The Insects Associated with the Manchester Mummies

by

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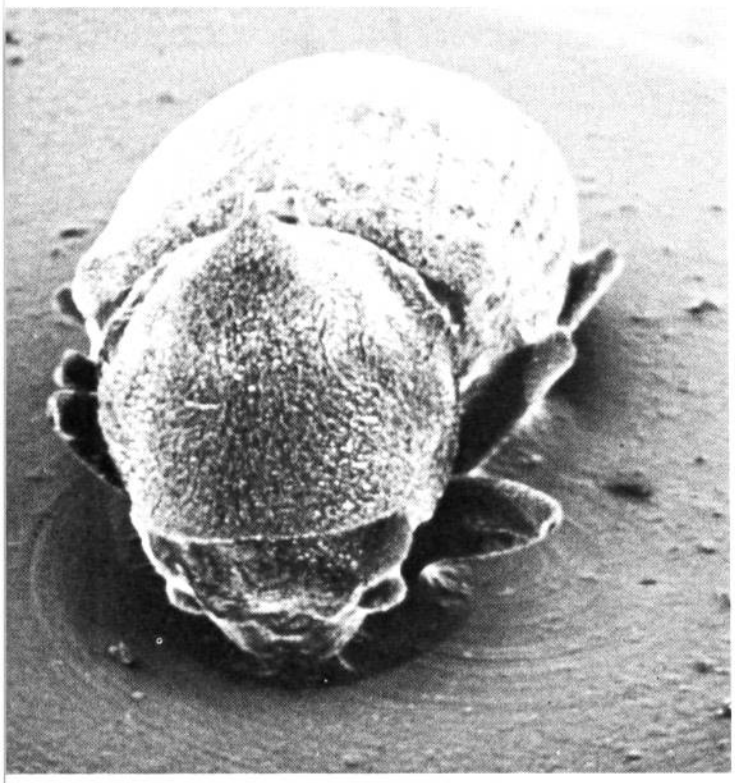
Summary

The insects found in the Manchester Museum collection of Mummies are described. Various beetles, true flies, and a cockroach have been identified. The feeding habits and the probable time of infestation by these insects is discussed.

Introduction

The ancient Egyptians were well aware of the insects that existed in Egypt. Indeed, a mythology was based on the activities of a dung beetle, *Scarabaeus sacer* (Evans 1975). This sacred beetle's activities were seen by the Egyptians as a reflection of the world around them and was a symbol of rebirth. Likenesses of this beetle were put into tombs to ensure the soul's immortality. Lice and fleas are recorded in Egyptian papyri (Brothwell and Sandison 1967). Some Egyptian plagues were entomological in nature, being composed of flies or locusts (Cloudsley-Thompson 1976). Herodotus (480–425 B.C.) wrote that the ancient Egyptians slept under the protection of mosquito nets (Cloudsley-Thompson 1976). Also, honey from bees was collected by ancient Egyptians (Cloudsley-Thompson 1976).

The Egyptians, unlike many other civilizations in the ancient world, did store food as a safeguard against famine and they effectively stored their dead. There is evidence that ancient Egyptian foodstores suffered infestations by insects (Hinton 1945). It seems likely that insect pests were troublesome to the Egyptians and it was no surprise therefore that several of the mummies and associated canopic jars in the Manchester collection were found to contain insect remains. However, the finding of dead insects with mummies does not necessarily mean that the infestation originated in antiquity. The parasitic worms found in this study of the Manchester mummies must have been present in ancient times as these parasites need living hosts. It is less easy to predict



(**1**) An adult woodworm, *Anobium punctatum*, found in a wooden sarcophagus. ×26.

(**2**) Insects found in mummy '1770', *Necrobia rufipes* (*top right*), puparia of common house fly, *Musca domestica* (*top left*), wing case of a carabid beetle (*bottom right*), puparia of the cheese skipper, *Piophila casei* (*bottom left*). All ×6.

the time of infestation by insects. Beetles, depending on their habits, could invade a body at the time of death, during its subsequent embalming, in the tomb, during transportation, or on display in a museum. Certain beetles can be serious pests of museum collections if special precautions are not taken. The museum beetle, *Anthrenus museorum*, is a cosmopolitan species and has been found in a mummified fish (Leek 1978), but not in any of the Manchester mummies.

Deducing the time of infestation by flies is easier as their larval stages do require a moist food source. In forensic science estimates can be made of the time of death by the fly larvae present and their stage of development (Smith 1973; Jane 1975). Even here there may be uncertainty as some dipteran flies can infect the human body during life and cause a type of disease called myiasis (Oldroyd 1964; Zumpt 1965).

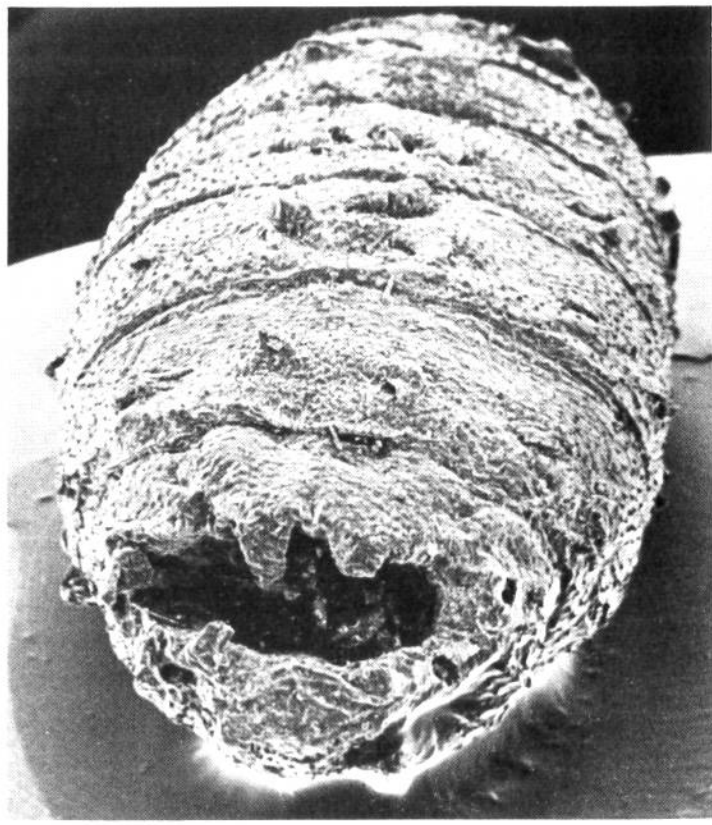
Insects are identified by the various features found on their exoskeleton and this can be relatively easy if they are adult insects. Larval stages are much less well known scientifically than adult insects and hence are more difficult to identify. Often insects from the mummies are incomplete, because parts of their exoskeletons have broken off and are missing, rendering identification difficult.

(3) Empty puparium of *Piophila casei*. ×29.

Materials and Methods

Most insects were found by carefully examining either the exterior of the mummy wrappings and their sarcophagi or by sorting through the remains of '1770' and the jars containing the remains of Nekht-ankh and Khnum-Nakht, who had been unwrapped earlier this century by Margaret Murray. The insect exoskeletons were very fragile. Examination was undertaken either by viewing under a dissection microscope or in the scanning electron microscope (SEM). SEM specimens were attached to stereoscan stubs with a conductive adhesive and coated in gold, either in an Edwards sputter coater or using a rotator in an A.E.I. vacuum coating unit. These were examined either in an A.E.I. Corinth 275 electron microscope fitted with a scanning attachment (CESA), or in a Cambridge S4–10 Stereoscan.

A novel technique was used to free insects remains from the hardened mass of canopic jar material of Asru. Pieces were immersed in a 10 per cent solution of buffered formalin for several hours. The rehydrated pieces were examined using a dissection microscope and complete larval skins of flies teased out.



(4) Puparium of *Chrysomyia albiceps*. ×28.

Results

The common woodworm, *Anobium punctatum*, was present in the wooden sarcophagi of several of the mummies in the collection (**1**).

'1770', the mummy which was unwrapped, contained within its bandages a multitude of insects. The commonest were a beetle, *Necrobia rufipes* (**2**) and a dipteran fly, *Piophila* probably *P. casei* (**2** and **3**). Adult beetles, but only one adult fly were found, the majority of the fly's remains being puparia. *Piophila* puparia were scarce in the outer bandage layers, but numerous in the inner bandages and body of '1770'. A few puparia of the

common house-fly, *Musca domestica*, were in the inner bandages and bodily remains of '1770' (**2**). The body also housed a few wing cases (elytra) of a carabid beetle (**2**).

The remains of the two brothers, Nekht-ankh and Khnum-Nakht, were inundated in insects different to those found in '1770'. Puparia of a dipteran fly *Chrysomyia* probably *C. albiceps*, were common (**4**). The predominant beetle was an unusual species, *Gibbium psylloides*, unusual because it resembles a giant mite and has the common name of the hump spider beetle (**5**). Smaller numbers of a second beetle, *Mesostenopa sp.* were also found in the remains of the two brothers (**6**). Unidentified fragments of a third beetle were also found in the remains of the two brothers (**7**).

Intact larval skins of *Chrysomyia*, probably *C. albiceps*, were common in the intestinal remains of Asru, found in a canopic jar (**8**).

An object attached to the outer wrappings of mummy '1767', another mummy in the Manchester collection, proved to be the egg case (ootheca) of a cockroach, *Blatta orientalis* (**9**). The egg case was firmly attached to the canvas covering of this mummy by the wax used as part of the wrapping process.

The results are summarized in Table I.

Discussion

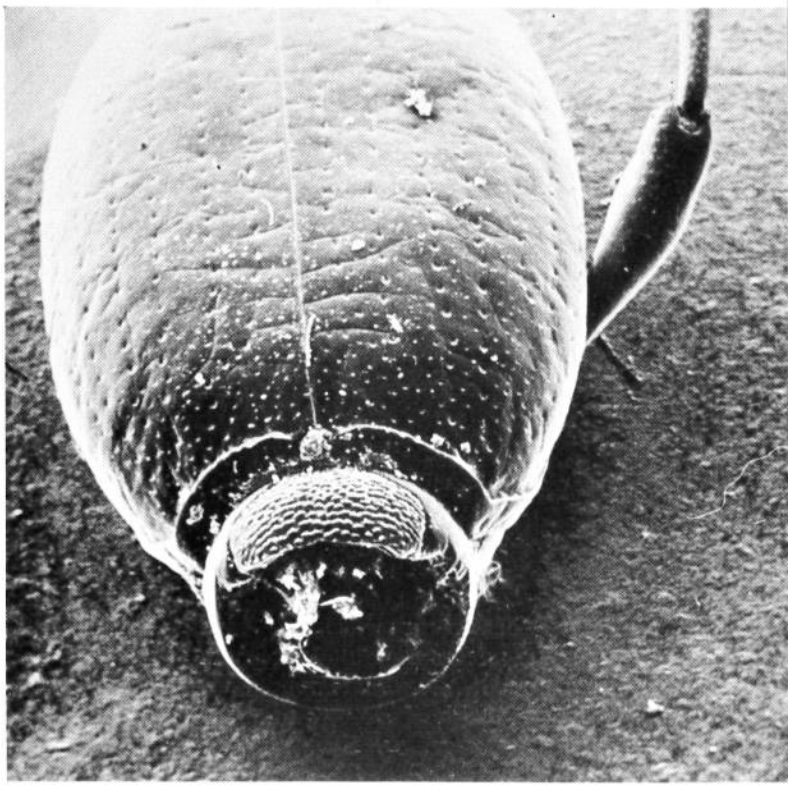
The woodworm, *Anobium punctatum*, is a highly destructive beetle which has been estimated to be present in up to three-quarters of the buildings in Britain (Hickin 1964). This insect will consume almost all types of wooden structure, so its presence in the sarcophagi of several mummies is not unexpected. The infestation of these wooden sarcophagi with *Anobium* could have occurred at any time in their history.

Piophila is more commonly known as the cheese skipper and is a domestic pest (Oldroyd 1964). It is known to breed in cheese, bacon, ham and similar foodstuffs and, because of these habits, it can be eaten accidentally. The larvae are extremely resistant to gastric juices and consequently can survive to attack the gut wall causing bleeding of the intestine (Zumpt 1965; Oldroyd 1964). Mummy '1770' may have been infected during life but, as *Piophila* is a pest of stored meat, it seems that infestation occurred after death. Some of the extreme deterioration of this mummy was undoubtedly caused by the ravages of this fly and of the beetle, *Necrobia*. *Piophila* puparia were also found in the body cavity of a mummy Pum II unwrapped in Detroit and were covered in resin from the embalming process (Cockburn et al. 1975).

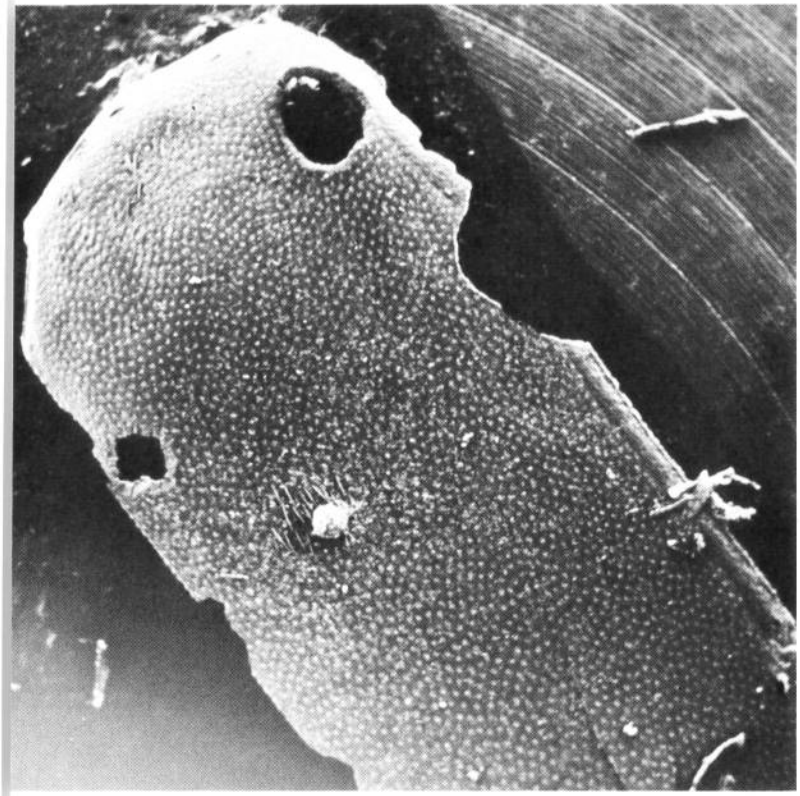
Necrobia rufipes can infest carrion during the fermentation stage when the carcass is drying out, feeding on the skin and ligaments (Evans 1975). In addition to eating some of the flesh of '1770', *Necrobia* would probably have attacked and eaten the larvae of the cheese skipper, as it has been reported to prey on larvae of other species in the same food source (Hinton 1945).

The common house-fly, *Musca domestica*, is probably the most familiar of all insects and has accompanied man everywhere (Oldroyd 1964; Cloudsley-Thompson 1976). It breeds in waste food or faeces if the larval food source is not too dry (Hickin 1964).

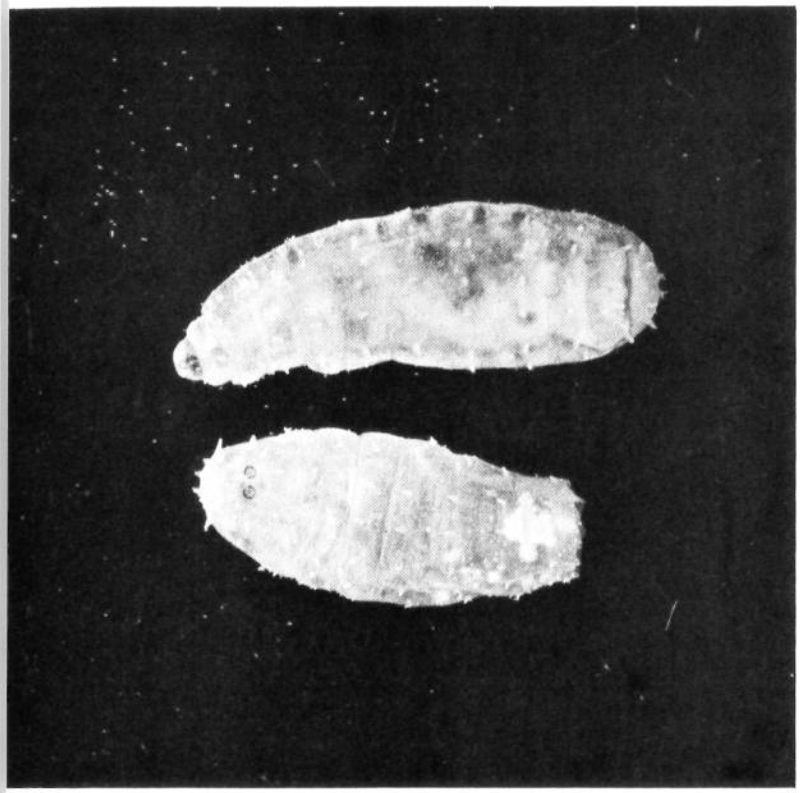
(**5**) An adult hump spider beetle, *Gibbium psylloides*. ×36.



(**6**) Remains of beetle, *Mesostenopa sp.* from the two brothers. ×30.



(7) Wing case of an unidentified beetle. Note the holes which have been produced by the feeding activities of other insects. ×24.



(8) Larvae of *Chrysomyia albiceps*, recovered from a piece of rehydrated stomach. ×6.

If '1770' had been correctly embalmed originally, a few insects in the body would not have been unexpected. Carbon-14 dating (see section by Newton) has shown that the bandages of '1770' are considerably younger than the body. As these 'new' bandages contained many of the insects, it suggests that the body of '1770' was rehydrated, perhaps by flooding of the tomb. This flooding could be the reason why '1770' was rewrapped and perhaps the lower limbs were 'mislaid' at this time.

The many insects living in '1770' did not have an idyllic life surrounded by food, because a carabid beetle was present. Carabids are predaceous beetles (Evans 1975) and were probably feeding on the other insects present in the tissues and wrappings of '1770'.

Chrysomyia found in the two brothers and Asru is known to lay eggs on carrion, which the larvae eat voraciously, but it has predaceous and cannabalistic habits (Oldroyd 1964; Zumpt 1965). As with the cheese skipper, this fly was also found in Pum II, unwrapped in Detroit (Cockburn et al. 1975).

Gibbium psylloides is a serious pest of vegetable products and may therefore have used the bandages of Nekht-ankh and Khnum-Nakht as a food source (Hinton 1945; Hickin 1964). *Gibbium* has long been known to infest grain products and has been reported previously from the tombs of Egyptian Pharaohs (Hinton 1945).

Beetles such as *Mesostenopa* (Tenebrionidae) are pests of stored food and live in sandy, arid environments (Evans 1975).

The ootheca of the cockroach, *Blatta orientalis*, was firmly attached to the bandages of '1767', and was thus of ancient origin. '1767' is a mummy from the Roman period and dates somewhere between A.D. 100–200. This evidence of association with man is, perhaps, not unexpected as *Blatta orientalis* is thought to be a native of North Africa (Cornwell 1968). Cockroaches associated with man attack and consume a wide range of food products and what is not ingested is fouled (Hickin 1964).

The Egyptian art of mummification was to some extent countered by the ravages of insect attack. Insects use a body as a food source and not as a sacred object. Of the two types of insects commonly encountered, the dipteran flies probably infested the bodies prior to or during embalming, unless the bodies were rehydrated at a later period. In contrast, some of the beetles may have infested the mummies at any time during their history. The cockroach's and the house-fly's association with human civilization is demonstrably of ancient origin. Thus the common insect pests of modern man were probably just

(9) Egg case of the cockroach, *Blatta orientalis*. ×6.

as much a problem to the ancient Egyptians. Life in ancient Egypt was clearly not idyllic. Insects were probably pests around the household, a serious nuisance to the embalmer, and common in food storage buildings.

Acknowledgements

The assistance of Colin Johnson and Alan Brindle (Department of Entomology, Manchester Museum), Ken Smith (British Museum, Natural History), Robin Grayson, John Hutton and A.E.I. Scientific Apparatus Ltd (Kratos) is greatly appreciated.

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Table I

	'1770'	Nekht-ankh/Khnum-nakht	Asru	'1767'	Various Sarcophagi
Coleoptera (beetles)	*Necrobia rufipes* adults +++	*Gibbium psylloides* adults ++++			*Anobium punctatum* adults +++
	Carabid Elytra +	*Mesostenopa sp.* adults ++			
		+ unidentified fragments			
Diptera (true flies)	*Piophila*, probably *P. casei* 1 adult, puparia +++++	*Chrysomyia*, probably *C. albiceps* puparia ++++	*Chrysomyia*, probably *C. albiceps* larvae +++		
	Musca domestica puparia ++				
Dictyoptera (cockroaches)				*Blatta orientalis* ootheca +	

+++++ abundant ++++ very common +++ common ++ occasional + rare