

Ageing without sex?

SIR — Is it possible to grow old without having sex? This intriguing question was discussed in a stimulating review¹ in which Partridge and Barton argue that accumulation of deleterious mutations is at least a part of the cause of senescence. In asexual lineages deleterious mutations inevitably accumulate by 'Muller's ratchet'². This happens because, in a finite population, there is always a chance that the class of individuals with the fewest deleterious mutations will be lost. Without recombination, this class cannot be recovered and so fitness (or longevity in this case) will decline irreversibly.

Discussion of Muller's ratchet always raises the question of persistent asexual lineages²: if they exist in organisms with large genomes and population sizes less than about 10^{10} (ref. 3) they present a paradox. Partridge and Barton refer to lineages of fish and salamanders, believed to be aged 4–5 million and 100,000 years old, respectively, based on mitochondrial DNA analyses, but argue that they are not truly asexual. A more commonly quoted example is the bdelloid rotifers, a whole order of animals that is considered to be entirely asexual². However, the rotifers have essentially no fossil record⁴ and have yet to be subjected to molecular analysis.

We wish to draw attention to the ostracod superfamily Darwinuloidea. These freshwater crustacea have an excellent fossil record extending back to the Carboniferous (>286 million years). They are very distinct in that females possess a brood pouch, absent in most other freshwater ostracods; not surprisingly, pouch-brooding leads to marked shell sexual dimorphism in other ostracod groups (such as Timiriasevinae). Modern darwinuloids are exclusively parthenogenetic, and there is no evidence of shell dimorphism (or sexuality) in any fossil darwinuloid since the late Mesozoic (about 70–90 million years ago)⁵. There are two extant genera, *Darwinula* and

Microdarwinula, in which all species are exclusively asexual. *Darwinula* spp. are known into the Carboniferous⁶, and one species, *D. stevensoni*, is common in deposits throughout the Quaternary and earlier into the Miocene (24.6 million years ago), but a single report of a male now appears unreliable⁶.

D. stevensoni lives for 3–4 years, of which it may be adult for 2 years^{7,8}. This is considerably longer than most freshwater ostracods, whose life cycles typically last for 1 year at most⁹. It is not rare or obscure as population densities may exceed 10^5 m⁻² (ref. 8). Therefore it does appear to represent a paradox.

Large population size may be a way out of this paradox. Populations of *D. stevensoni* may exceed the limit of 10^{10}

above which Bell³ considers sex unnecessary to avoid Muller's ratchet, but these large population sizes are unlikely to be maintained in the shallow freshwater habitat of the species for extended periods of time. Certainly, populations present in Europe today must have passed through much smaller population sizes during periods of postglacial expansion.

Maynard Smith says we 'badly need to know' how bdelloid rotifers manage without sex². Given their excellent fossil record, perhaps attention should also be paid to the Darwinuloidea.

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Ancient use of cannabis

SIR — From the presence of *Cannabis sativa* in the ancient tomb of a girl who probably died in childbirth, Zias *et al.* in their Scientific Correspondence¹ conclude that the plant was used to increase the force of uterine contractions and decrease labour pains, and was administered by a midwife because "in antiquity" physicians were prohibited by law from attending women in labour. Although we agree that the plant probably was used for medicinal purposes, we do not think that it was used for the purpose Zias *et al.* suppose.

Even if we assume that cannabis does increase the force of uterine contractions and decrease labour pains (we are not aware of recent studies on these subjects), the fact that it was used in a difficult delivery does not prove that it was used because of these pharmacological properties. In ancient medicine, many plants were used (of the more than 300 medications mentioned in the *Corpus Hippocraticum* about 250 are plants²), and therefore it would not be surprising if cannabis were found among the plants used in the case discussed. But this does not mean that it was used because of its (alleged) effects on the uterus.

As a general rule, if a certain plant used in antiquity has a particular pharmacological property, it is not justified to assume that it was used because of that property³ unless it can be shown that the drug was used more often than others in the appropriate clinical situations⁴. If, for example, besides Δ^9 -THC, Zias *et al.* had also found traces of opium, would they be justified in concluding that the patient was given *Papaverum somniferum* to relieve her pain? No. Taking the *Corpus Hippocraticum* as a guide, it is clear that the plant was often used, but usually with other plants and not for the treatment of pain. Rather it was used for such disparate conditions as empyema, "phthisis", "typhus", leucorrhoea, habitual abortion,

"dropsy of the uterus", metrorrhagia and "displacement of the uterus". In all these cases there is no mention of pain. On only three occasions is the relief of pain mentioned and, in these, poppy is used as one ingredient in a mixture with other drugs (thirty in one case, four — burned for fumigation — in another) and only in one case is given with just one other drug. Therefore, we cannot conclude that poppy was used by Hippocratic physicians for the purpose of controlling pain simply because they used it and because we know that it contains opium. Similarly, as we do not know the circumstances concerning the use of cannabis in the case described by Zias *et al.*, it is likely that it was used (probably with other herbs) by chance and not for its (alleged) effects on labour pains.

We do not know why Zias *et al.* believe that "in antiquity" physicians were prohibited by law from attending women in labour, but in ancient Mesopotamia the physician presumably attended deliveries as he performed caesarean sections⁵. In the *Corpus Hippocraticum* there is ample evidence that physicians attended deliveries, and Soranus' *Gynecology* dispels any notion that physicians did not attend women in labour in the Roman world.

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