with secateurs. The heads may then be treated in one of two ways: they may be turned on a lathe-like machine to square off the ends, and a hole drilled in either end, so that they can be set on spindle barrels or 'Lana' brushing machines or, with a short length of stem still attached, they are set in two rows between parallel rods, each composite 'rod' taking 120 heads. Twenty-four such rods are fixed to the drum against which the cloth is drawn to raise the nap (teasing usually takes place more than once to raise the nap—often wires are used initially, and teasels reserved for the final raising). Although both sides of the heads are used before the rods are discarded, one-quarter of the rods are replaced on the drum each day. That one firm can supply all the cloth industry's needs at such a turnover of teasels is perhaps an indication of how much the woollen industry has declined in recent decades.

'Seed' from the heads is retained by Taylor's, treated for eelworm (the main crop pest, infestations of which can result in very poor quality heads), and returned to the growers. The market is currently (early 1992) buoyant, though there is not enough business for Taylor's to employ more than a single worker-manager.

Anyone interested in contacting Taylor's is welcome to contact Mr Ledger at Edmund Taylor (Teazle) Ltd., Green Lea Mills, Cross Green Road, Dalton, Huddersfield, HD5 9XX, W. Yorkshire. (N.B. The spelling of *teazle*, here, is the alternative given by the Oxford English Dictionary; I follow Clapham *et al.* 1989 in using *teasel*.)

Archaeological teasels

By one of those chances that I have described in the pages of this journal before as serendipitous, our visit to Britain's last teasel factory preceded by only a few weeks the analysis of medieval deposits from excavations of the Dominican Priory in Beverley, North Humberside (Foreman, forthcoming) in which teasel fruits and receptacular bracts were recorded from a pit fill (context 185). The deposit was part of a

sequence which accumulated outside the line of the Priory precinct and which may in fact pre-date the founding of the House (dating by artefacts is to the twelfth century). That textile working was going on in the area was attested by the presence in other deposits of the sequence of remains of certain or probable dyeplants: root fragments of madder (*Rubia tinctorum* L.), stem fragments of dyer's greenweed (*Genista tinctoria* L.), pod fragments of woad (*Isatis tinctoria* L.), seeds of weld (*Reseda luteola* L.) and leaf fragments and fruits of sweet gale or bog myrtle (*Myrica gale* L.). The plant remains from this site are considered in more detail by Allison *et al.* (forthcoming).

Similar macrofossil assemblages, including dyeplant waste and teasels had been identified from excavations of an adjacent property in Eastgate, Beverley (McKenna in press) and it may be that this is part of the same phase of occupation of the area. At first the *Dipsacus* material from the Eastgate excavation, which included a half-head (Fig. 2), was thought to be wild teasel, *D. fullonum* L. (nomenclature follows Tutin *et al.* 1976). The bracts ended in a smooth spine which looked very different from the reference material of fullers' teasel, *D. sativus* (L.) Honckeny (I have rejected *Dipsacus pilosus* on the basis that it has very different achenes and much smaller receptacular bracts).

However, the whole fossil bracts were very much narrower in their basal portion than were the bracts of either of the two teasel species and this suggested that some tissue had decayed from them. To test this, bracts from reference material of *D. fullonum* and *D. sativus* in the Environmental Archaeology Unit, University of York, were boiled in dilute hydrochloric acid for about 20 minutes. They were then left (unintentionally!) for several days before being examined (representative examples are shown in Fig. 3). Under the binocular microscope it was clear that in both species there is an outer layer of delicate tissue which would easily decay in the ground. In *D. fullonum* the spines themselves are also very flimsy after acid treatment and gentle scraping with a needle caused these to break off, leaving only the basal portion of the bract intact. In *D. sativus* the cilia at the base of the spine (Fig. 4)—which feel stiff and appear likely to be resistant to decay—were found to be no more than processes on the soft superficial tissue and were easily removed by gentle scraping with a needle. The central bristle-like spine that was left was very like

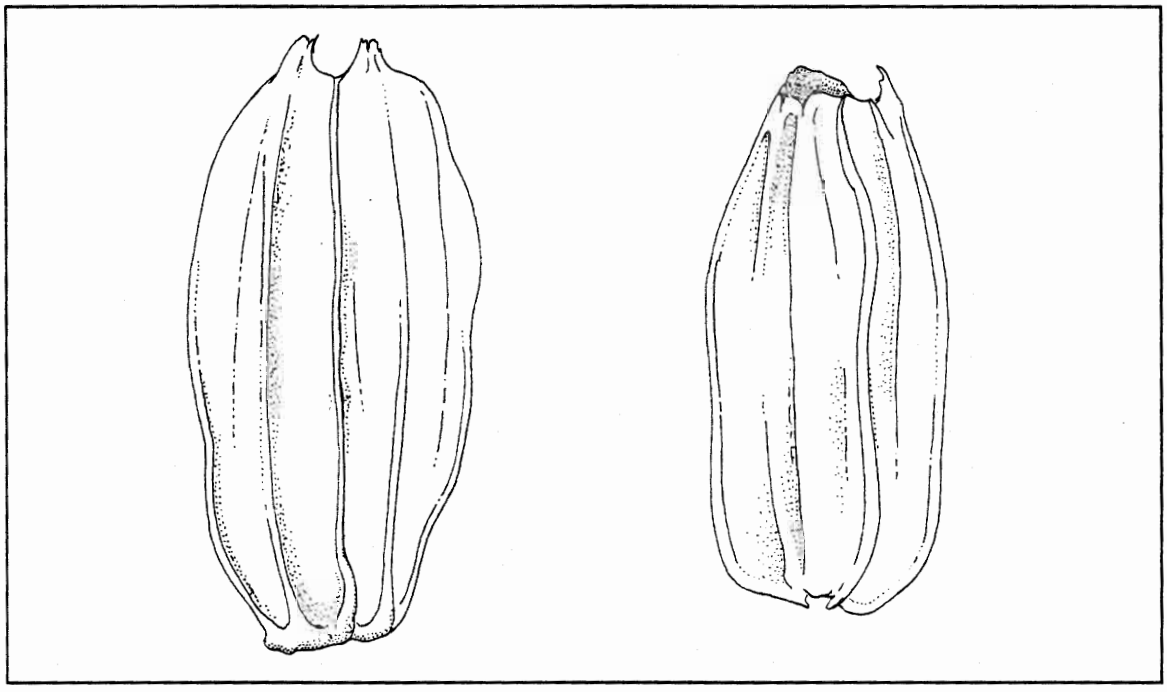

Figure 5. Achenes from 12th century layer 185 at the Dominican Friary site, Beverley, N. Humberside. The right-hand achene has a clear double rib on the left-hand face, indicating that it is D. sativus*; the left-hand lacks doubling and might be* D. sativus *or* D. fullonum. *Magnification x15.*

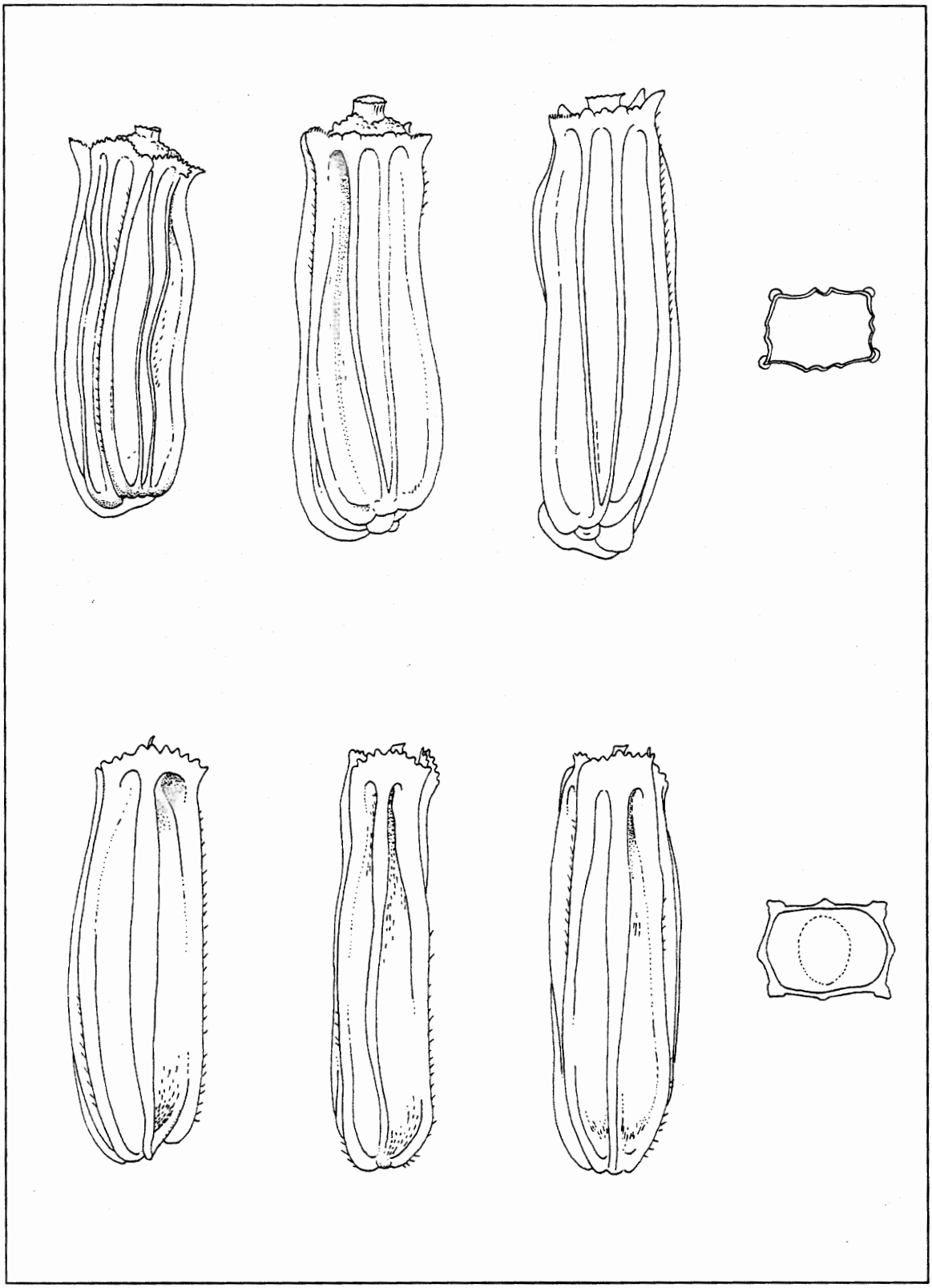

Figure 6. Modern reference specimens of fruits of Dipsacus sativus *(above) and* D. fullonum *(below). Magnification x15.*

the fossil material in retaining a degree of springiness and a slightly recurved form.

The *Dipsacus* fruits from context 185 at the Dominican Priory excavations at Beverley were also scrutinised more closely. The modern reference material available suggested that there were subtle differences in size and shape between the two species, with *D. fullonum* being, on average, a little longer and narrower than *D. sativus*, though the fossil material was usually somewhat flattened or even fragmentary. A difference in pubescence between the two—if it was, indeed, a reliable character—was also unlikely to be of much use with fossil specimens. The most reliable character would seem to be the presence of double ribs on the faces of the achene (Fig. 6) in *D. sativus*. Although not all specimens may show this, and extra ribs may only be present on one of the four faces of the fruit, I have not seen them in the material of *D. fullonum*, which has simple, single ribs on each of the faces.

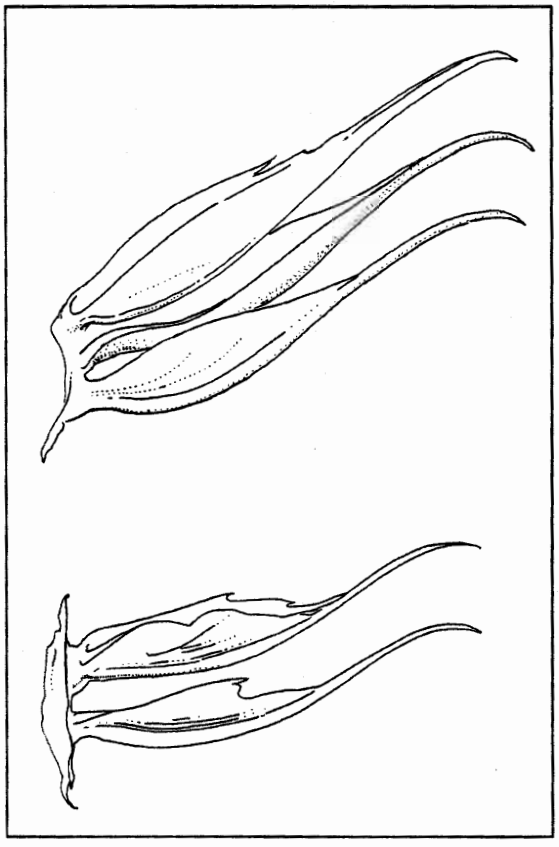

Figure 7. Receptacular bracts of Dipsacus sativus *from late ninth century deposits (layer 26721, sample 1732) at Coppergate, York (site code 1976-81.7). Magnification x4.*

On this basis, I determined the bulk of the achenes and all of the bracts from the Eastgate and Dominican Priory deposits as *D. sativus* (cf. Fig. 5) and undertook re-examination of some more material, from Anglo-Scandinavian deposits at 16-22 Coppergate, York. *Dipsacus* bracts and/or fruits from three contexts of a cess-pit fill from this site, dated to the period AD *c.*850–*c.*900 led to the re-determination of the bracts (Fig. 7) and of some of the fruits as *D. sativus*. There were remains of *Isatis tinctoria*, *Diphasium complanatum* (an exotic clubmoss implicated in dyeing as a source of aluminium for mordanting) and weld in one of the layers containing teasel remains.

Acknowledgements

I am grateful to Barrie McKenna for bringing my attention to Edmund Taylor (Teazle) Ltd., and to Mr T. J. Ledger both for his kindness during our visit to his factory and for checking several points in an early draft of this paper. Mike Hill (Environmental Archaeology Unit) undertook the painstaking work of drawing the teasel material and is offered sincere thanks.

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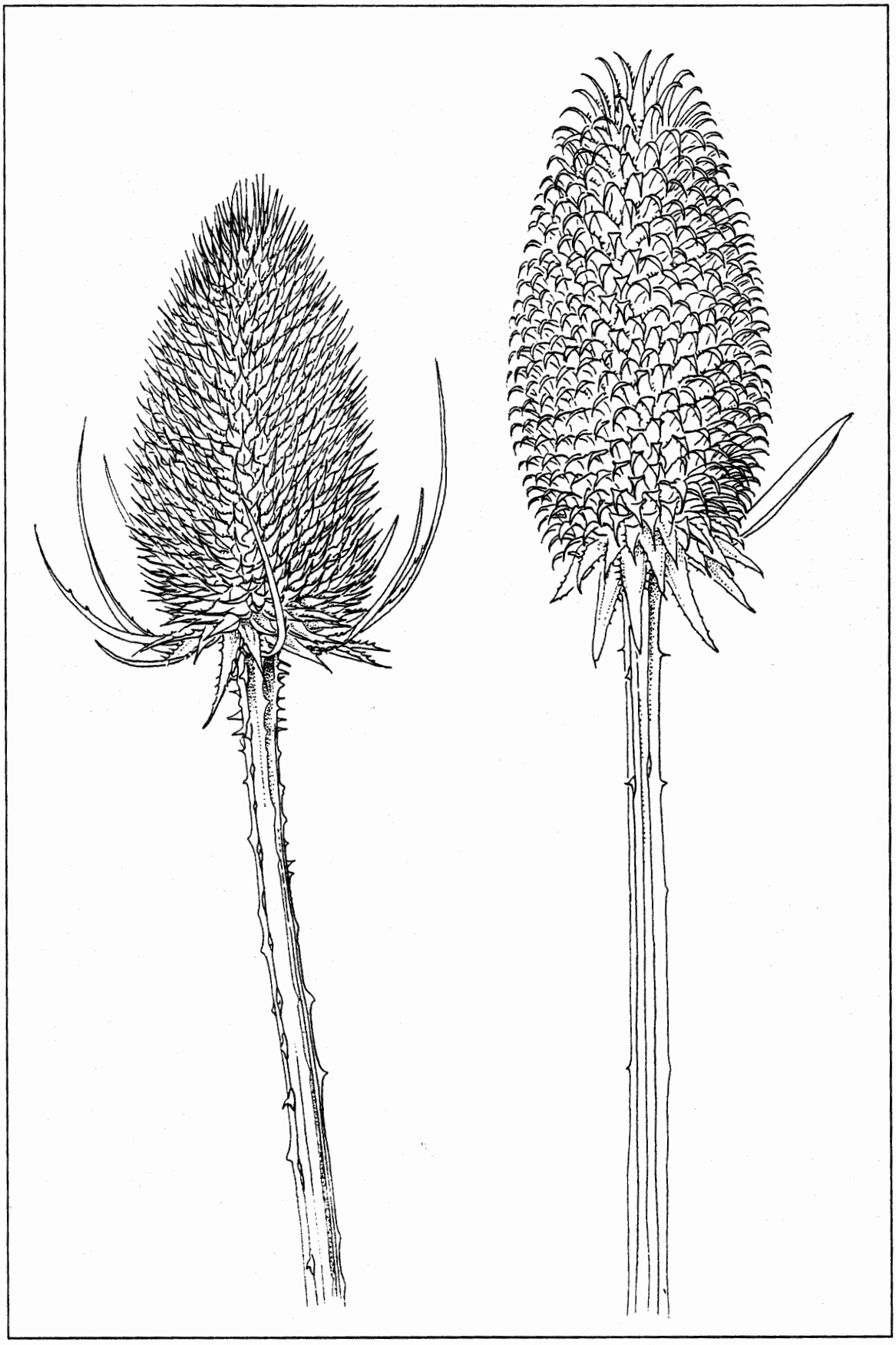

Figure 8. Drawings of modern reference specimens of mature flower heads of Dipsacus sativus *(left) and* D. fullonum *(right). Scale approximately 1:1.*

Postscript to *The last teasel factory in Britain*

Although I have not examined them in detail, the spines present on the stems (and probably also those on the midribs of the leaves of teasels) seem superficially very similar to the prickles of *Rubus* and *Rosa*. They appear to be exogenous, as in *Rosa*, but it is possible that poorly preserved material of these three genera may be confused. —ARH

Papers from the bone taphonomy workshop at York, September 1991

Bones and beyond bones: insects, stains and keratin remains

While some aspects of taphonomy may now be well understood, there are clearly other areas of the subject deserving further exploration. Two very different topics have recently been occupying my thoughts, and it seemed to me that they deserved mention at this taphonomy workshop.

First of all, there is the question of unusual states of preservation. Do we as yet fully recognize their research potential, and indeed might special states of preservation offer to be especially valuable in studying the chemistry and molecular biology of organic remains? This point can be illustrated by means of three examples:

(a) Special states of preservation as a result of the change of body fat to adipocere is well known to forensic pathologists, but to what extent can it help in the preservation of animal remains and would such a process assist in the preservation of the bone chemistry? An example of adipocere was accidentally produced in a partly defleshed pig carcase I buried in sand some five years ago. On excavation a year ago, many of the well preserved bones were covered in deposits of white cheese-like adipocere. Given further burial time (but how much?), the adipocere would have slowly decomposed, but it could have had a long-term effect on the quality of bone preserved.

(b) Although it has long been known that bronze/copper staining on bone, because of its antibiotic properties, leads to an area of very well preserved bone, no significance has been attached to this fact. Also, the excavator tends to overlook the fact that hair and leather seems to preserve in such an environment (and there is one case of helminth preservation). Again, it would seem worth questioning whether such well preserved areas might have special value in chemical or biomolecular analyses.

(c) Finally, as regards special states of preservation, it seems to me that we may be

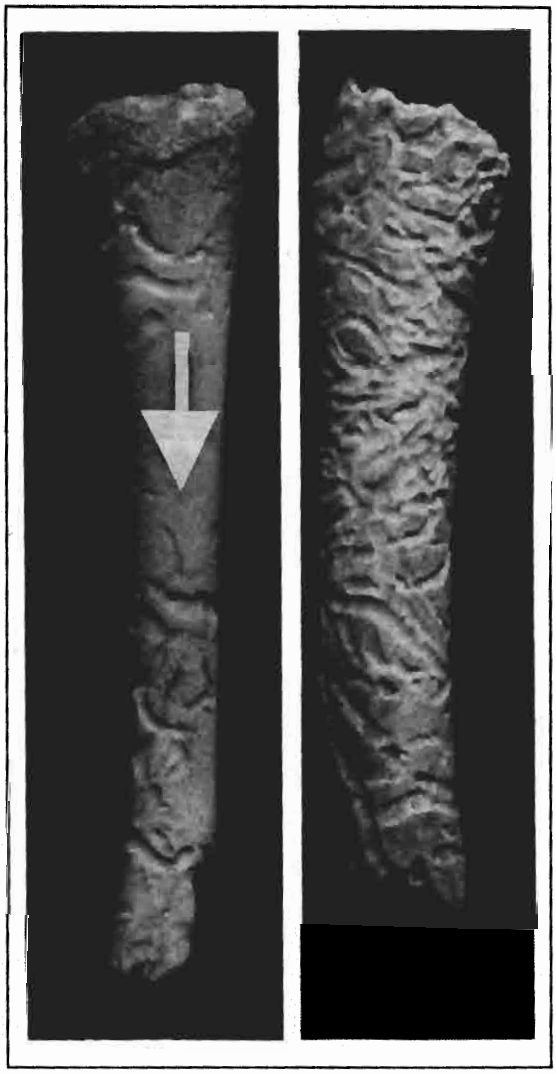

Figure 9. General detail of two Roman chicken long-bones from Uley, Somerset, displaying two degrees of severity of channelling damage.