DEATH OF A SPECIES

Why there is only one species of Olive Sunbird

The distribution of Olive Sunbird mirrors that of forested habitats in Africa.

The Olive Sunbird *Cyanomitra olivacea* is one of the most widespread sunbirds in Africa, occurring in a range of forest habitats from Senegal to Ethiopia and eastern South Africa. In 1993, Phillip Clancey argued that it comprised two species: the Eastern Olive Sunbird *C. olivacea*, confined to areas east of the Rift Valley, and the Western Olive Sunbird *C. obscura* from west of the Rift, with isolated populations on Zanzibar and Pemba. The main feature used to separate the two species was the presence (Eastern) or absence (Western) of yellow pectoral tufts in females. This classification was adopted by *Birds of Africa*, but a recent genetic study that

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formed part of Rauri Bowie's PhD thesis has shown that the situation is more complex, and arguably more interesting.

Bowie's study was motivated by more than a desire to assess the validity of the proposed split of the Olive Sunbird. By studying the evolutionary relationships among current populations, we can gain valuable insights into prehistoric changes in climate and vegetation patterns. Although Africa wasn't subject to extensive glaciation during the so-called ice-ages, Pleistocene cycles of glacials and inter-glacials almost certainly had major impacts on the continent's climate and vegetation. During wet periods, forests probably occurred continuously from Senegal to Ethiopia and south-eastern South Africa, whereas in dry periods they were confined to refugia in the Upper Guinea region, Congo Basin and the chain of mountains that run down the eastern side of the continent.

The cycles of forest contraction and expansion would have fragmented and re-united populations of birds and other forest species, a process thought to be important in the evolution of Africa's forest birds. However, the genetic evidence to date worldwide suggests that, at least among birds, most species-level divergence occurred well before the Pleistocene. To test ideas about Pleistocene impacts, we have to look within species or a recently evolved group of species. And this is where the Olive Sunbird is ideal.

Bowie's study was the first to analyse the genetic relationships at a continent-wide scale among an African forest bird that occurs in both montane and lowland forests. Blood samples collected from across the continent were sequenced for the mitochondrial NADH gene to construct an evolutionary history or genealogy for the Olive Sunbird complex. Perhaps surprisingly, genetic divergence is generally low, and there is no support for separation of eastern and western populations. Indeed, most of the genetic diversity occurs in East Africa, with birds from as far afield as South Africa, Zambia, Congo, Cameroon and Ghana all being closely related to one another.

Apparently, the Olive Sunbird experienced a considerable expansion of its range about a million years ago, probably from a core population in East Africa, coincident with climate changes and an expansion of the forest biome during the mid-Pleistocene era. The subsequent contraction of forests as the climate became drier now keeps the eastern and western populations out of contact with each other, and genetically isolated. Yet the evidence of low genetic divergence suggests that there have been several instances of secondary contact in the more recent past, presumably associated with smaller climate and habitat shifts.

The genetic evidence also provides little support for the 13 or so subspecies currently recognised based on morphological differences. This might be because evolution in size and shape may occur quite rapidly, especially among small, isolated populations. The discrepancy between the species' genetic structure and the distribution of physical attributes requires further study. However, the results emphasise the potential of sophisticated analytical techniques applied intelligently to the detail of the life around us to unlock some of the secrets of our planet's history.

*For further information, see Bowie, R.C.K., Fjeldsa, J., Hackett, S.J. & Crowe, T.M. 2004. 'Molecular evolution in space and through time: mtDNA phylogeography of the Olive Sunbird (*Nectarinia olivacea/obscura*) throughout continental Africa.'* Molecular Phylogenetics and Evolution *33: 56-74.* □

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