Geologists challenge asteroid theory of extinctions

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estimated from fossil deposits in the areas that the layer was deposited at only 0.6 millimetres per thousand years. The researchers concluded that the deposits formed naturally over 200,000 years.

Other deposits are known from the same geological boundary, 367 million years ago. However, none of the others contains excess iridium, according to Helmut Gilsanz of the Geological Survey of Canada in Calgary. He agrees with Hurley and Van der Voo that algal mats could have concentrated iridium. However, he thinks that the deposits formed in a much shorter period, perhaps weeks or months. His evidence is based on the fact that they contain none of the sand found in layers above and below the deposit.

Gilsanz believes that the mats formed when a shallow ocean basin overturned. This created anoxic, or reducing, conditions which were suitable for the growth of algae. He says that the iridium layer was formed after the mass extinction.

Another geologist has also come up with evidence that casts doubt on the asteroid-impact hypothesis. Thomas Lehman of Texas Tech University in Lubbock believes that the climate changed at the end of the Cretaceous period, when dinosaurs and many other species became extinct.

Lehman has studied stream deposits in Texas. The sediment sample is 31 metres thick and indicates, he says, that the climate changed from warm and dry to cool and damp from the late Cretaceous to the early Palaeocene (Geology, vol 19, p 362). There is a sharp change in fossil-bearing soils just above the last dinosaur bones. The sediment indicates the climate was changing for about two million years says Lehman. This is hard to explain on the basis of one impact, he says. Earlier, researchers studying fossil pollen had also found evidence of a climate change in the late Cretaceous.

In the sediment, Lehman found a layer that was slightly enriched in iridium five metres above the last dinosaur bones. However, he does not consider this layer "conclusive evidence" of an impact-related iridium anomaly. Ocean coverage of the continental shelf was changing at the time, but the deposits were formed several hundred kilometres inland, where climate impact should have been minimal.

**Killer sparrows**

INFANCIDICIDE is widespread in the animal world—and it is largely carried out by males. Now, however, a Spanish biologist has found a species in which both females and males practise infanticide.

José Veiga, of the Natural Science Museum in Madrid, has studied the house sparrow (Passer domesticus), a species in which infanticide is a major cause of the death of nestlings. He finds that the two sexes have different reasons for murdering nestlings. In both cases, however, infanticide is "sexually selected"—that is, it occurs when members of one sex compete for mates (Animal Behaviour, vol 39, p 496).

Infanticide is most common in males because females tend to invest most time and energy in reproduction. This limits the rate at which males can mate and produce offspring. By killing a female's young, a male will make the female available to breed and so increase his own opportunities to reproduce.

Infanticide which has been sexually motivated is much rarer among female animals. It occurs only in species in which the females have to compete for the parental help of the males.

Among house sparrows, one in 10 of the attempts to breed occur after a bird has committed infanticide. Veiga found that if male house sparrows commit infanticide, they do so when they have recently lost a mate. They then breed with the female whose brood they have destroyed.

On the other hand, Veiga found that the females that kill nestlings always seem to be the "second wives" of bigamous males. He says this is because the male will help to feed the nestlings of his "primary" mate only. The male kills these nestlings in order to divert the male's parental care to her own offspring.

**Why watchful males are more attractive**

In the world of the grey partridge (Perdix perdix), you're a good catch if you're a vigilant male. A biologist in Sweden has found that females are unimpressed by macho types which notch defeat other males in fights. Instead they go for males that keep a good look-out for danger.

Jens Dahlgren of the University of Lund in Sweden carried out experiments to determine just what it is that female grey partridges look for in a male (Animal Behaviour, vol 39, p 464). Grey partridges are monogamous, which means that choosing a mate is particularly important. Often, females that are breeding for the first time change their mate several times before finally settling on a partner for life.

Dahlgren found that female grey partridges do not choose their mates on the basis of any obvious morphological characteristics. Puzzled, he decided to investigate whether they are influenced by the "vigilant behaviour of males". Vigilant birds crane their necks and look around in an alert manner. Dahlgren had noticed that males seem to do this more than females.

To test whether this vigilant behaviour was important, Dahlgren placed partridges in two types of aviary. One was screened from the outside world, while the other was not. First thing, he arranged things so that females had to choose between two males: one from the screened-off enclosure and one from the open one.

He found that the birds preferred the male from the open enclosure. These birds were clearly the most vigilant. Dahlgren satisfied himself that the female grey partridges were showing a preference for the males, and not just a preference for the aviary.

Dahlgren believes he can explain why female grey partridges pick mates who are watchful of their surroundings. The more vigilant a female's mate is, he says, the more time she can afford to spend with her head down, foraging. The better fed she is, the more likely she is to rear a large brood of chicks successfully.

Males can also be vital in cases where the chicks have hatched with both parents on the lookout for danger. Chicks are less likely to be snatched by predators.

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