Mysteries of the mountain francolins

Clues to the history of life on earth obtained from analyses of DNA challenge old ideas and pose new questions about evolutionary relationships among birds. For example, in recent years systematists have discovered that many of Africa's 36 currently recognised species of 'francolin' are not close evolutionary relatives.

A combination of DNA, anatomical, behavioural and ecological evidence places them in at least two major groups that 'perch' on widely spaced branches of the gamebird evolutionary tree. One such group of 'francolins' includes partridge-like species such as the Red-necked *Pternistis afer* and Swainson's *P. swainsonii* francolins. Indeed, they group with species such as the Chukar Partridge *Alectoris chukar*, introduced populations of which still persist on Robben Island. Those from the other, distantly related major group that includes quail-like birds such as the Coqui *Peliperdix coqui*, Crested *Dendroperdix*

Djibouti Francolin* Pternistis ochropectus*. Range: Two small montane forests in Djibouti. Population: <1 000, decreased by more than 90 per cent in the past 20 years. Status: Critically Endangered. Taxonomic position: unknown.

Mount Cameroon Francolin* Pternistis camerunensis*. Range: SE and NE slopes of Mount Cameroon. Population: <10 000 and decreasing. Status: Endangered. Taxonomic position: unknown.

sephaena and Greywing *Scleroptila africanus* francolins reside on the same evolutionary branch as the Asiatic 'francolins' and, believe it or not, the common chicken (= Junglefowl *Gallus gallus*)! Although francolins and partridges are broadly similar in their ecology, behaviour and anatomy, they seem to have converged on these common natural histories from different evolutionary directions.

Pamela Beresford, a new post-doctoral fellow at the Fitztitute, is studying the evolutionary history of the seven 'mountain francolins' of Africa. All seven have small – in some cases minute – ranges confined to ever-shrinking highland habitats. They are widely scattered across Africa, from Djibouti in the east to Cameroon in the west and Angola in the south. Little is known about them – they are secretive and rarely seen – and three of the seven species have the dubious honour of holding places in the latest (2000) Red Data Book.

Because collecting new specimens of these montane endemics is not a realistic option, unravelling their history will only be possible by using evidence from DNA extracted from small flakes of skin from long-dead museum specimens. The development of this technique (studied by Dr Beresford as a Chapman Graduate Fellow at the American Museum of Natural History in New York) has opened the world's museum collections of rare or endangered birds, such as the montane francolins, to molecular evolutionary scrutiny.

The seven mountain francolins were first proposed as belonging to the same evolutionary group by Mrs Pat Hall (British Natural History Museum) in 1963, but whether or not they are indeed each other's closest evolutionary relatives remains to be tested rigorously. Some preliminary DNA-based research done in the late 1990s suggested that one of the species, Erckel's Francolin *Pternistis erckelii*, belongs among the partridge-like francolins, but the taxonomic positions of the remaining six remain unresolved. If these 'francolins' prove to be each other's closest relatives, there may have been ancient connections between the remnant patches of highland vegetation to which they are now confined.

After spending many years in the biological doldrums, bird taxonomy is experiencing a major revival, spurred to a large degree by the requirements of the looming biodiversity crisis. In parallel with this, the development of cutting-edge molecular techniques has provided modern scientists with tools their predecessors did not even dream of. Even 20 years ago, the idea of reconstructing species' evolutionary histories from DNA extracted from tiny snippets of skin seemed far-fetched. This new molecular evolutionary microscope

Swierstra's Francolin* Pternistis swierstrai*. Range: Isolated mountains in central western Angola. Population: <10 000 and decreasing. Status: Vulnerable. Taxonomic position: unknown.

minimises the need to catch or kill rare and endangered species. Thanks to the collecting efforts of museum-based ornithologists in the past, we are now in a position to gain new knowledge from specimens sometimes more than a century old that could help us to conserve these species in the future.

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