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15. Saxon flax retting in river channels and the apparent lack of water pollution

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Flax (*Linum usitatissimum* L.) was a significant crop in Saxon England. Numerous finds have been made of flax processing remains from waterlogged deposits in circumstances that would suggest flax was being retted in water (Robinson 1992, 60). Retting is the process by which the stems of flax are subjected to bacterial action in order to facilitate the separation of the fibres when they are subsequently beaten. The soaking of flax has the reputation for being a particularly foul process, which is malodorous and results in the production of noxious effluent. Some Saxon retting was undertaken in tanks or small gullies and doubtless an oxygen deficit developed in the water in which this was occurring. For example, abundant flax seeds, capsules and stem fragments were identified from a Middle Saxon wattle-lined gully at 79-80 St Aldates, Oxford (Brown 1977), from which aquatic insects were absent (Robinson, unpublished).

However, some discoveries have been made of flax retting remains in company with insects suggestive of clean, well-oxygenated water including beetles from the family Elmidae which are extremely fastidious in their requirements (Table 22). High concentrations of flax capsules and flax seeds were discovered in palaeochannel sediments of the River Nene at West Cotton, Northants (Campbell 1994). Although no flax stems were found, oak pegs had been inserted into the channel bed, possibly to peg down bundles of flax. A radiocarbon date of AD620-890 (cal 2 sigma) was obtained on flax capsules, and dates of AD660-880 (UB-3323 cal 2 sigma) and AD640-860 (UB-3328 cal 2 sigma) were obtained on the pegs. A rich fauna of elmidae beetles was present, with at least five species represented (Robinson, unpublished).

These beetles, which cling to stones or aquatic plants, are so fastidious in their requirements for unpolluted, well-oxygenated water that in most of the major English lowland river systems, if they occur at all, they are restricted to weir outflows and fast-flowing tributary streams.

Of particular interest was the occurrence of *Stenelmis canaliculata*, which was only added to the British list about 40 years ago when it was discovered to live in Lake Windermere (Claridge and Staddon 1960). It has subsequently been discovered in several other drainage systems in Britain (Ormerod 1985) including some recent captures further downstream in the Nene at Water Newton (G. Foster, pers. comm). In Europe, *S. canaliculata* lives in clean, well-oxygenated water in weirs, rapids and on submerged plants in flowing water (Freude *et al.* 1979, 277). A few flax capsule fragments were found in a Saxon palaeochannel of the Thames at 42 St Aldates, again in the company of *Stenelmis canaliculata*, which no longer occurs in the Thames (Robinson unpublished).

Further upstream on the Thames a beet (twisted bundle) of flax plants, numerous flax capsule fragments and flax seeds were discovered in a palaeochannel at Oxey Mead, Yarnton (Robinson, unpublished). A radiocarbon date of AD660-1010 (OxA-3643 cal 2 sigma) was given by the flax beet while the overlying sediments were dated to AD 630-890 (OxA-7359 cal 2 sigma). Although there was probably little flow to the channel in the Saxon period, the beetle *Oulimnius* sp. was present.

The entomological results suggest the waters of the Rivers Nene and Thames were clean in Saxon times even when they were flowing over flax that was being retted. It might be argued that the insect remains at West Cotton

Table 22. Flax and Elmid Beetles from Saxon Palaeochannels.

	Sample	West Cotton		42 St Aldates		Oxey Mead			
		3	5	6	7	11	10	3/6	3/5
FLAX REMAINS									
<i>Linum usitatissimum</i> L.	- seeds	+	+	+	+	-	-	+	+
<i>L. usitatissimum</i> L.	- capsules	+	+	+	+	+	-	+	+
ELMID BEETLES									
<i>Elmis aenea</i> (Müll.)		+	-	+	-	-	-	-	-
<i>Normandia nitens</i> (Müll.)		-	+	-	-	-	-	-	-
<i>Oulimnius</i> sp.		+	+	+	+	-	+	+	-
<i>Riolus subviolaceus</i> (Müll.)		-	-	+	+	-	-	-	-
<i>Stenelmis canaliculata</i> (Gyll.)		-	+	-	-	+	-	-	-

and Yarnton had been derived from further upstream and the water where the flax retting was occurring was polluted. Dead insects are certainly carried along by the current of rivers and could have been introduced from tributaries. However, numerous excavations in the St Aldates area of Oxford have shown flax remains are present in Saxon deposits in palaeochannels at many locations (Robinson 1992, 60; Robinson, unpublished). The water in the channel at 42 St Aldates would almost certainly have flowed over sites of flax retting upstream. It is thought probable that the scale of flax retting was small enough that the flow of water was able to maintain sufficiently well-oxygenated conditions for the survival of elmid beetles. Thus, although the flax retting industry has the potential to cause serious water pollution, it does not seem to have caused grave problems in the Rivers Nene or Thames in Saxon times.

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