



Loess and bee-eaters III: Birds and ground in the Punjab and the Indus region



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ABSTRACT

Part 3 of the study of loess ground and bee-eater birds concerns birds and ground in the north-western part of the Indian Sub-continent. Three species of bee-eaters are considered, relative to the Indus region: the Green bee-eater, the Blue-cheeked bee-eater and the European bee-eater. Loess in the Indus region is considered via the deterministic approach to loess deposit formation; the P events occur in the mountains of the western part of High Asia, particles are formed by the action of mountain glaciers. Major T actions involve the five rivers of the region which carry loess material into the Punjab plains. Subsequent T actions deliver loess material to local deposits, which provide nesting grounds for bee-eaters. To some extent the bee-eaters define the loess. The Green bee-eater is small (16–18 cm long) and lives over all of India and Pakistan—nesting ground is available everywhere. The larger bee-eaters (European and Blue-cheeked: (25 cm)) are more constrained by ground properties—they require the ideal properties of loess ground (an ideal positioning relative to the Heneberg compromise) for nesting, and thus tend to define loess extent. Soil mechanics requires that more exact stress conditions are achieved when a relatively large nest tunnel is being constructed.

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“Bee-eaters prefer to nest in loess.”

Zoltan Kerenyi and Emilia Ivok (2013)

1. Introduction

The connection of loess and bee-eater birds has been explored in two previous papers (Smalley et al., 2013b; McLaren et al., 2014) and discussed in detail by Heneberg (2013). In this paper we focus on the loess deposits in N.W. India and neighbouring regions and on the Blue-Cheeked and Green bee-eaters. In some ways, this is a continuation of the study of the 15N region in Africa and the Northern Carmine bee-eater. The demarcated ground is the same type of second-order loess as indicated on the Scheidig (1934) map and the approach is the same. We attempt to determine if it is possible to produce a satisfactory sedimentological and geomorphological view of the critical region which explains the presence of material which can be described as loess- and the presence of a particular species of bee-eaters. The region needs a name: the 15N

designation was very useful for the Northern Carmine bee-eaters and their associated ground, not precise but convenient and memorable. We propose the “Indus region loess”: this is a major region indicated on Scheidig (1934) and Fry (1984) distribution maps and is a useful zone for initial focus.

We aim to show that this should be considered a loess region because large bee-eaters choose to nest there. We aim to show that bee-eaters nest in the Punjab and the Indus region because they are attracted by the loess deposits. This is small scale engineering; bird engineers test the ground and then construct quite elaborate nests and living quarters; bird engineers mimic human engineers. The concept of bee-eater as engineer has been discussed (Casas-Criville and Valera, 2005).

2. The bee-eaters (species and sub-species)

We concentrate on three bee-eater species: the Asian Green Bee-eater (*Merops orientalis* Latham 1801) (Fig. 1), the Blue-cheeked bee-eater (*Merops persicus* Pallas 1773) (Fig. 2), and the European bee-eater (*Merops apiaster* L1758) (see Smalley et al., 2013b for discussion). Distribution maps based on Fry (1984) are shown in Fig. 3 and 4. We have a very early speculation based on the size of these birds. The European and Blue-cheeked bee-eaters are

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Fig. 1. The Green bee-eater (the little Green bee-eater, the Asiatic Green bee-eater) *Merops orientalis* Latham 1801.

relatively large, they are perhaps the largest of the bee-eaters, being about 23–26 cm long (not counting tail extensions), they are relatively similar birds and they do interact (Kossenko and Fry, 2008). The Green bee-eater, on the other hand, is the smallest of the bee-eaters, about the size of a sparrow, ~16 cm long. This could affect the nesting. The ground requirements for a large tunnel are much more rigorous and restrictive than those for a small tunnel—which would give the Green bee-eater access to many more grounds than its larger cousins.

Fig. 3 shows the breeding zones of the Green bee-eater (based on Fry, 1984, pl.5). The sub-species are indicated: *M. o. viridissimus* is found in zone 1, in West Africa. Its breeding grounds overlap with those of *M. nubicus* which were discussed in McLaren et al. (2014). *M. o. cleopatra* (3) is Nile based, and *M. o. cyanophrys* (4) favours the coastal regions of the Arabian peninsula. *M. o. beludschicus* (6) is found in the region under consideration, this is an Indus region bird, but the species spreads all across India (Asokan et al., 2003) and Bangladesh (*M. o. orientalis* 7) and into Burma and neighbouring countries (*M. o. ferrugeiceps* 8). Boehm's Bee-eater (*Merops boehmi*) 9 is found in southern Africa.

Fig. 4 shows the breeding grounds of the Blue cheeked bee-eater (based on Fry, 1984, pl.6). The sub-species are indicated: *M. p. chrysocercus* 1, and *M. p. persicus* 2. There is a well marked nesting zone in the Indus region, and *M. p. persicus* spreads to the west as far as the shores of the Mediterranean. One or two interesting outliers: in north-west Africa we speculate that there is a band of

loess or loess-type ground immediately to the south of the Atlas mountain range, and that this accounts for that isolated observation of *M. p. chrysocercus*; which is also found at the northern bend of the Niger river—another possible site for loessic material (see McLaren et al., 2014). In Fig. 4 some small occurrences of the Madagascar bee-eater *Merops superciliosus* are indicated: *M. s. superciliosus* 3, and *M. s. alternans* 4, small occurrences of a bird very similar to *M. persicus*.

3. Loess in India and Pakistan

The situation appears to be ideal for loess formation; there is a source for loess particles, there is a large river for transport, there is a desert for particle storage if required, there are landscapes for aeolian deposits, there are winds and climates and environments propitious for loess deposit formation. The simple deterministic



Fig. 2. The Blue-cheeked bee-eater *Merops persicus* Pallas 1773.



Fig. 3. Distribution of Green bee-eater; after Fry (1984, pl.5). Sub-species locations are shown: *M. o. viridissimus* 1; *M. o. flavoviridis* 2; *M. o. cleopatra* 3; *M. o. cyanophrys* 4; *M. o. najdanus* 5; *M. o. beludschicus* 6; *M. o. orientalis* 7; *M. o. ferrugeiceps* 8; Boehm's Bee-eater (*Merops boehmi*). Widespread distribution over all of the Indian sub-continent.

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