scarce with increasing aridity and distance from human settlements. It is uncommon or rare in sand dunes and the species has not been recorded at all in the whole of the core Empery Quarter. It is scarce and local in desert areas of Yemen, central Oman and many parts of central and northern Saudi Arabia. Although widely regarded as sedentary, a few do make short-distance wanderings, probably mostly in winter, and individual birds can turn up in the most remote and arid locations. However, its wandering range must be relatively small, because there are some isolated human settlements that it has not yet, or only recently, reached. For example, the village of Jubba in the south-central part of the Great Nafud, which is surrounded by sand-seas for at least 40 km in all directions, did not have the species in 1986. Also, the Crested Lark was not present in 1996 near the relatively large Saudi Arabian town of Sharawrah in the southwest Empty Quarter, which is at least 100 km of sand away from the nearest other settlement. This lark also occurs on all the large islands and many small islands around Arabia, having apparently colonised some UAE islands like Qarman, Abu al-Abyad and Das in the 1990s. The relatively remote Das Island had eight birds present in June 1997. It is absent from the Socotra Archipelago. There is no evidence of immigration into Arabia in winter of birds from the north, although the occasional bird that turns up on Das Island does suggest that a few may cross the Arabian Gulf.

The map shows all records.

The population is large but more concentrated than, for example, the desert-dwelling lark species. One estimate of the birds present on a 500 ha farm near Sohar in Oman was 100 pairs, 56 pairs were once estimated as resident on the northern plain of Ma'atra Island, and one observer in highland Yemen reported a pair every 80-100 m during a transect of 3 km. Another count of the species singing and displaying in a previously unrecorded field of Alfalfa Medicago arabica in central Arabia, 500 m in radius (70-80 ha), gave an extrapolated population for the singlepivot of 475 pairs. The optimum breeding conditions found in fodder crops such as alfalfa and grasses are not commonplace and are less numerous than the area devoted to wheat growing, which is not favoured by the species, possibly because it receives more applications of pesticides than fodder crops. The total Arabian population is suggested to be about six or seven million breeding pairs, based on its occurrence in 700 Atlas squares with an average population in each of these Atlas squares of 10,000 pairs; or about three pairs for each square kilometre. The Arabian population has probably increased at least five fold since about 1970, because of the great increase in human settlements and agricultural development in that time. During the ABIA period the species has been found to be numerous in many Atlas squares where irrigated agriculture has been established in recent decades, areas which were probably unsuitable for the species a few years earlier. On the other hand, there are anecdotal reports that the species is becoming scarce in some local areas, notably in northern Oman. The UAE population was estimated at 50,000-100,000 pairs in 1996 (Abu-Arub 1996 b), but revised down to 25,000-50,000 pairs in 2006.

In usual habitat is cultivated areas, gardens, waste ground around human settlements and nearby scrub desert. It is commonly seen by the roadside. This habitat is not generally shared with other lark species, with the possible exception of the Greater Hoopoe-Lark, Alauda africanus. Food is taken on the ground and it will also dig into the surface with its bill. Food recorded in Arabia includes a variety of seeds and invertebrates. Of four birds collected in spring near Jeddah, seeds made up the majority of the crop contents of all, and the other food items present were termites and ants. A bird collected in Kuwait held 266 seeds of four varieties, a nut and some sand, whereas insects and grain were in a specimen from Ras al-Khaimah, UAE. It has been seen carrying carrion to young. Food passing between adults has been noted, which may have been part of courtship. On one occasion, a bird was seen to steal a grasshopper from another Crested Lark and eat it. There is also a record of a Crested Lark having its food stolen by a White-cheeked Bulbul Pycnonotus leucogenys. Another was chased by an Indian Roller Coracias benghalensis, but it failed to relinquish the grub it carried. Elsewhere, human food scraps such as bread and a variety of plant material, fruits and plant shoots are taken. Its commensalism with humans and limited dispersal into arid regions may be because it needs to drink regularly.

Despite the species' relative abundance, few notes of breeding behaviour have been reported. In May, a male displayed to a female on the ground with both wings outstretched and flapping, the tail was cocked and the head thrown back onto the mantle with the bill wide open and it pirouetted. On another occasion, the male sang on the ground and displayed to the female with drooped wings and crest erected vertically. Males do sing on the ground, but the full song is sweet and varied and given during a display flight which involves bowing and circling and may be high (80 m). Song flight often ends in a plummet.

The period when the majority of nests hold eggs is from March to June. Near Jeddah, nests have been reported with eggs in January and February. Late nests with eggs, in June and July, are almost all from the Dhofar region. Some nesting reported from Ma'atra Island was also relatively late. However, both these latter regions have also recorded nests which fit the main breeding period mentioned.

The nest is a cup in the ground that may be excavated, or a natural depression such as a hoof print may be utilised. This depression is lined with grasses, small twigs and moorlets, and plastic threads may be woven into the main fabric. It is lined with softer material such as sheep wool, hair or feathers. The nest is usually protected, but the majority of birds are seen in the north side and at the base of a clump of grass. At other times it can be shaded completely by a plant, and the entrance is reached by the birds creeping under the plant. Most rarely the nest is in a relatively open situation such as a grassy lawn.

Of 39 nests where eggs were recorded, the clutch size and the number of nests with that clutch size were as follows: 1 (1 nest), 2 (2 nests), 3 (19 nests), 4 (10 nests) 5 or more (4 nests) and 6 (3 nests). One observer monitoring five nests in Kuwait found that of the 21 eggs laid (clutch sizes 1 x 5 and 4 x 4), 14 birds were thought to have fledged. Of the remainder, one clutch of four was deserted, two eggs from one clutch were broken by children (but contained embryos) and another egg from the same clutch was infertile. Thus, three full broods of four or five all fledged. The nestling period for those nests was 9-11 days. At least one young bird left the nest before it could fly. Groups of birds from June to September have been noted to contain mostly juveniles (Boxer et al. 1989).

Black-crowned Sparrow-Lark Eremopterix nigricaps

The seven species of the genus Eremopterix occur from the Cape Verde Islands, through sub-Saharan Africa, Arabia and the Indian sub-continent. The Black-crowned Sparrow-Lark is scattered throughout the semi-desert and desert belt from the Cape Verde Islands to north-west India. Five subspecies are usually recognised. The subspecies E. n. affinis of south-eastern Iran and north-west India has occasionally been suggested for some eastern Arabian specimens, but the majority of Arabian specimens are attributed to E. n. melanophanes, which ranges from east Sudan to Somalia through Arabia to Iraq and Iran. The birds of the Arabian mainland were previously widely recognised as E. n. scincitaula (Ripley 1967) and those on Socotra Island, reportedly showing more robust upper parts and a large white patch on the forehead, have been named E. n. forbesiana (Ripley & Bond 1966), but neither have been universally recognised and Kilian (2007) considered that both are referable to E. n. melanophanes.

In Arabia, the Black-crowned Sparrow-Lark is a resident or nomadic species occurring generally in small parties. During
the ABBA period it has been recorded in a fairly narrow belt along the Arabian Gulf coast, in Kuwait, eastern Saudi Arabia, Bahrain, Qatar and the UAE. It is a widespread and abundant resident in Oman and Yemen (except the highlands). It has been recorded commonly in coastal areas of the Red Sea north to Jeddah. It also breeds on many sandy islands in the Gulf and the Red Sea. On the Arabian mainland, it inhabits the central plains south of about 26°N. There are few records from the Emirate Quarter. It is common on the Socotra Archipelago, including Abd al-Kuri Island. In Arabia, it is found in a wide range of suitable habitats. Its flexible ecology enables it to successfully survive in arid environments and to adapt to new ones: it has for example colonized irrigated Allfalla Madigae uattur pivots in central Arabia (Rustem & Wocher 1996) and frequents arable and dairy farms. No real migration patterns have been identified. The number of birds at any one site may vary from year to year, so in some years it may be common while in others it may be absent altogether. This suggests a degree of nomadism, linked with local environmental factors such as humidity, temperature or food availability; for example the species is often recorded in areas with recent rainfall. It is regarded as resident in Bahrain, Dhusar and near Jeddah. The species has a tendency to wander and move away from the breeding grounds in the Eastern Province, central Arabia, the UAE and Oman after breeding. In the UAE, flocks gather from mid-July to September, when molts is completed, and then leave coastal areas to roost inland in winter. On the Al Madam Plain in the UAE, Woottan et al. (1997) found 115 birds in each square kilometre in winter. Outside the breeding season, birds may then become locally common, for example from October to mid-March on the Salalah Plain, Dhusar, where flocks of several hundred birds can gather and large post-breeding flocks of over 1,000 have been reported. A flock of 700 was seen in winter near Taif.

The map shows all records.

The density of breeding birds is variable. Pairs are generally loosely distributed over suitable habitat, with densities perhaps averaging 0.2–0.5 pairs per hectare, sometimes higher. For example, 2.2 birds per hectare were recorded in herbaceous grassland on the Yemeni Tihama, where it was regarded as common (Dowsett 1996) and pairs were spaced 50–100 m apart in Kelha, UAE. Locally, where rich, suitable environment is reduced or parched, density may be much higher in optimum habitat and up to about 10 pairs per hectare have been recorded in sandy, well-vegetated small wadis among bare, stony ground in Bahrain (Berger & Horner 1990). The breeding population in the UAE has been estimated at 5,000–10,000 pairs or more. This works out at a maximum of 500 pairs in each atlas square where the species occurs in the UAE. This would seem to be a reasonable population density for the rest of the Gulf, northern Oman and southern Arabia, but more might be expected on the Red Sea coastal districts and fewer in central Arabia. In the sand-seas few birds are found and these are probably nomadic, for example two driving transects in the eastern part of the Emirate Quarter in February only produced 0.5 birds in a linear 100 km (equivalent to about one pair in 80 km2) in an area of high dunes and small sabkhas (first transect) and none at all in an area of gravel plains, sabkhas and dunes (second transect). This was an arid region with limited plant diversity. A similar driving transect in the Wadihah Sandh, Oman, in December yielded 46 birds over 105 km (equivalent to about one pair in 1 km2) and in the Kuwait interior desert (overgrazed) in March three birds were seen in 32 km (equivalent to about one pair in 5 km2). Local census work on Socotra Island suggests a much higher density locally, with perhaps 70,000 pairs present on the island. High density is also reported from Faraan al-Kahil and Seghd Islands in the Red Sea. The total Arabian population is probably at least 400,000 pairs but there may well be over one million pairs.

This species inhabits light or sandy soils covered with loose vegetation, in assembling often dominated by grasses (such as Pennisetum turgidum, Sporobolus arabicus, Stipagrostis plumosa, Zea piperioides and Zea arabica), and Gramineae (Cyperus avicenniae and C. comatus) that give abundant food, either insects for young in the nest or seeds for the feeding of adults. It is commonly seen near cultivation, at farms, by the roadside and irrigated green flanks of highways and in acacia groves. It has been recorded from sea level to 850 m on Socotra Island in April at 9,800 m near Taif and 2,200 m in Sana'a's airport, Yemen. It feeds on the ground but will occasionally perch on low bushes, or the top of a standing head of millet. In the Eastern Province, food taken was mostly seeds, either picked from the ground or directly from plants, sometimes fluttering up to 30 cm from the ground to snatch seeds, but birds were also taking insects and caterpillars, including flying insects which were chased (Morgan & Polvin 1986). In central Oman, small groups were seen feeding on bare sand dunes during a strong breeze and it appeared they were picking up small items, probably seeds, exposed by the breeze. Near Jeddah a male was seen offering seeds of Z. simplex to three females, which was probably part of courtship; one took seeds directly from its bill. Near Jeddah the feeding habits of four spring birds contained seeds only. The species has been seen to eat split grain near Aden and uncooked rice split on a concrete lorry park in Oman and so is able to exploit human sites. Other food recorded in Arabia is millers, borage seeds and locusts. Feeding activity is mostly concentrated in the early part of the day and the last hours before sunset. The hottest part of the day is often spent in the shade of plants and rocks, where individuals may seek a small hollow in the sand in which to lie panting and with spread wings, which clearly has temperature regulation benefits. It has also been recorded using the burrow of the large Spiny-tailed Lizard Uromastyx aegyptius for thermal regulation. It has been seen feeding at roadside rainwater pools and effluent streams and it drinks regularly when water is available. On Socotra, it has been recorded drinking at brackish pools.

It has been reported feeding in the UAE desert with a flock of House Buntings Emberiza arbistris. On one occasion, a pair on a Yemen Red Sea island in July was seen to hold out their wings while facing a Gruner Hoopoe-Lark, Alouatta alouatta. This may have been an anti-predator behaviour to protect eggs or small chicks from the larger lark.

In the Eastern Province nests were built on the ground usually at the base of vegetation such as Anabasis articulata (the most favoured plant in that area), Heliotropium crispum, Pennanumum digitatum and Astragalus sieberi and on Bahrain nests were built against Zeysippa pseuder and Panicum turgidum. Nests are mainly oriented to avoid direct hot sun in the afternoon. Other Arabian nests have been found in a bank on the side of a water catchment bank, below a concrete block 1 m above the ground, on the side line under a piece of driftwood and in the shade of a leaning stone. Territoriality is only marked in the immediate vicinity of nests, that is within about a 2.5 m radius of the nest. The nest is a small cup dug in the ground, lined with fine material such as grass and sedge stems or leaves with seed plumes, more rarely with a few feathers and pieces of plastic and paper. Dead stems are laid around the cup. Once in Oman, grasses were added to a nest that already contained eggs. A pair of small pellets and mud pieces is sometimes placed at the nest entrance. Nest-building activity last only 1–3 days. Nesting has been recorded mainly in spring in Arabia, but the Black-crowned Sparrow-Lark is an opportunistic breeder that times its reproductive cycle to rainfall, humidity and temperature; it is thus able to breed all year round, provided that the right environmental conditions are met. It is likely
that successive broods are hatched at widely separate locations if climatic conditions are suitable. Song, courtship and nest-building have been recorded all year round. Eggs-laying is mainly from March to June, particularly in the Gulf and in central Arabia, but eggs or young have been found in every month except December, although one nest with three eggs was found on 1 January (Essos 1989). The main breeding season in Socotra is probably in the winter, with eggs noted there in November and February. Eggs are laid daily and are mainly incubated by the female for 10-11 days. The clutch size is five to four eggs (with a mean of 2.56 eggs recorded from 43 nests, Table 15). The loss of eggs, eggs and young is locally high, and the average brood size at successful nests is 2.88 young (recorded from 18 nests, Table 15). One report from Kuwait noted that a female and two chicks were found dead at the nest after heavy rain. At six days of age, young explore the vicinity of the nest and leave it two days later; no family parties in excess of two young have been recorded. Both adults feed the young out of the nest. A female has been observed feeding from a standing plant of Amara kogidina (Boraginaceae) and also taking seeds from the plant and giving them to a young juvenile with her.

Patrick Bergier

Temminck's Lark

Eremophila bilopha

Temminck's Lark is a monotypic species inhabiting a belt of land from the western Sahara through North Africa to Syria and Iraq and northern Arabia. It is the Saharo-Sindian counterpart of the Horned Lark E. alpina, which is widely distributed in North America and northern Eurasia. There is one report of two "harried" larks from Maita Island on 11 September 1972. These birds were thought by the observer to be E. alpina because of yellowish marks on the face and the fact that they were on the shoreline, a typical non-breeding habitat of that species.

Temminck's Lark is a resident of the hard northern desert plains and is most numerous north of 29°N. It occurs commonly in the extreme north of Saudi Arabia, especially near the border with Jordan and Iraq, but in some years it also breeds as far east as Kuwait and as far south as Riyadh, near Abqaq, and probably also near Hasa in the Eastern Province. It is almost certainly more widespread as a breeding bird in central Arabia than records suggest, but there are also large areas of apparently suitable habitat in the north from which it is absent. Flocks form after the breeding season, and sometimes as many as 150 birds together. In most winters, generally November to March, small groups are found over a wide part of central Arabia, including near Riyadh. A few individuals move much further afield and exceptional records have been reported from Yanbu (September) and Jeddah (November) on the Red Sea coast and Dubai, UAE, in December. A single adult reported from the desert interior of Yemen (Tatters 1994) in June is difficult to explain. It has not been recorded from Bahrain, Qatar, Oman or the Socotra Archipelago. The map shows all records, including the extralimital ones.

The results of driven transects and walked censuses during a survey of the northern plains of Saudi Arabia in February 2009 suggested that the population in that region after some years of drought was between 142,000 and 305,000 pairs (Jennings et al 2009). As the species is more numerous further south, the total population of Arabia is probably about 750,000 pairs, or an average of about two or three pairs in each square kilometre over about 100,000 square kilometres in northern Arabia. Almost all are in Saudi Arabia, this species has been little studied in Arabia and more information is needed to understand its precise habitat requirements. Presumably it is less tolerant of hot arid conditions than many other larks in view of it being restricted to northern Arabia. The species is generally found breeding in hard, stony deserts, or rock-strewn sandy areas with tufts of vegetation. It does not breed in areas of bare rocks, hilly regions or soft, sandy desert and never apparently in sand dunes. Breeding has not been recorded within 50 km of the coast. It rarely occurs above about 800 m altitude. Winter habitats occupied are broadly the same as the breeding areas. In years of good rains it can be found in the same habitat as five or six other breeding larks, but in its typical habitat in northern Arabia there are usually few other lark species present to compete with it. There is no information available on how the increase in irrigated farmland has affected this species. It is perhaps likely to have benefited from the increased availability of green vegetation that agriculture provides and the areas of rough ground between irrigated crops would be suitable for it. There is little precise information from Arabia on food taken. Once in northern Arabia, a bird was seen to peck at and eat pieces of a fleshly leaved green plant and it has been seen to feed a caterpillar to young. Once, one was observed flying-catch. It is likely to take small seeds and a range of invertebrates as elsewhere in its range. It has been noticed turning over small stones, in the manner of the Ruddy Turnstone Arenaria interpres, presumably looking for seeds or invertebrates. In winter, flocks have been reported to visit rubbish areas regularly.

In Kuwait birds have been seen to sit on the green leaves of the Desert Grass Clasidium edule during periods of hot weather, interpreted as a cooling mechanism (Cowen & Brown 2001).

Pairs form into winter flocks in January, and adults then remain mostly paired until late May or early June. In the dry spring of 2009, birds were paired and building nests in early February in the eastern part of northern Arabia, which had received a little rain, but in the dry north-west region the species was still roaming flocks at the end of the month. The song of repetitive whistling notes can be given from the ground or a perch or during a rising and falling song flight. Two males showed aggression to each other in the presence of a female by bowing deeply to each other with tails raised and hopping aggressively forward, which culminated in an aerial flight, rising vertically. During courtship there is much pair-chasing both on the ground and in the air; aerial clashes sometimes ending in copulation. Courting birds have been seen to adopt a creeping gait, which has also been noted in the vicinity of nests under construction. Nests are invariably placed on the north side of a rock or plant. The nest is excavated as a deep cup into the surface and is lined with roots, dry grasses, scraps of paper, compacted plant down, wool or feathers, also strands of plastic feed bags. One nest cup in central Arabia was lined with mud, similar to the nest of the Song Thrush Turdus philomelos, with small pieces of rag and wood embedded in the mud but with no grass in the structure. Every nest has