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On the natural history of West African Rock Dove *Columba gymnocycla*

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Summary.—Named in 1856, West African Rock Dove *Columba livia gymnocycla* differs markedly in appearance from other Rock Dove subspecies. Recent DNA analyses have revealed that *gymnocycla* is also genetically very different from *Columba livia*, warranting species status for this taxon. The species was never abundant in its small distribution, and only a small number of specimens are present in museum collections. A search for the species in Senegambia in 2024 was unsuccessful and *C. gymnocycla* may have already vanished from much or all of its distribution.

'*Our knowledge of* Columba gymnocyclus *is very small, and there is no reliable evidence of its distribution*' (Hartert 1899: 406).

West African Rock Dove was named by G. R. Gray (1856: 28) based on a description of rock doves in Senegal by Hartlaub (1854: 205–206). Gray named the species 'The Western African Pigeon' *Columba gymnocyclus*. Due to its remarkably dark coloration (Fig. 1), later authorities (e.g., Hartert 1912–21: 1471) questioned whether Gray's *gymnocyclus* was a Feral Pigeon *Columba livia* rather than a separate taxon, and Hartert (1916: 84) included *gymnocyclus* as a subspecies of *Columba livia*. Similar dark-coloured rock dove populations

Figure 1. West African Rock Dove *Columba gymnocycla* (right-hand image of each pair, NHMUK 1855.12.19.299, adult, Senegal) compared with Rock Dove *C. l. livia* (NHMUK 1965.M.4564, adult, 22 January 1918, Taranto, southern Italy). *C. gymnocycla* is smaller (see Table 2) and much darker than any of the *C. livia* subspecies, see also Fig. 7. It also has a large, bare patch of red skin around the eyes unlike any *C. livia* subspecies (see also Fig. 3) (Jonathan Jackson, © Trustees of the Natural History Museum, London)

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Figure 2. All earlier museum specimens of West African Rock Dove *Columba gymnocycla* (see Table 1) came from 'Senegal' but without any further locality and/or habitat details. A: MNHN-ZO-MO-1880-3685, adult, Senegal (Patrick Boussès, © Museum national d'Histoire naturelle, Paris). B: RMNH.AVES.216826, adult, Senegal [Senegambia on later label] (Pepijn Kamminga, © Naturalis Biodiversity Centre, Leiden)

from Mali and Ghana were described as *Columba livia lividior* by Bates (1932: 12) but subsequently this taxon was synonymised with *gymnocyclus* by White (1965: 153). Based on gender agreement between Latinised adjectival species-group names and the genus name with which they are combined (ICZN 1999: xxvi), the name *gymnocyclus*—Latinised from the Greek *gumnokuklos* (bare-ringed)—had to be changed to *gymnocycla* (David & Gosselin 2002: 29).

Recent genomic analyses have demonstrated that Senegalese *gymnocycla* is indeed closely related to populations in Mali and Ghana (*lividior*), despite moderate genetic differentiation (F_{st} = 0.15), probably due to geographic isolation (Hernández-Alonso *et al*. in press). More importantly, together with earlier analyses it was found that *gymnocycla* is basal and highly differentiated (F_{st} >0.3) compared to other *livia* populations (Hernández-Alonso *et al*. 2023, in press). Another key finding of these analyses is that, unlike *livia*, West African *gymnocycla* shows no evidence of genetic introgression from the closely related Hill Pigeon *C. rupestris* in Central Asia from Turkestan to north-east China (Gibbs *et al*. 2001), indicating distinct evolutionary histories. For these reasons, in combination with the morphological differences, Hernández-Alonso *et al*. (2023, in press) argued that West African populations should be considered a full species.

To explain the genetic divergence of West African *gymnocycla*, an evolutionary model based on the Refugia Theory has been proposed (Hernández-Alonso *et al*. 2023). According to this model, West African *gymnocycla* represents an ancestral lineage that diverged due to allopatric cycles associated with Pleistocene glacial and interglacial periods. The West African lineage likely survived in refugia south of the Sahel during hyper-arid Sahara periods, whereas the *livia* lineage may have survived in refugia in Central Asia, where admixture with Hill Pigeon occurred.

In this paper we emphasise the importance of West African Rock Dove being treated as a species to galvanise conservation efforts. *C. gymnocycla* has always been rather rare with a limited distribution, and only a small number of specimens—all with few or no locality data—exist in museum collections (Table 1, Fig. 2), but currently it seems to have become

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TABLE 1

Skin/mounted specimens of West African Rock Dove *Columba gymnocycla* present in museum collections and known to the authors. NHMUK = Natural History Museum, Tring; MNHN = Museum national d'Histoire naturelle, Paris; ZMB = Museum für Naturkunde, Berlin; NHMO = Natural History Museum, University of Oslo; RMNH = Naturalis Biodiversity Center, Leiden; AMNH = American Museum of Natural History, New York.

Reg. number	**Locality**	**Date**	**Sex**	**Skin/mount**
NHMUK 1837.5.13.199	Unknown (= Senegal)	Pre-1837	ad.	ex-mount
NHMUK 1855.12.19.299 **	West Africa (Senegal, died in captivity)	Pre-1855	ad.	ex-mount
NHMUK 1855.12.19.327	West Africa (Senegal, died in captivity)	Pre-1855	ad.	ex-mount
NHMUK 1920.6.8.150	Senegal, Dakar	3 June1920	f	skin
NHMUK 1920.6.8.151 **	Senegal, Dakar	3 June 1920	f	skin
NHMUK 1932.8.6.1 * (holotype of *lividior*)	Mali, Mopti, Fiko	9 January 1932	m	skin
NHMUK 1932.8.6.35 (paratype of *lividior*)	Mali, Mopti, Fiko	4 January 1932	m	skin
NHMUK 1932.8.6.36 * (paratype of *lividior*)	Mali, Mopti, Fiko	9 January 1932	m	skin
NHMUK 1938.3.18.30	Mali, Hombori	15 January 1938	f?	skin
NHMUK 1911.12.23.135	Ghana, Gambaga	18 April 1901	m	skin
NHMUK 1936.2.21.356 *	Ghana, Gambaga	13 April 1901	m	skin
MNHN-ZO-MO-1936-935	Mali, Koulikoro, Kati, Kati	8 August 1920	f	skin
MNHN-ZO-MO-1880-3685	Senegal (died in captivity)	20 December 1880	ad.	mount
MNHN-ZO-MO-1938-1161	Mali, Mopti, Douentza, Hombori	18 January 1938	m	skin
MNHN-ZO-MO-1933-1512 (paratype of *lividior*)	Mali, Mopti, Fiko	6 January 1932	f	skin
MNHN-ZO-MO-1947-452	Mali, Kayes, Bafoulabé	1888–89	ad.	skin
MNHN-ZO-MO-1947-453	Mali, Kayes, Bafoulabé	1888–89	ad.	skin
MNHN-ZO-MO-1947-454	Mali, Kayes, Bafoulabé	1888–89	ad.	skin
MNHN-ZO-MO-1966-391	Mali, Mopti, Douentza, Hombori	5 September 1959	f	skin
ZMB 11158 (holotype of *gymnocycla*)	Senegal	Pre-1853	ad.	ex-mount
ZMB 2000.18337	Togo, Savanes, Bogou	16 July 1901	ad.	skin
NHMO-BI-59310	Unknown (= Senegal)	unknown	ad.	ex-mount
RMNH.AVES.216826	Senegal (Senegambia on later label)	Pre-1850	ad.	mount
AMNH 612028	Ghana, Gambaga	28 August 1898	f	skin
AMNH 612029	West Africa, Senegal	unknown	ad.	skin

* Samples used in Hernández Alonso *et al*. (2023).
** Samples used in Hernández Alonso *et al.* (submitted).

even rarer and may already have disappeared from parts of its distribution (e.g. Dowsett-Lemaire & Dowsett 2014: 160, 2019: 168–169). Loss of habitat and/or hybridisation with feral *C. livia* are believed to be contributory factors in its decline.

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Taxonomic history of *gymnocycla*

West African Rock Dove *C. gymnocycla* differs from Rock Dove *C. livia* subspecies in being smaller but with a heavier bill (Table 2, Fig. 3), overall much darker plumage, and especially in having a broad, bare red patch of skin around the eyes. Despite these marked

TABLE 2

Measurements (in mm) of West African Rock Dove *Columba gymnocycla*, Sahara Rock Dove *C. livia targia* and Rock Dove *C. l. livia*. In addition to the differences in colour between *C. gymnocycla* and subspecies of *C. livia* (see Figs. 1, 3 and 7), *C. gymnocycla* is also smaller than either *C. livia* subspecies but has a much heavier bill.

	NHMUK reg. nos.	**wing**	**tail**	**bill (depth)**
Columba gymnocycla	1837.5.13.199	214	114	5.9
	1855.12.19.299	211	113	5.9
	1855.12.19.327	215	115	6.0
	1920.6.8.150	196	102	5.7
	1920.6.8.151	198	102	5.7
Columba gymnocycla (former *lividior*)	1911.12.23.135	214	108	6.4
	1932.8.6.35	205	107	6.5
	1932.8.6.36	206	107	6.1
	1936.2.21.356	210	105	6.0
	1938.3.18.30	198	101	6.0
Mean of *C. gymnocycla*		**206.7**	**107.4**	**6.02**
Columba livia targia (Hoggar, Sahara)	1965.M.4617	214	111	4.6
	1965.M.4620	210	112	4.8
	1965.M.4621	212	110	4.8
	1965.M.4622	215	116	4.7
	1965.M.4624	210	106	4.5
Columba livia targia (Sudan)	1922.12.8.76	210	112	5.1
	1922.12.8.83	207	109	4.4
	1922.12.8.90	215	111	4.9
	1922.12.8.91	216	114	4.9
	1947.26.1	215	113	4.9
Mean of *C. livia targia*		**214.4**	**111.4**	**4.76**
Columba livia livia (Shetlands)	1868.11.28.45 *	231	121	5.0
	1934.1.1.1802	224	116	4.6
	2021.1.88	218	115	4.7
Columba livia livia (Outer Hebrides)	1953.76.100	224	118	4.8
	1965.M.4558	220	116	5.0
	1965.M.4561	212	116	4.5
Columba livia livia (Orkney)	1897.11.10.171	230	120	4.8
	1897.11.10.172	217	120	4.8
	1907.12.20.16	219	116	4.9
	1965.M.4562	223	119	4.7
Mean of *C. l. livia*		**221.8**	**117.7**	**4.78**

* Darwin's specimen which he used as his reference for wild Rock Doves

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Figure 3. West African Rock Dove *Columba gymnocycla* (left, NHMUK 1855.12.19.299, adult, Senegal) has a heavier bill (see also Table 2) than Rock Dove *C. livia* (right, NHMUK 1965.M.4564, adult, Taranto, southern Italy, 22 January 1918), perhaps indicating a diet slightly different to that of *C. livia*, including more fruit and leaves, potentially suggesting West African Rock Dove is more arboreal (Hein van Grouw, © Trustees of the Natural History Museum, London)

Figure 4. Holotype of *Columba gymnocyclus* G. R. Gray, 1856, ZMB 11158, adult, Senegal, collected and/or presented by S. Delbrück (Pascal Eckhoff, © Museum für Naturkunde, Berlin)

differences, Hartert (1916: 84) was the first to classify it as a subspecies of Rock Dove. Prior to this, West African Rock Dove was generally considered a species.

The species was first mentioned, but not named taxonomically, by Hartlaub (1854: 205–206) as '*Columba livia*' in his synopsis of the birds of West Africa. Hartlaub's description, based on a specimen from Senegal held in Berlin (Fig. 4), is not especially detailed and could apply to any *C. livia* with a white rump: the dark colour is not emphasised, and he also did not mention the red orbital ring, presumably because its colour had faded in the specimen. In fact, he did not mention the broad, bare patch around the eyes at all. This characteristic, however, must have been noticed by Gray (1856: 28), as he named the bird *gymnocyclus* (now *gymnocycla*) for its large naked eye-ring. As no description was given by

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Gray, his *gymnocycla* would have been a *nomen nudum* if it had not been for the fact that he referred to Hartlaub's '*Columba livia*' as being the same species. As Hartlaub (1854: 205) *did* give a description and, despite it being not very accurate, the specimen in Berlin is thus the holotype of *C. gymnocycla*, and the four specimens then present in the British Museum and seen by Gray have no name-bearing status but are paratypes.

Three years after he had discussed '*Columba livia*' from Senegal, Hartlaub (1857: 193) mentioned the naked orbital ring and that it was 'flesh-coloured'—*periophthalmiis nudis, carneis*—and that Gray had suggested to separate them from *C. livia* under the name *C. gymnocyclus*. Four years later, having examined the specimens seen by Gray in the British Museum, Hartlaub (1861: 266) confirmed that the dark-coloured birds from Senegambia were distinct from *C. livia*.

Until *c*.1900 the taxon was still recognised as a separate species (e.g. Shelley 1896: 135, Hartert 1899: 406, Reichenow 1901: 400, Alexander 1902: 368). The bird Hartert referred to was collected by Lieutenant-Colonel William Carter Giffard (1859–1921) at Gambaga, Ghana, and is now in the American Museum of Natural History, New York (AMNH 612028; Table 1). He stated, 'This interesting pigeon looks very much like some domesticated races of *C. livia*, and agrees perfectly with the types of *C. gymnocyclus*, except that it is of a lighter grey…'. Because of their coloration Hartert speculated 'possibly the Gambaga birds are a paler sub-species.' Almost two decades later, by which time the concept of subspecies was more accepted, Hartert (1916: 84, 1912–21: 1471) seems to have abandoned the idea of *C. gymnocycla* possibly being a species and classified it as a subspecies of *C. livia* instead. He was, however, conscious that it could represent a population of feral pigeons rather than a

Figure 5 (left three). Holotype of *Columba livia lividior*, NHMUK 1932.8.6.1, male, collected at Fiko, east of Mopti, Mali, 9 January 1932 by G. L. Bates (Jonathan Jackson, © Trustees of the Natural History Museum, London)

Figure 6 (right two). Near-adult male *Columba gymnocycla* specimens, NHMUK 1911.12.23.135 (left) and NHMUK 1936.2.21.356 (right), collected at Gambaga, Ghana in April 1901 by Boyd Alexander (Jonathan Jackson, © Trustees of the Natural History Museum, London)

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wild bird; 'The very rare *Columba livia gymnocyclus* (not *gymnocycla*!), …, is insufficiently known, and the possibility of its being feral requires consideration.' (Hartert 1916) and, translated from German, 'it remains to be determined whether these are not the offspring of feral domestic pigeons' (Hartert 1912–21). Bannerman (1931) followed Hartert in recognising *gymnocycla* as a subspecies of *livia*, but had no doubt it was a wild bird.

In 1932, George Griswold Latimer Bates (1863–1940) collected four rock doves in French Sudan [Mali] with a 'wide ring of bare red skin around the eye.' As these were less dark than *C. l. gymnocycla*, Bates (1932: 12) considered them a different taxon, which he named *C. l. lividior* (Fig. 5). He referred to Alexander, who 30 years earlier had collected two *C. gymnocycla* in Ghana (Fig. 6) which, according to Alexander (1902: 368), were a little paler on the upperparts than *C. gymnocycla* specimens in the British Museum and which in Bates' (1932: 12) opinion are 'more like my new specimens.' He did not mention Giffard's bird or Hartert's earlier suggestion that the paler pigeons may be a different taxon. Vaurie (1961: 11) was first to suggest that *lividior* may be a synonym of *gymnocycla*, presumably because he did not consider the slight differences in colour significant. White (1965: 153) must have agreed, as he treated *lividior* as a junior synonym of *gymnocycla*. Bates' name has usually been regarded as a synonym ever since, and molecular analyses have recently shown this treatment to be correct (Hernández-Alonso *et al*. submitted). But, as described above, the genetic analyses also warranted treating *Columba gymnocycla* as a separate monotypic species.

Distribution and biology of *Columba gymnocycla*

Hartert's statement (1899: 406) 'Our knowledge of *Columba gymnocyclus* is very small, and there is no reliable evidence of its distribution' is, after nearly 130 years, still valid. Even today there appears to be still no consensus concerning the distribution of *C. gymnocycla*. It is variously considered to occur in Senegal and Guinea to Ghana and Nigeria (Gibbs *et al*. 2001: 179); in Mauritania, coastal Senegal, Guinea, Mali, Burkina Faso, northern Ghana and northern Togo (Borrow & Demey 2001: 475); in Mauritania, Mali, Gambaga (Ghana), coasts of Senegambia and Guinea (Urban *et al*. 1986: 477); from Senegal to southern Mali and Nigeria (Dickinson & Remsen 2013: 52); and in coastal Senegambia and Guinea patchily to central Mauritania, southern Mali and Ghana (del Hoyo & Collar 2014). In all these cases it is unclear on what information these distributions are based.

Establishing the (former) distribution of *gymnocycla* via published records has proven difficult, as often only '*Columba livia*' is mentioned without explicit reference to *gymnocycla*. Despite the remarkable differences in appearance, without clear reference to *gymnocycla*, the pigeons recorded could have been subspecies *targia* (Fig. 7) or feral *livia*. Therefore, the presence of *gymnocycla* in Guinea (Morel & Morel 1988: 162), Mali (Moulin *et al*. 2001: 529,

Figure 7. Sahara Rock Dove *Columba livia targia* (NHMUK 1965.M.4622, adult, Taharanet, Hoggar, southern Algeria, 9 March 1931) is similar in overall colour to nominate *livia* but has a grey rump, and is remarkably different from the dark, white-rumped West African Rock Dove which is also smaller (see Table 2). *C. l. targia* lacks a bare eye patch, like all *livia* subspecies, which together with the smaller bill also distinguishes it from *C. gymnocycla* (Jonathan Jackson, © Trustees of the Natural History Museum, London)

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Figure 8. Domesticated *Columba livia* specimen (NHMUK 1855.12.19.328) formerly misidentified as *gymnocycla*, from Abyssinia, (Jonathan Jackson, © Trustees of the Natural History Museum, London)

Dowsett-Lemaire & Dowsett 2004: 6) and Niger (Giraudoux *et al*. 1986: 59) cannot be confirmed. For Mauritania (Isenmann *et al*. 2010: 217–218) and Senegal (Morel 1985: 116–117, Morel & Morel 1990: 79) *gymnocycla* was specified. In Ghana (Dowsett-Lemaire & Dowsett 2014: 160) and Togo (Dowsett-Lemaire & Dowsett 2019: 168–169), the (sub)species is recorded as now 'probably extinct'.

The species was also reported from the Los Islands (Îles de Los) off Conakry, Guinea (Reichenow 1900–01: 400, Bannerman 1931: 317, White 1965: 153), based on a single specimen mentioned by the French naturalist Jean-Frédéric Émile Oustalet (1844–1905), and identified by him as *C. l. schimperi* (Oustalet 1879: 156). The identification appears unlikely as *schimperi* occurs only in East Africa and is remarkably paler than most other *C. livia* subspecies. Oustalet remarked 'A specimen from the Loss Islands appeared to me to belong to this variety [*schimperi*], rather than to any other race of our Rock Dove' (translated from French). Based on the locality, later authorities must have assumed that the specimen was *gymnocycla*. It is no longer present in the Museum national Histoire naturelle, Paris (P. Boussès *in litt*. 2025) and its true identity is unknown. Even Ethiopia was considered to form part of its distribution (Shelley 1896: 135), based erroneously on a specimen held in the British Museum, received from the Zoological Society of London and supposedly originating from 'Abyssinia'. The specimen, however, was incorrectly identified as *C. gymnocycla* and is, in fact, a dark-coloured domestic *C. livia* (Fig. 8).

In search of greater clarity regarding the species' distribution, van Grouw (2024) queried whether members of the West African Ornithological Society had seen this pigeon, but received no responses. The same question was posed directly of several ornithologists who visit Senegal regularly (see Acknowledgements), but the answer was the same; no one could recall seeing it. Based on museum specimens (see Table 1), we know that the species occurs, or at least did occur, in Senegal, Mali, Ghana and Togo, but what are the reasons for the recent lack of records? Borrow & Demey (2001: 475) stated that the species is a 'locally common to not uncommon resident', but that appears no longer true, unless it is overlooked. Perhaps they occur in unexpected habitat? For Senegal, many authorities (e.g., Bannerman 1931: 316, White 1965: 153, Urban *et al*. 1986: 477) have stated that it occurs on coastal cliffs, presumably based on the assumption that *livia* prefers cliffs. The only detailed record we are aware of is from Cohel, Senegal (13°39′02.5″N, 15°37′48.9″W) (Fig. 9), far from the coast in a river valley with secondary riparian vegetation, surrounded by grazed savanna (C. Moning *in litt*. 2024). West African Rock Dove may occupy habitat different

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Figure 9. West African Rock Dove *Columba gymnocycla*, Cohel, Senegal (13°39′02.5″N, 15°37′48.9″W), 13 January 2014. Based on the lack of iridescent neck plumage, these appear to be immatures, but the bare, red patch of skin around the eyes is nevertheless already well developed. Perched in a dead tree in a savanna, the species may occur in habitat different from that of *C. livia*. This may be the only photograph of live West African Rock Dove ever published (© Christoph Moning)

from that of *livia* after all. Arboreal habits have also been recorded in Mali (Urban *et al*. 1986: 478) and this may apply to *gymnocycla* populations elsewhere too. The heavier bill (see Fig. 3, Table 2) may indicate a slightly different diet from *C. livia*, including more fruit and leaves, which also suggests it being more arboreal.

Another reason why this pigeon is not recorded may be because, due to its dark colour, the species is confused with feral *C. livia*, which has many different colour varieties. Besides being simply overlooked, we should not rule out the possibility that the species has become extremely rare and may even be on the brink of extinction.

Not only the habitat requirements of West African Rock Dove are unsure, we also know almost nothing about its habits. Only two brief first-hand observations are known to us, both from Ghana. The first is from W. C. Giffard, cited in Hartert (1899: 406), who collected a specimen: 'The little blue rock-pigeon is a wild bird. These birds live in a big 800-feet scarp, about six miles from Gambaga, and some come down in fair numbers at sowing and harvest time, at other times they are seldom seen.' Alexander (1902: 368), who collected two specimens, stated 'We only observed these Pigeons at Gambaga, where they were very wild. They breed in holes in steep rocky declivities. About the middle of April they appear in small flocks, in company with *Columba guinea*, on the newly sown grain-plots outside the village.'

Discussion

C. livia does not occur naturally within the supposed distribution of *C. gymnocycla*. The nearest wild *livia* population involves *C. l. targia* in the mountains of the Sahara, Hoggar and Aïr, east to Sudan (Gibbs *et al*. 2001: 179) (Fig. 7), which is currently isolated from West

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African Rock Dove by the Sahara. However, during the Holocene Green Sahara Period (*c*.5,000–11,000 years ago), a hybrid zone may have become established between the two lineages, given signals of admixture identified in West African Rock Dove. Possibly due to the latter being able to occupy a distinct ecological niche associated with more tropical, forested and flatter regions, homogenisation with *C. l. targia* was prevented, whereas the divergence and speciation processes were likely promoted (Hernández-Alonso *et al*. in press).

As shown above, little is known about the ecology, behaviour and distribution of *C. gymnocycla*, and further research is necessary to enable future conservation efforts. There is, however, no doubt that they can and will hybridise with *C. livia* in areas where they may meet. Importantly, no signals of admixture have been found with domestic/feral *livia* (Hernández-Alonso *et al*. 2023, in press), confirming that *gymnocycla* is indeed a distinct taxon and not an isolated population of feral *livia*, as suggested in the past (e.g. Hartert 1899, 1916). However, these findings are based on a historical dataset, and it is possible that admixture with feral *livia* has occurred more recently, due to the significant increase in rural and urban development in West Africa that promotes the presence of feral pigeons.

C. gymnocycla populations are fragmented, and exhibit very high inbreeding, similar to many endangered species (Hernández-Alonso *et al*. in press). In addition to the effects of inbreeding such as loss of genetic diversity, habitat loss caused by climate change, urbanisation and environmental deterioration increases pressure on these populations, accelerating their collapse and eventual extinction. Urbanisation also increases the threat of admixture with feral *livia*, genetically diluting or even wiping out *C. gymnocycla* populations. Currently, *C. gymnocycla* is not recognised as a species by the IUCN but is included within *C. livia* on the Red List (IUCN 2025), with the latter species being categorised as Least Concern. For all these reasons and given that West African Rock Dove represents a well-differentiated taxon, it would be wise to re-evaluate its conservation status as a first step to ensure the species' protection.

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