V I E W P O I N T

THE SIGNIFICANCE OF PCBs IN OTTERS: A REPLY

KRUUK Hans

Institute of Terrestrial Ecology, Banchory AB31 4BY Scotland

The 'Viewpoint' by Chris Mason in the previous bulletin perpetuates a fallacy which should not go unchallenged, because it could affect conservation efforts. The points I will make here are that there may be effects of polychlorinated biphenyls (PCBs) on otter populations, but they have not been demonstrated, and that there are thriving otter populations in which most individuals carry concentrations of PCBs far in excess of the 'environmental standards' mentioned by Mason. By focussing solely on PCBs we may ignore other, harmful substances occurring in the same areas, and by applying the wrong 'environmental standards' we may declare large areas unsuitable for otters (and otter introductions) although they are, in fact, good otter habitat.

There is no doubt that several of the PCB congeners, in the concentrations at which they are sometimes found in the wild, can be severely deleterious to an otter's welfare and cause death (Leonards, 1997). Many other organisms are affected, and obviously every effort should be made to rid the environment of PCBs.

However, we should not overstate our case. PCB levels were probably high in at least several of the areas in Europe where otters disappeared. But we do not know that PCBs were the causal factor: in many, if not all of those same areas industry and agriculture between them shed a load of different pollutants (organochlorines and heavy metals), also lethal to animals and many of them appearing and disappearing with similar timing. Only few of these have been adequately studied. Since we cannot do experiments, we will never know for certain if there was only one culprit in the demise of otters, if so which one, or if there were several.

What makes me suggest that we have to be especially careful with the suggestion of PCBs as the culprit is
(i) other organochlorines such as dieldrin have been convincingly demonstrated as the cause of decline in many birds of prey and aquatic birds (e.g., Newton et al., 1993). They are therefore also likely to have been involved in the case of the otters (common declines, therefore common cause), and
(ii) PCBs probably do not accumulate in otters with increasing age, so the animals must be metabolizing or excreting them (Kruuk and Conroy 1996; Leonards 1997).

The effects which PCBs have on individual otters are a matter of concern as animal welfare. However, for conservation management it is more important to study the effects on populations, a point eloquently made by Newton (1988) for birds. Every ecologist knows that mortality effects in populations are not just additive: often we see compensation. To simplify this ad absurdum: if a lake has enough food for ten otters, and if there are ten animals and each year ten cubs are born, then half the population has to die or emigrate each year. From a population point of view it may be immaterial if this is achieved by starvation, or by emigration, or some other cause of death such as pollution.

The consequence is that if a habitat is sufficiently rich in resources, an otter population can sustain heavy mortality from whatever source, as long as the animals can reproduce fast enough.

The argument is not just theoretical: there is convincing evidence that otter populations can thrive in many of the areas with a high load of PCBs. We have demonstrated in Shetland in what must be one of the densest and largest populations in Europe, that the majority of otters carries almost twice the concentration of PCBs in the liver which Mason calls 'critical for survival' (Kruuk and Conroy 1996; Mason et al., 1992). It is disingenuous to suggest that this is caused by a single oil terminal on Shetland which acts as a poisoned sink for otters. Even if it were true, it would be special pleading to explain away a result which does not fit the hypothesis. The fact is that the terminal output is scrupulously monitored by independent observers and always has been, there is no local PCB hotspot, and otters everywhere on Shetland carry heavy loads of PCBs, on all the islands as far as they can be from the terminal. It has been demonstrated that many North Sea mammals have a very high PCB burden (hence people on the Faroe Islands are strongly advised not to eat the livers and blubber of pilot whales, Simmonds et al., 1994), because a very large area is polluted.

Shetland does not stand alone, but we showed that the average otter over large freshwater areas on the Scottish mainland also has a very high PCB burden, albeit somewhat lower than in Shetland, but still above the so-called 'critical concentration' (Kruuk and Conroy, 1996). These are areas such as the north-east, the north-central region and the south-west region of Scotland, mixed agriculture and woodland areas where otter numbers are high, they are everywhere, and numbers are either demonstrably stable or increasing. Similarly, there are several otter populations in continental Europe and Ireland (also referred to by Mason) which are thriving, whilst carrying high burdens of PCBs.

It will probably always be impossible to trace the exact cause of the crash in otter populations in previous decades, whether this was PCBs or some other contaminant. We now have to look ahead, and at what is happening at the moment. The welfare of individual otters existing with various pollutants is of obvious concern, and that would be reason enough to make every effort to rid our environment of PCBs. But when we are involved with conservation management, or with reintroductions of otters, one should assess population performance (e.g., reproduction versus mortality) and not just one single cause of disease or pollution. Such assessment cannot be achieved by just a few spraint counts.

Some otter populations are clearly able to thrive even if the environment is dirty: it is up to us to find out exactly what keeps their numbers down. So far, we have no convincing evidence that PCBs are the culprit.

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