

Forensic Science is Not a Game

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ABSTRACT

With reference to specific cases involving the author, who is not a forensic entomologist but a specialist on Diptera, especially Phoridae, some of the pitfalls and limitations in the use of entomological data are highlighted.

Keywords: Diptera, forensic entomology, Phoridae

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INTRODUCTION

I am not a forensic scientist. I am an academic entomologist who is a specialist on the large insect order Diptera - the flies, midges and gnats. In the 1960s I was a medical entomologist, in Belize (British Honduras) and then Cameroon, where I studied biting flies that transmit parasites that cause diseases in man (e.g. Disney 1968). Subsequently, as director of a Field Centre and National Nature Reserve at in northern England, I continued my studies of flies. In the early 1970s I researched the aquatic meniscus midges (Dixidae) and wrote the standard work on the British species; and when a quarter of a century later I was asked to produce a second edition I added the trickle midges (Thaumaleidae) partly for fun but also because these two families of midges are the most sensitive indicators for surfactant pollutants (Disney 1999). Since 1974 I have worked on Phoridae - the scuttle flies. Initially I wrote the standard work on the British species (Disney 1983, 1989). I then turned my attention to the scuttle flies of the world and have published the only book (Disney 1994) devoted to this family and about 500 papers on this family of insects.

MY INVOLVEMENT IN FORENSIC SCIENCE

As a specialist on flies, and on scuttle flies in particular, I am occasionally asked to identify and comment on insect specimens submitted by trading standards officers, commercial companies under threat of litigation, animal welfare officers or most often I am asked to examine scuttle fly specimens from a corpse submitted by a forensic entomologist, a forensic pathologist or the police. Indeed, I receive specimens of such scuttle flies from around the world. A glance at my files on specimens from human corpses reveals cases from Malaysia, Japan, South Africa, Chicago (USA), the Canary Islands and mainland Europe, apart from those from Britain. Normally my reports are subsumed within a larger report by a forensic entomologist, forensic pathologist or whoever. Only rarely am I summoned to appear in court as an expert witness. To a large extent, therefore, I am only a marginal contributor standing on the sidelines.

However, I believe, on the basis of some of the cases I have undertaken, that some of my perceptions of forensic

entomology and of the English legal system, and especially of experts who offer advice beyond their area of expertise, are matters not only of interest but also of concern. I propose, therefore, to comment on a few cases in order to draw attention to four areas of concern:

- I. MISAPREHENSIONS REGARDING THE ROLE OF THE SCIENTIST
- II. INADEQUATE SCIENCE
- III. REFUSALS TO ACCEPT INESCAPABLE SCIENTIFIC CONCLUSIONS AND LIMITATIONS
- IV. INCOMPETENT AND FRAUDULENT SCIENCE

I. MISAPREHENSIONS REGARDING THE ROLE OF THE SCIENTIST

(a) The scientist requires specific questions in order to help an investigation

The role of the scientist is to examine material evidence in order to address a specific question put to him or her by whoever provided the samples from the case being investigated. Unless the provider of the samples poses a question the exercise is may prove to be pointless. Just because one has found insects in a corpse it does not follow that one needs the services of an entomologist. For instance, it is known that insects can act as bio-accumulators of some noxious substances: and in one case analysis of some scuttle fly pupae from the mummified remains of a woman drug addict allowed the identification of the drugs amitriptyline and nortriptyline (Miller *et al.* 1994). There was nothing to be gained by asking someone like myself to name the species of the pupae being analysed by the toxicologist. So why pay an entomologist to perform an irrelevant task? I was personally interested to read which species of scuttle fly was involved, but knowing this did not advance the investigation of the case.

A competent and honest scientist will only spend time identifying specimens if there is a specific question that requires this information. The unscrupulous will happily charge for the information even when he or she knows that it is irrelevant to the investigation.

Sometimes one does not know that the specific identity of the species tells one nothing useful until after one has

identified the specimens. For example, a customer purchased two batches of quality French wine, one white and one red. In each batch one bottle had a large fly floating just beneath the surface. I was asked to comment on the likely origin of this contamination - whether at the time of filling the bulk containers in France or in the bottling plant in Scotland. The large fly in each bottle proved to be a female of the same blowfly species. However, the species in question occurs in both France and in Scotland. Of more concern was the fact that both specimens were bloated with eggs. This meant that they had taken a protein rich meal prior to the maturation of the eggs. The normal source of such meals in these flies is dung or carrion, both of which are rich sources of unwelcome bacteria. When I poured the wine down the sink, by way of a sieve, I was surprised to find three *Drosophila* fruit flies at the bottom of the bottle of red wine. Again the species proved to be one common in both France and Scotland. However, a blowfly floats just below the surface as there are large air sacs in its thorax that help to cool its bulky thorax. This is why blowflies hum when they fly. Fruit flies, which have a larger surface area to volume ratio, lack these air sacs; which is why they sink when they drown in wine. This difference proved to be the critical observation, rather than the specific identity of the flies. How come that flies that sink and those that float ended up in the same bottle? By scrutinising two independent hygiene audits of the bottling plant in Scotland, I concluded that this double contamination was virtually impossible given the rigid procedures and series of routine checks that were in operation. I was therefore virtually certain that the contamination occurred at the time of the filling of the bulk containers in France.

(b) A scientist should have an open mind regarding competing hypotheses until the analysis is completed

For example, a lady assumed that the presence of insect eggs in a tray of mince covered in clingfilm, that she had purchased from a supermarket, were grounds for litigation against the supermarket in question. A Trading Standards officer brought me the offending eggs and details of the events preceding their discovery. The lady had removed the tray of mince from the chilled display cabinet and placed it in her shopping trolley. She subsequently tossed tins of dog food into the trolley. Back at home she put the mince in her fridge. The day she decided to eat the mince she took it from her fridge and left it on the table to thaw out before cooking. Later, when she picked it up she not only observed a small tear in the cling film but she also spotted the eggs some distance from the tear. I identified the eggs as being those of a species of blowfly and ascertained that the temperature of the display cabinet in the supermarket was below the threshold temperature at which the female blowfly of the species in question will lay her eggs. My reconstruction of the chain of events was that the tear in the clingfilm probably resulted from a tin of dog food landing on it and that a passing blowfly spotted the opportunity when the mince was thawing out on the lady's kitchen table. The lady initially rejected this hypothesis on the grounds that the eggs were too far from the tear. What she did not realise was that the female blowfly has a telescopic ovipositor that allows it to insert its eggs many millimetres into the cavity of a dead rabbit's nostril or whatever. She did not proceed with litigation when I advised that I would employ my interpretation of the facts in defence of the supermarket.

In the above case I had some idea before my investigation began as to whose side my findings would be likely to favour. In other cases I have no idea until my investigation is complete. For example, I recall a more serious case where my evidence averted a far more damaging threat of litigation. It involved insect contamination of supposedly sterile feed for rodents used in product evaluation trials by a Biotech company in France. As they were about to open the packet it was noticed it contained several small insects. The company therefore lodged a formal complaint with the sup-

plier, a French distribution company who had purchased the product from a Japanese company, to whom they therefore passed on the complaint. The Japanese company responded by threatening to sue them for defamation. I was asked to examine the insects in the offending packet. They included the scuttle fly species *Megaselia spiracularis*. This allowed me to conclude that contamination had occurred in the Oriental Region rather than in Europe. This resulted in no further talk of litigation against the French distribution company. The Japanese Company had never dreamed that accurate identification of the insects might indicate whether the source of the infestation was Europe or the Far East.

A striking case of an accidental introduction is that of *Megaselia scalaris* unwittingly transported to Australia's Antarctic base at Casey Station. The question was 'where had this infestation originated?'. The ship left Hobart in Tasmania and next docked in Perth in Western Australia to take on stores. It then headed for Cape Town in South Africa. However, it broke down and returned to Perth. Containers were offloaded and left on the wharveside in the heat of summer, while the ship was repaired. They were then reloaded and the ship once again headed for Cape Town, where more stores were loaded. It then headed for the Antarctic. When the containers were opened at Casey station flies swarmed out of some trays of eggs, some of which had cracked and gone bad. The conclusion I reached was that the eggs probably went bad when the container was on the wharveside in Perth and the flies probably detected the odours of these in Cape Town and laid their own eggs before the ship departed for Casey station (Nickolls and Disney 2001).

The above examples serve to underline that typically accurate identification of the species of insect in the sample from a case is the first step in one being able to draw any conclusions. Indeed some texts insist that this is invariably the case. But it is not so. It depends on the question posed. As I suggested just above, the use of insects as bioaccumulators of noxious substances does not necessarily require the specific identification of the insects concerned.

Perhaps the most striking example of an unexpected answer, underlying the necessity of not jumping to conclusions in advance, came from a case in Belgium. I was passed specimens of a scuttle fly recovered from the corpse of a woman found dead in her home and was asked for an estimate of the postmortem interval (the PMI). Fortunately I was also supplied with information as to when she was last seen alive. When I had estimated the most likely date of the laying of the eggs (oviposition) by the flies that had been reared from the larvae and pupae found on the corpse, to my surprise it fell within the pre-mortem period. Now the species of fly involved, *Megaselia scalaris*, will not only breed in corpses but will also invade the living in the right circumstances (Disney 2008). Confronted with my estimate I therefore suggested to my colleagues in Belgium that this was not a case of oviposition on a corpse after death but a case of pre-mortem myiasis. When the pathologist re-examined his notes it transpired that the location of the fly larvae in the corpse was indeed far better explained by the hypothesis of myiasis than that of postmortem oviposition. We therefore published this case as a cautionary tale (Dewaele *et al.* 2000).

This case has another lesson for us, but especially for the police. While the knowledge brought to bear upon a case may be derived from a body of research based upon carefully designed experiments, the investigation of a particular forensic case is an exercise in historical reconstruction based upon fragmentary data. The withholding of pertinent data, in a misguided attempt to avoid influencing the scientist, will be more likely to lead to a less precise answer than one that would be of more use to the police. Furthermore the police might ignore a correct answer because of it being unexpected. Thus if the police had not given my colleagues the date when the deceased was last seen alive they would not have learnt that the same species of fly might occur in both corpses and the living. Without

that knowledge, the police would have concluded that the PMI estimate I provided was wrong, and in all probability they would have then discounted my report!

My final comment in this section, on keeping an open mind until the analysis is complete, concerns the vital distinction between facts, which are sacred, and suppositions, which are just that. A particular case springs to mind. I was passed specimens of scuttle fly larvae from the corpse of a child exhumed from a shallow grave in a remote hillside wood. I was told that the incident leading to the girl's death had occurred at midday on a particular date more than two months before. I therefore asked for the temperature and rainfall data from that date until the day when corpse was exhumed. My forensic entomologist colleague also had a data logger placed in the grave for a week and reconstructed the temperature regime, by comparison with the Met Office data from the two nearest met stations. When I wrote my report I started with a statement of the given facts, including the precise date of the incident. The police then asked me to resubmit my report without mentioning this fact. It seems it had been a supposition only, derived from their interview of the prime suspect (an inveterate liar), but that later evidence had contradicted it. So I urge the police to supply the scientist with all relevant facts when submitting material evidence for examination, but to make sure that they are indeed facts and not mere suppositions.

II. INADEQUATE SCIENCE

Sometimes an apparently straight forward but erroneous conclusion may be due to a specialist straying outside his or her area of expertise. For example, I was asked to examine some insect larvae that a vet had found infesting the deep litter of a poultry unit. He wished to enforce action requiring the farmer to clean out the unit, disinfect it and spray it with insecticide. The farmer objected. The vet wanted me to endorse his condemnation of the conditions in which a farmer was keeping his chickens. He assumed the larvae represented a hygiene hazard. Having identified the insects as the caterpillars of a moth of a species whose larvae relish materials such as chicken feathers, I advised that nothing be done. My perception was that the caterpillars were useful refuse disposal operatives and that any spotted and swallowed by a hen would comprise a beneficial protein supplement. If however a change of the litter were to be deemed desirable on other grounds, then spreading it on the ground outside would provide a free meal of caterpillars for the local starlings. I perceived no grounds for the use of insecticide. Indeed, I perceived no case for the farmer running to the expense of scrubbing down, disinfecting and spraying insecticide. The vet was nonplussed. To him any insect larvae infesting litter in a poultry house was a bad thing and the farmer should be obliged to deal with it, whatever the cost. I would just add that Calvert *et al.* (1970) report on raising blowfly larvae on the chicken dung from poultry units and then harvesting the pupae for use as a substitute for soybean meal in the diet for growing chicks. They reported that these dried pupae were more than 60% protein.

III. REFUSALS TO ACCEPT INESCAPABLE SCIENTIFIC CONCLUSIONS AND LIMITATIONS

I will illustrate this point with the case of a badly neglected dog with maggots in a wound on its buttock. The lady responsible for the dog claimed that the wound had been acquired on the day she took the dog to the vet. He, however, didn't believe her and called in the RSPCA (an animal welfare organization), who passed me a sample of the maggots from the wound. I concluded from the age of the fly larvae that she was lying, as the eggs from which the larvae had hatched must have been laid some days before. Unusually, I had to appear in court as the lady, or rather her solicitor, refused to accept the logic of my report. Furthermore this solicitor indulged in two further habits that scientists find fundamentally disquieting when being cross examined by a

solicitor or lawyer.

1. He went in for bouts of indefensible time wasting. For example he asked me to state my academic qualifications. I referred him to the headed paper on which my report was written. At the top it gave my name followed by the standard abbreviations for Master of Arts, Postgraduate Certificate in Education, Doctor of Philosophy and Doctor of Science, the last being the highest British academic qualification it is possible for a scientist to obtain. I enlarged by adding that the first degree was based on the Natural Science Tripos at the University of Cambridge. The same university awarded me the PhD for my 1960s publications on medical entomology and later awarded me the ScD for subsequent publications on Diptera. The solicitor was not satisfied and requested that I start at the beginning and list what academic certificates, if any, I had obtained at school! I and the three magistrates were not amused by this time-wasting fatuity!

2. He made deliberate attempts to lure me into commenting on matters outside my remit. For example he started asking me about temperatures in dogs. I was obliged to cut him short and to tell him that if he wished to pursue that line of questioning then he would need to recall the vet to the witness box.

It is this sort of nonsense that brings the legal profession into contempt with those like myself, whose professional preoccupation is concerned with trying to arrive at the truth behind the surface appearance of things. While I recognise that both science and the law thrive on the clash of rival interpretations of evidence, in science, at least, it is generally regarded as reprehensible to attack one's opponent rather than his or her arguments; especially to do so by trickery designed to imply that one's opponent is a fool. It is even more to be regretted when a professional lawyer does this to an expert witness who is essentially an amateur in the thrust and parry of such silly games. Furthermore, it would not appear to be serving the interests of justice.

Returning to my theme, perhaps a commoner aspect of a refusal to accept the logic of scientific inference is an unwillingness to accept the limitations as to what the material evidence can tell us. For example in another case I did for the RSPCA a goat had had one leg tethered with wire, which caused a wound that became infested with maggots. I provided an estimate of the **minimum** time the goat had had the wound, observing that there were larvae derived from three distinct episodes of egg laying by the species of fly involved. I refused to give an opinion as to how long the goat had had the wound. My reason was simple. When third stage larvae come to the end of their feeding stage they will drop off the goat in order to seek a place in the soil to pupate. I was not in a position to know whether the three cohorts of larvae recovered from the wound were the only three that had infested the goat or whether they had been preceded by several previous cohorts.

The limitations of entomological evidence means that most of the time one deals in estimates not certainties. With insects, such as blowflies, that locate a corpse within a few hours or less following its exposure, the pre-oviposition period (POP) is short and the duration of development is likely to vary within strict limits. Consequently estimates of the postmortem Interval (PMI) may vary within narrow limits. With other species, such as scuttle flies, the degree of variation is greater. For example for *Megaselia scalaris* the published durations of development derived from laboratory cultures kept under fairly constant temperature regimes were recently summarized (Disney 2008). They show a surprising degree of variation, which may partly reflect different culture conditions and partly different strains of the fly. Besides, these data only provide the means of calculating the earliest estimated oviposition date (EOD), and hence the minimum PMI. They provide no information on the POP, which is influenced by the degree of exposure of the corpse, such as whether it is buried or wrapped in materials such as plastic bin liners. It is also known that for many carrion insects the POP is affected by differences in

the weather patterns prevailing at the time and in the preceding weeks and months (e.g. Archer 2003). Furthermore, in nature the temperature constantly fluctuates. A study of the durations of developments of two species of forensically important species of scuttle fly under different naturally fluctuating temperature regimes (Disney 2005) revealed a greater degree of variation than indicated by data derived from laboratory cultures.

IV. INCOMPETENT AND FRAUDULENT SCIENCE

When forensic science is the responsibility of government agencies it is liable to be inadequately funded. However, the subjection of forensic science to the pressures of market forces is liable to be not always in the best interests of justice. During most of the 20th Century forensic science in England was the responsibility of the Government's Forensic Science Service (FSS), who contracted outside experts in fields in which they lacked their own specialists. In 1989, the Tory Government gave the FSS agency status and opened it up to competition from independent companies. While most of the latter do a good job, inevitably some companies appeared on the scene that were either incompetent or fraudulent or both. I give below the details of my encounter with such a company in a high profile murder case. Before summarizing the salient points of this case, and the response of the Establishment to it, I provide a brief background - both entomological and political.

A. The entomological background

In the case in question I was asked by the police 'when were the eggs laid, which gave rise to the sample of scuttle fly larvae found in the corpse?'. They were hoping the answer would provide them with a minimum estimate of the Postmortem Interval (PMI). I therefore needed to take account of the fact that the duration of development depends on two sets of factors - genetic and environmental. Each species will have a genetic determinant involved in regulating the rate of development. Within the limits of this genetic constraint the rate can be speeded up or slowed down by environmental factors, of which temperature is usually by far the most important. However, all biological processes are subject to variation and therefore estimates of the PMI will be in terms of a range rather than a precise figure.

In order to attempt to answer the question posed by the police I needed three pieces of information:

- A. Identification of the larvae to the species level.
- B. The age of the oldest larvae present.
- C. Temperature data relating to the situation of the corpse.

In addition any circumstantial evidence, such as when the victim was last seen alive, where the body was found, etc., will be helpful.

So much for my problem when asked to estimate the minimum PMI.

I also need to sketch the political background in England that has allowed the growth of incompetent and fraudulent forensic science in a limited number of cases.

B. The political background

When a corpse is discovered the English police are required by law to get a medic to certify that the body is dead. They are also obliged to get a pathologist to attempt to determine the cause of death. However, it is entirely up to the police to decide if they require the services of any other forensic scientists. For most of the 20th Century England and Wales had a Government Forensic Science Service. It was funded by an annual contribution from each police force. The Police did NOT pay for each individual report on material evidence submitted. The FSS did not employ specialists to cover every possible field of science relevant to their investigations.

They maintained lists of competent specialists they

could contract as required.

They therefore exercised a measure of quality control on such expert witnesses.

A notable such freelance specialist was Zakaria Erzincioğlu, an expert on blowflies (Calliphoridae) (Erzincioğlu 1996), who was Britain's most experienced forensic entomologist before his untimely death in 2002.

By contrast with Zak, I am not a forensic entomologist but a specialist on the scuttle flies (Phoridae) of the world. I have only got involved when people like Zak in this country, Bernie Greenberg in Chicago, USA or Marcel Leclercq in Belgium passed me phorid specimens from their forensic cases. My reports on such specimens are normally incorporated in their reports to the police.

This system, of the FSS contracting expertise they lacked, worked reasonably well, apart from an occasional notoriously incompetent report. However, things changed when, in 1989, the Tory Government gave the FSS agency status, opened it up to competition from the private sector, and required the police to pay for each individual report requested. This commercialisation of the FSS means that police forces no longer know in advance how much forensic science services will cost them each year. While some excellent companies responded to the opportunity of entering the forensic arena, it also created an opening for charlatans. Zak highlighted this situation in a series of articles, notably in *Nature* with an article entitled 'British forensic science in the dock' (Erzincioğlu 1998) and in the last chapter of his excellent book *Maggots, murder and men* (Erzincioğlu 2000a).

The response of the Establishment to Zak's writings on this topic was, in general, an agreement with Zak's concerns, but there were some who criticised him for not naming names and providing detailed evidence of their chicanery.

Eventually, there was a belated response from the Establishment when the Blair Government formally launched the COUNCIL FOR THE REGISTRATION OF FORENSIC PRACTITIONERS (CRFP). However, this initially appeared to be a toothless tiger, as its Chief Executive had declared that it is NOT concerned with 'cleaning out dirty stables' (Kershaw 2000).

In the U.S.A. the increase in bogus experts is being dealt with by a growing demand that expert witnesses have relevant certificated qualifications in a branch of forensic science. Thus entomologists claiming expertise in forensic entomology increasingly require a postgraduate qualification in this sub-discipline (e.g. see Byrd and Castner 2001). Even then such forensic entomologists occasionally require the services of a specialist on a particular family of insects beyond their own range of expertise. While there is some merit in this demand for certification it runs the risk of excluding subcontracted specialists such as myself, who lack certification in a branch of forensic science. A further development in the U.S.A. is increasingly frequent litigation against fraudulent 'expert' witnesses for their incompetent reports and the subsequent exposure of their ineptitude in court (e.g. see Byrd and Castner 2001). The basis of such litigation is a charge of malpractice on grounds of tort. By contrast, in Britain it seems that anyone can claim to be an expert and can charge increasingly inflated fees to the police for their essentially fraudulent reports.

In response to the criticism of Zak by the Establishment to the effect that they could not act unless he named names and spelled out the detailed evidence, I tested this assertion when I encountered first hand one of these rogue experts when I was called upon as an expert witness in the case of the murder of an 87 year old lady in July 1999.

I proceeded to name names and give the evidence, but still the Establishment failed to act. I therefore wrote this up and published it (Disney 2002), and the company in question subsequently failed in their attempt to sue me for defamation.

I will now proceed to describe this specific case, but I will focus attention on the unacceptable science rather than dwelling upon the naming of names.

C. A particular case of fraudulent forensic science

I choose this case because of my own involvement. It is, however, representative of the sort of work that characterises a **small** minority of rogue companies as manifested in several other cases encountered by myself and others.

The murderer had left his victim's body under a blanket on the floor of a ground floor room while he systematically worked through the house over the next few weeks. Some scuttle fly (phorid) larvae were recovered from the corpse at postmortem and passed to me for an estimate of the post-mortem interval. How did I set about this?

The first stage was to identify the larvae to the species level. The size of this problem is the fact that there are well over 300 species of scuttle fly recorded from Britain? The nearest urban garden for which I had data was Buckingham Palace Garden in London (**Table 1**). This figure of 23% of the recorded British scuttle flies is similar to the figure of 25% for Cambridge gardens (Disney 2001). However, only 51% of the species of the two lists combined were common to the two sites. That gives some idea of the size of the problem. One can start reducing this by eliminating from consideration species whose larvae are known to be parasitoids of ants, ladybird pupae, etc. However, the larval habits of most species are still unknown. So I had to compare the specimens from the case with preserved samples of voucher specimens from series of larvae, the majority of which were not preserved but were reared through to the adult stage. The most important collection of such voucher material in Britain is in the Cambridge University Museum of Zoology. I identified the larvae as the species *Megaselia rufipes*. Today the use of molecular signatures is gradually replacing, or at least augmenting, such traditional methods of identification. But we are only just starting to obtain such data for Phoridae (Böhme *et al.* 2010).

The second stage of the investigation is to estimate the age of larvae from their stage of development and consideration of the temperature regime during the period preceding discovery of body. On this basis I estimated that the eggs giving rise to the larvae had probably been laid between 12th and 16th July. So my minimum PMI estimate was that death occurred not later than 16th July. However,

there were cheques made out 'by the victim' to a dairy and an electricity supply company, both dated 19 July. Her milkman produced a note 'from the victim' dated 21st July, saying she was away in hospital. A British Gas man had also called at the victim's house on 21st. He could get no reply but reported a radio or TV could be heard. In addition my estimate eliminated the two prime suspects the police had on their list, as they had assumed that death had occurred later than my minimum PMI estimate. The police therefore sought a second opinion on the PMI estimate. Unfortunately they contracted a company with no expertise in the identification of scuttle fly larvae. This company, which I will call the MEC, was contracted to examine the four larvae that I had not slide mounted. One of their entomologists, who I will call B, collected these four larvae from me. Despite having no doctorate (as I later discovered), he signed the chain of custody documents, for these larvae, in which he is twice referred to as '**Dr**' B! These are, of course, legal documents that are especially likely to be closely scrutinised in any appeal proceedings.

Mr B merely looked up a 1980s text on forensic entomology (Smith 1986) that only keys relevant fly larvae to the **family** level. He 'identified' the species by choosing the one discussed at the greatest length under the family Phoridae. He chose the species *Conicera tibialis* that typically goes for **buried** bodies, as indicated by its common name of Coffin Fly. Having got the **genus** and the **species** wrong he produced a PMI that estimated the latest date for the arrival of the fly's eggs as **26th June!** However, the last recorded phone call by victim was on **10th July**. The frustrated police therefore asked Zak to adjudicate between the two reports. His report endorsed mine and concluded that B's report was totally unacceptable. The subsequent police investigation discovered that the murderer had deliberately forged the milkman's note and two cheques, thus providing false evidence that the victim was still alive, while he methodically plundered her home over several days. It was probably the murderer who had turned on radio or TV that the British Gas man heard.

The report by B was so unprofessional that, following the court case, I lodged a formal complaint with the Council for the Registration of Forensic Practitioners (CRFP), copied to the Police, the Crown Prosecution Service (CPS) and a scientific society (here referred to as the Society).

My reason for copying my report to the Society was that B (in his report) gave as part of his credentials that he was a member of the Society. The Council of the Society set up a subgroup to decide how to respond to my report. Despite being aware that the MEC was (rightly or wrongly) widely regarded, by the scientific community, as being responsible for poorly controlled experiments and the selection of data to support favoured conclusions, the Society's Council declined to widen its enquiry beyond the specific complaint against B's report to the Police.

The Society's subgroup requested an explanation from B. In particular he was asked how he could claim to have examined (internal) larval mouthparts without having dissected a larva. He correctly claimed that one larva was damaged at its head end. He also claimed to have found some mouthparts floating free in vial of alcohol. However, I had decanted the larvae from the original vial, slide mounted some, and then one by one transferred the rest to new vial of fresh alcohol. No free floating mouthparts were transferred, none were in vial that police subsequently collected from B for Zak's investigation, and B was unable to produce the mouthparts specimen at issue. If he had been able to do so these mouthparts would have demonstrated his incompetence beyond dispute, as they so clearly differ in the two species at issue (see Figs 82 and 83 in Smith 1986). However, all this is a gross red herring, as B's remit was to report on the four larvae that I had handed over to him, not on any debris, real or imagined, that was floating about in the same tube.

Furthermore, in the Crown Court at the trial of the murderer, I had put it to the jury that my two-year old grand-

Table 1 Genera and numbers of species of scuttle fly recorded from Buckingham Palace Garden compared with the list for the British Isles (from Disney 2001).

GENUS	Summary of List of British Phoridae		%
	Number of Species		
	British List	Bpg List	
<i>Aenigmatias</i>	3	0	0
<i>Anevrina</i>	4	0	0
<i>Beckerina</i>	1	0	0
<i>Borophaga</i>	6	0	0
<i>Chaetopleurophora</i>	4	0	0
<i>Chonocephalus</i>	1	0	0
<i>Conicera</i>	6	2	33.3
<i>Diplonevra</i>	7	3	42.9
<i>Dohrniphora</i>	1	1	100
<i>Gymnophora</i>	4	1	25
<i>Gymnoptera</i>	2	1	50
<i>Hypocera</i>	1	0	0
<i>Megaselia</i>	229	56	24.5
<i>Metopina</i>	8	4	50
<i>Obscuriphora</i>	1	0	0
<i>Phalacrotophora</i>	2	1	50
<i>Phora</i>	13	2	15.4
<i>Plectanocnema</i>	1	0	0
<i>Pseudacteon</i>	3	1	33.3
<i>Puliciphora</i>	1	0	0
<i>Spiniphora</i>	4	1	25
<i>Triphleba</i>	23	2	8.7
<i>Woodiphora</i>	1	0	0
Total Genera	23	12	52.2
Total Species	326	75	23

daughter would be able to **disprove** the identification of the larvae by B if she were to be shown images of larvae of the two species in question that our Departmental Photographic Section had prepared for me. Apart from technical details, the larvae of the Coffin Fly are much more slender, and nearly round in cross section, compared with the larvae from the case. One can never prove an identification, but it is often easy to disprove an identification. The conclusion was that B's report was an amalgam of ignorance, incompetence and fabrication.

I sent a report of my appearance at the trial (including copies of the photographic images) to the Society and the CRFP. The Society's Council then took almost six months to reach the astonishing conclusion that admission to its membership only indicates academic standing and that betrayal of professional standards therefore does not, under the Society's statutes, provide grounds for expulsion from its membership. Furthermore they concluded that the misidentification by B 'was a general error of the kind that any of us might make'! I responded that we were not discussing an undergraduate project, but a report to the police for which a high fee had been expected for an expertise that B patently lacked. I suggested that an equivalent error in mammalian taxonomy might be the misidentification of a young rhinoceros as a juvenile hippopotamus. The judgment of the Society's Council, and their seeming defence of B, completely ignored fact that he had flouted the first rule of forensic science - never comment on anything outside one's area of special expertise. I therefore sent critical comments on their judgment to the Society and copied these to the Police, the CPS and the CRFP. None of these institutions thought that the unacceptability of the B report to the Police was a matter requiring action from them. However, after the trial, the Police did submit a report to the National Crime Faculty on the conflicting reports from myself and B.

D. So who is responsible for ridding the system of rotten apples when it comes to grossly incompetent forensic scientists?

In pursuit of an answer I wrote an article on this case, naming names and giving the evidence. This article was initially offered to three Establishment journals in Britain

- *Nature*, then *Science & Public Affairs* and then *New Scientist*. However, despite initial enthusiasm on part of the first two, they backed off because of a fear of litigation, despite fact that all relevant facts and interpretations condemning B's report were already in the public domain (not least in the proceedings of a Crown Court). The rejection by the *New Scientist* was unfortunate, as in 2001 they had published an article on the MEC. This article was excellent free publicity for a commercial enterprise, but bore little relationship to its reputation within the scientific community. Furthermore, by refusing to publish my article *New Scientist* allowed itself to be seen to have given credibility to the MEC. My detailed account of this case and the Establishment evasions was therefore published in the leading French journal of forensic medicine (Disney 2002). Almost predictably I was sent a threatening letter by B's solicitor in February 2003. He had advised him that I should be threatened with litigation on the grounds that my article amounted to defamation. He demanded that I publish a retraction and pay B's legal costs. However, the bluff was called when it was pointed out that the sure way to bring adverse publicity down upon the MEC would be for me to defend my charges against B's report in court.

More than 50 copies of my article were sent to relevant people in the Establishment. Less than half responded, including the two members of the Cabinet most directly concerned - the Home Secretary and the Lord Chancellor. I did, however, get a note of acknowledgement from 10 Downing Street, but received no evidence from any member of Tony Blair's Government that the matter was of any concern to them.

This then leaves us with a final consideration.

E. Why has the British establishment failed to act, despite overwhelming evidence of the unacceptability of Mr. B's report to the police?

The Establishment had quickly learned from others, apart from it being documented in the proceedings of several court cases, that B's report to the police was not unrepresentative of the quality of the MEC's forensic work. I have no evidence of conspiracy to silence me. Indeed, all those I have dealt with have invariably been civil, even courteous. They have seemingly been honourable and well intentioned. However, they have shared two characteristics: a reluctance to be involved in a rumpus and a fear of litigation. When legal advice has reinforced the latter fear it has then served to reinforce the former. Furthermore, legal advisers themselves are evidently fearful of offering incorrect legal advice regarding the likely risk of litigation and thus tend to allow this fear to incline them to exaggerate the risk. When this fear is allied to perception that their client is wanting an excuse for avoiding any action that is likely to produce a distasteful rumpus then the temptation to exaggerate the risk of litigation may become irresistible. However, it was clear that any threat of litigation in this particular case could not be sustained. Indeed, in the lively exchange of letters between B's solicitor and myself, he was unable to demonstrate that a single statement in my article referring to B or the MEC was untrue. B paid his own legal costs. I incurred none.

CONCLUSION

I conclude that the British Establishment has not consciously conspired to avoid confronting the issues posed by this case. Its response has been more akin to that of an immune system confronted with an antigen, leading to a cumulative rejection response to the challenge to take action against B for his fraudulent report.

Finally, I would like to point out that other areas of forensic science are also suffering from the Bs of this world, as indicated in Zak's further book *Every Contact Leaves a Trace* (Erzinclioğlu 2000b). The testimony of incompetent or fraudulent scientists runs the risk of allowing guilty persons to go free or innocent persons to be wrongly convicted.

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REFERENCES

- Archer MS** (2003) Annual differences in arrival and departure times of carrion insects at carcasses: implications for succession studies in forensic entomology. *Australian Journal of Zoology* **51**, 569-576
- Böhme P, Amendt J, Zehner R, Disney RHL** (2010) Molecular identification of carrion-breeding scuttle flies (Diptera: Phoridae) using COI barcodes. *International Journal of Legal Medicine* **124**, 577-581
- Byrd J, Castner JL** (Eds) (2001) *Forensic Entomology - the Utility of Arthropods in Legal Investigations*. CRC Press, London, 418 pp
- Calvert CC, Morgan NO, Martin RD** (1970) House fly larvae: biodegradation of hen excreta to useful products. *Poultry Science* **49**, 588-589
- Dewaële P, Leclercq M, Disney RHL** (2000) Entomologie et médecine légale: les Phorides (Diptères) sur cadavres humains. Observation inédite. *Journal de Médecine Légale Droit Médical* **43**, 569-572
- Disney RHL** (1968) Observations on a zoonosis: Leishmaniasis in British Honduras. *Journal of Applied Ecology* **5**, 1-59
- Disney RHL** (1983) Scuttle Flies - Diptera, Phoridae (except *Megaselia*). *Handbooks for the Identification of British Insects* **10** (6), 1-81, with 186 figs
- Disney RHL** (1989) Scuttle flies - Diptera Phoridae genus *Megaselia*. *Handbooks for the Identification of British Insects* **10** (8), 1-155
- Disney RHL** (1994) *Scuttle Flies: The Phoridae*, Chapman and Hall, London, xii + 467 pp
- Disney RHL** (1999) British Dixidae (meniscus midges) and Thaumaleidae (trickle midges): Keys with ecological notes. *Freshwater Biological Association, Scientific Publications* **56**, 1-129
- Disney RHL** (2001) The scuttle flies (Diptera: Phoridae) of Buckingham Palace Garden. *Supplement to the London Naturalist* **80**, 245-258

- Disney RHL** (2002) Fraudulent forensic scientists. *Journal de Médecine Légale Droit Médical* **45**, 225-230
- Disney RHL** (2005) Duration of development of two species of carrion breeding scuttle flies and forensic implications. *Medical and Veterinary Entomology* **19**, 229-235
- Disney RHL** (2008) Natural history of the scuttle fly, *Megaselia scalaris*. *Annual Review of Entomology* **53**, 39-60
- Erzinclioglu Z** (1996) *Blowflies*, Naturalists' Handbooks 23. Richmond Publishing Co. Ltd., London, 71 pp
- Erzinclioglu Z** (1998) British forensic science in the dock. *Nature* **392**, 859-860
- Erzinclioglu YZ** (2000a) *Maggots, Murder and Men*. Harley Books, Colchester, 256 pp
- Erzinclioglu Z** (2000b) *Every Contact Leaves a Trace*, Carlton Books Ltd, London, 256 pp
- Kershaw A** (2000) Courting expertise. *Science and Public Affairs* **October**, 24-25
- Miller ML, Lord WD, Goff ML, Donnelly B, McDonough ET, Alexis JC** (1994) Isolation of amitriptyline and nortriptyline from fly puparia (Phoridae) and beetle exuviae (Dermestidae) associated with mummified human remains. *Journal of Forensic Sciences* **39**, 1305-1313
- Nickolls P, Disney RHL** (2001) Flies discovered at Casey station. *Australian Antarctic Magazine* **1**, 54
- Smith KGV** (1986) *A Manual of Forensic Entomology*. British Museum (Natural History), London, 205 pp