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BIRDS SEEN ON A TRANS-SAHARAN OVERLAND CROSSING
IN SPRING 1966

V.W.Smith.

During Spring 1966 many migrants and local birds were seen on an overland journey, made in a Land Rover from Kano, Nigeria, to Ksar-Es-Souk in southeastern Morocco, east of the High Atlas and south of the Middle Atlas Mountains. At three places mist-nets were used.

Timetable & Places (Lat. and Longt. are approximate).

Vegetation and conditions encountered on route.

24.iii Depart KANO Nigeria ($12^{\circ} 03'N.$; $08^{\circ} 32'E.$).

28.iii Depart AGADEZ Niger Republic ($16^{\circ} 20'N.$; $07^{\circ} 40'E.$).

On the road the last patches of Sahel grassland were seen some 200 miles northwest of Agadez, but the grass was very dry; the last surface water (brackish) was seen 100 miles further south.

30.iii (Dawn) IN GUEZZAM Algeria ($19^{\circ} 30'N.$; $05^{\circ} 50'E.$).

Casuarina grove; no surface water.

31.iii-2.iv TAMANRASSET Algeria ($23^{\circ} N.$; $05^{\circ} 30'E.$). Casuarinas plentiful; small irrigated vegetable plots, otherwise very little surface water.

2-14.iv At a transient flowing stream (known locally as a guelta), 35 miles N.N.E. by road from TAMANRASSET, on the Hoggar Massif at just over 2,000 metres a.s.l. In this wilderness of basalt boulders and peaks, the water in the guelta appeared and disappeared along a narrow two-mile-long strip lying mainly northeast-southwest, providing along its banks small patches of dense cover (grasses and reeds, small flowering bushes and oleander-like shrubs) and abundant surface water and insect food.

A number of animals, reptiles and amphibia frequented this ecological niche; rock hyraxes, bats, hares, jackals, gazelle, semi-wild camels and donkeys, one small snake, many lizards (a few Agama) and frogs were seen; also fish (Macrocarpus ?) up to 18" long were present in some of the rock pools.

Days were hot; nights were very cold; winds were mainly southerly, light to strong, but on two days (4,10.iv) were northerly and strong. Five mist-nets were used at 100 yd. intervals across the guelta.

14-16.iv TAMANRASSET.

16.iv (Night) ARAK GORGES Algeria ($25^{\circ} 30'N.$; $03^{\circ} 40'E.$).

Surface water in gorge and dense vegetation (reeds & grasses).

18.iv Depart AIN SALLAH Algeria ($27^{\circ} N.$; $02^{\circ} 40'E.$). Surface water in palm oasis.

20.iv (midday) REGGANE Algeria ($26^{\circ} 30'N.$; $00^{\circ} 20'E.$). No surface water seen.

21.iv Depart ADRAR Algeria ($27^{\circ} 50'N.$; $00^{\circ} 20'W.$).

21-23.iv BENI ABBES Algeria ($30^{\circ} N.$; $02^{\circ} W.$). Palm oasis in wadi with surface water.

23-30.iv At a lake (Chott Daïet Tiour) approx. 40 miles south of COLOMB BECHAR Algeria ($31^{\circ} 30'N.$; $02^{\circ} W.$). The Chott, rapidly drying-up, was surrounded by mud, shrubby vegetation and grass. Five mist-nets* in one line were used at its edge. During this week winds were mostly still, but light N.W. on 24.iv, light S.W. on 25.iv and strong northerly on 29.iv.

30.iv-5.v BENI ABBES. Five mist-nets* were used in the wadi over or adjacent to water and sedges.

7.v KSAR-ES-SOUK Morocco ($31^{\circ} 50'N.$; $04^{\circ} 30'W.$). Palm oasis.

* In addition, Mons. A. R. Dupuy of C.R.M.M.O., Paris was using ten mist-nets. His daily observations have been included during the period 23.iv - 5.v.

Materials & Methods.

Nylon and terylene three and four sholf mist-nets, 20 to 60 ft. long were used. Migrants caught were weighed with Pesola spring balances, measured and ringed with rings bearing the return address 'Museum Paris'. Birds ringed are shown in Table 1; An analysis of weights obtained is shown in Table 2. Specimens of some local species were collected for later confirmation of identity. Moon-watching was attempted 3-6.iv (full moon 5.iv)

Systematic List.

The nomenclature and order follows Etchecopar & Hue (1964). Species personally netted are marked* but Table 1 shows only those birds which were ringed. B.M. = British Museum (Nat.Hist.)

Struthio camelus Ostrich.

Six north of Agadez 28th March.

Ardea cinerea Heron.

Twelve to thirty seen at Chott 28th-30th April.

Ardea purpurea Purple Heron.

One seen at guelta 3rd and 4th April. Four to fifteen seen at Chott 27th and 28th April.

Egretta garzetta Little Egret.

Twelve to thirty seen at Chott 28th-30th April.

Ardeola ralloides Squacco Heron.
One seen at Beni Abbas 4th May.

Botaurus stellaris Bittern.
One seen at guelta on 5th and 8th April may have been the same bird because it was expert at hiding itself.

Ciconia ciconia White Stork.
Ten seen over the guelta early morning of 7th April circling on thermals; when they had gained considerable height (approx. 1,000 metres above the guelta) they set a steady northerly course until out of sight.

There were a constant eighty to one hundred at the Chott 23rd-30th April.
(Passing through northern Morocco and Spain during the period 8th-13th May many White Storks were nesting; one nest in central Spain contained young).

Casarca = Tadorna ferruginea Ruddy Shelduck.
Five hundred (including non-flying young) at Chott.

Neophron percnopterus Egyptian Vulture.
Seen regularly, almost daily, at In Guozzan, Tamsaouasset, on the Hoggar and at the Chott.

Buteo rufinus Long-legged Buzzard.
A pair seen near the guelta almost daily. Individuals were also seen occasionally on the road and at the Chott.

Milvus m. migrans Black Kite.
One seen at Chott 24th April. (No M. m. tenobrochus noticed north of Agadez).

Circus aeruginosus Marsh Harrier.
Individuals seen at Chott 23rd and 24th April.

Circus cyaneus Hen Harrier.
One at Chott 28th April.

Falco peregrinus Peregrine.
One shown to me on cliff near Beni Abbas; I was told it fed on migrant bee-eaters.

Falco biarmicus Lanner.
Seen occasionally at the guelta, at the Chott (feeding on ducklings) and once near Beni Abbas.

Falco naumanni/tinnunculus Lesser Kestrel/Kestrel.
One seen at the guelta on 7th April was not positively identified.

Coturnix coturnix Quail.
Three seen at Chott 27th-29th April.

* Porzana pusilla Baillons Crane.
One netted by Dupuy at Chott on 28th April. One female seen in the net at Chott on 30th April was identified by the B. M. as P. p. intermedia.

Gallinula chloropus Moorhen.
One (probably G. c. chloropus) seen at the guelta on 8th and 9th April in the same patch of cover could not be found subsequently and appeared to be on passage. Two were seen at Chott 23rd April.

Chlamydotis undulata Houbara Bustard.
Seen occasionally from Beni Abbas northwards.

Charadrius dubius Little Ringed Plover.
Chott

Charadrius alexandrinus Kentish Plover.
Five to fifty seen at Chott 24th-30th April.

Numenius arquata Curlew.
One heard our first two days at Chott.

Tringa ochropus Green Sandpiper.
Ten to twenty seen at Chott at first but numbers decreased towards the end of our stay.

Tringa glareola Wood Sandpiper.
Three hundred seen at Chott but numbers decreased to twenty on our last day. A few seen at Beni Abbas 2nd-4th May.

* Tringa hypoleucos Common Sandpiper.
Ten to twenty at Chott 23rd-25th April. One at Beni Abbas 4th May.

Tringa totanus Redshank.
Twenty to fifty at Chott 23rd-30th April, but two hundred on 26th April.

Tringa erythropus Spotted Redshank.
Thirty at Chott on 27th April, only six on 28th and 29th April and none on 30th April.

Tringa nebularia Greenshank.
Fifty at Chott on 23rd April but none the following day and only individuals towards the end of the week.

Philomachus pugnax Ruff.
Up to one hundred and fifty at Chott 23rd-25th April but numbers decreased considerably by 30th April.

* Calidris minuta Little Stint.
Two hundred to six hundred at Chott most of the week. Two at Beni Abbas 4th May.

Himantopus himantopus Black-winged Stilt.
One hundred at Chott on 23rd April; eleven the following day and thirty to fifty the last four days.

Glaricola pratincola Pratincole.
Four to six at Chott 24th-27th April.

Cursorius cursor Cream-coloured Courser.
Seen north of Agadez 28th March; north of Reggane 20th April; around the Chott but not near the water 23rd-30th April; on road to Kasr-Es-Souk 6th May.

Chlidonias, Gelochelidon spp. Terns.
At Chott a few Whiskered Tern C. hybrida appeared 24th April; One hundred to two hundred White-winged Black Tern C. leucopterus were present 26th-28th April and one hundred Black Tern C. niger were present 27th-29th April. Ten Gull-billed Tern Gelochelidon nilotica were seen 27th-29th April.

Pterocles senegallus Spotted Sandgrouse.
Twenty every morning at the guelta. Up to fifty every morning at the Chott.

* Columba livia Rock Dove.
A few seen daily at the guelta (where two were trapped) appeared to be C. l. targia. A few seen at Arak Gorges 17th April.

Streptopelia turtur Turtle Dove.
Many heard and seen at Tezourasset on 1st and 14th April.

at guelta. Many, believed to be S. t. turtur, were seen leaving Arak Gorges flying northwest at dawn on 17th April, and a few were seen flying low in open desert between Arak and Ain Sallah the same day; a few seen almost daily at Chott, and at Beni Abbes 2nd-4th May.

Stigmatopelia senegalensis Senegal Dove.

A few seen at Beni Abbes 2nd-4th May.

Otus scops Scops Owl.

One caught by Dupuy at Chott on 28th April.

Bubo bubo Eagle Owl.

Heard at Chott on night of 26th April; probably Desert Eagle Owl B. b. ascalaphus.

* Caprimulgus europaeus European Nightjar.

One seen at Chott 26th April; one netted at Beni Abbes 3rd May two seen after sunset in headlights between Bechar and Ksar-Es-Souk 6th May.

Caprimulgus ruficollis Red-necked Nightjar.

One caught by Dupuy at Beni Abbes 4th May.

Caprimulgus aegyptius Egyptian Nightjar.

One caught by Dupuy at Chott 28th April.

Apus apus Swift.

Twenty seen at guelta, swooping over the pools to drink, on 4th April. Numbers seen most days at the Chott but an obvious passage on 25th April. A few seen at Beni Abbes.

Apus pallidus Pallid Swift.

A few seen at Beni Abbes 3rd and 4th May.

(Apus melba Alpine Swifts were breeding in holes in towers in Fez, N. Morocco, on 8th May.)

Merops apiaster Bee-eater.

Flocks seen at Tamarrasset 14th-16th April. Seen at Chott 23rd and 28th April. A few along roadside to Ksar-Es-Souk 6th May.

* Merops superciliosus Blue-checked Bee-eater.

A few at Chott 23rd and 25th April. Frequent at Beni Abbes 2nd-4th May.

Merops orientalis Little Green Bee-eater.

Last seen on road 100 miles south of Agadez 26th March.

Upupa epops Hoopoe.

Individuals seen in bush south of Agadez on 25th and 26th March; at guelta 7th and 11th April and on road to Ksar-Es-Souk 6th May.

Jynx torquilla Wryneck.

Caught by Dupuy at Chott 28th and 29th April.

* Calandrella cinerea Short-toed Lark.

Many at Chott on 23rd April; fewer two days later.

* Ammonance deserti Desert Lark.

Several pairs at the guelta; one male identified by B.M. as A. d. geyri. Few pairs at Beni Abbes.

Ammonance cincturus Bar-tailed Desert Lark.

A few at Chott and near Beni Abbes.

Eremopterix nigriceps ? albifrons Black-crowned Finch-Lark.

Several large flocks (possibly E. leucotis also present) along roadside into desert fringe 25th-28th March.

* Galerida cristata Crested Lark.

Many at Chott on arrival on 23rd April, but numbers decreasing.

Alacmon alaudipes Bifasciated Lark.

Seen frequently from Reggane northwards on the road and near Chott but not at water-side.

* Hirundo rustica Swallow.

The palaearctic species most regularly seen throughout the journey. Seen at Agadez 27th March; small party north of In Guezam 30th March. Many at the guelta daily, with obvious passages 6th and 9th April; several at Tamanrasset 15th April; small parties seen along road south of Ain Sallah 17th April; parties seen in featureless desert before and after Reggane on 19th and 20th April; one seen in a strong northerly 'sand wind' north of Adrar 21st April; all these birds were flying low and making purposeful progress northwards. One caught after dark in roosting hole at Beni Abbes 22nd April. Many were seen at Chott, passages in progress 23rd and 27th-30th April. Many at Beni Abbes with a passage on 2nd May.

* Hirundo obsolota Pale Crag Martin.

Few seen enly at guelta; one male identified by B.M. as H. o. spatzi.

* Riparia riparia Sand Martin.

Few at Tamanrasset 1st April but none seen on Hoggar at guelta. Small parties seen almost daily at Chott and Beni Abbes.

* Delichon urbica House Martin.

Small parties seen at the guelta on 4th and 9th April only. A few seen at Chott 23rd-26th April. Several at Beni Abbes with a passage on 2nd May.

Oriolus oriolus Golden Oriole.

One seen at Beni Abbes 2nd and 3rd May.

Corvus corax Black Brown-necked Raven.

Seen most days except in featureless desert.

Monticola saxatilis Rock Thrush.

Seen at Chott 28th April and one female seen at Beni Abbes 3rd May.

Oenanthe oenanthe Wheatear.

Seen at Tamanrasset on 1st and 14th-16th April; in open desert on 17th and 18th April. Numbers at Chott on 23rd April but fewer towards the end of the week. A few seen on road 6th May.

Oenanthe deserti Desert Wheatear.

Seen near Arak 17th April and near Reggane 20th April. Several pairs at Chott.

* Oenanthe leucopyga White-rumped Black Chat.

First seen at In Guezam 30th March and noticed most days; at the guelta several pairs present; One male with no white on head was identified by the B.M. as a juv. O. l. leucopyga. Adults with white heads seen feeding young in nest in crevice at top of basalt cliff 3rd April. Two other pairs seen building in similar localities 6th and 7th April. Many (mainly juveniles) at the Chott during our stay and at Beni Abbes.

* Saxicola rubetra Whinchat.

One male seen at guelta on 12th April; first seen at Chott

25th April and many on 29th April. Many at Beni Abbas 2nd-5th May; a few seen along road 6th May.

* Phoenicurus phoenicurus Redstart.

Several seen south of Agadez 25th March. At the guelta one female seen on 9th April, and a male and female on 13th April. A few seen at Chott 27th-30th April, at Beni Abbas 3rd May and on road 6th May.

* Luscinia megarhynchos Nightingale.

At guelta seen occasionally in dense bushes. A few seen at Chott.

Cercotrichas = Agrobates galactotes Rufous Warbler.

Seen at Chott 24th and 28th April.

Turdoides fulvus ? buchmanii Fulvous Chatterer. (Buchanan's Bush-skulker - Bannerman).

Party in casuarinas at Tamanrasset 1st April. Small party at Tadjemout spring, north of Arak Gorges, 17th April.

* Acrocephalus arundinaceus Great Reed Warbler.

A few at Chott and Beni Abbas 29th April to 2nd May.

* Acrocephalus scirpaceus Reed Warbler.

Many at Chott 26th April; seen frequently at Beni Abbas 2nd-4th May.

* Acrocephalus schoenobaenus Sedge Warbler.

Many at Chott and seen most days 23rd-30th April. Seen frequently at Beni Abbas 2nd-4th May.

* Hippolais icterina Icterine Warbler.

Seen at Chott 27th and 28th April.

* Hippolais pallida Olivaceous Warbler.

Many at Tamanrasset, probably the resident H. p. reiseri since one pair seen building a small grass cup in a fork 20 ft. up a casuarina tree on 1st April. H. p. opaca seen infrequently at the Chott and in greater numbers at Beni Abbas 2nd-4th May.

Sylvia hortensis Orphean Warbler.

One caught by Dupuy at Chott 28th April.

Sylvia atricapilla Blackcap.

Seen and caught by Dupuy at Chott 24th April.

* Sylvia borin Garden Warbler.

Seen at guelta 6th and 12th April. Several seen at Chott 25th-28th April.

Sylvia communis Whitethroat.

One caught by Dupuy at Beni Abbas 3rd May.

Sylvia naus deserti Desert Warbler.

Seen near Chott.

Sylvia cantillans Sub-alpine Warbler.

Numerous in trees south of Agadez 25th March. Many near the Chott 23rd April.

Sylvia conspicillata Spectacled Warbler.

Two at Chott 28th April.

* Phylloscopi spp. Leaf Warblers.

Many Phylloscopi seen at guelta 5th-10th and 13th April; five netted 7th-9th April were all trochilus. Several seen at Tadjemout spring north of Arak Gorges on morning of 17th April. A

few seen at Chott; sibilatrix identified at Chott 24th-28th April and at Beni Abbas 3rd May.

Muscicapa striata Spotted Flycatcher.

Seen at Chott, maximum numbers present 26th-28th April. A few seen at Beni Abbas 3rd-5th May.

Picedula hypoleuca Pied Flycatcher.

None at guelta. Many seen at Chott, maximum numbers present on 28th April. Several at Beni Abbas 1st-3rd May.

* Anthus spp. Pipits.

Seen with wagtails at Tamanrasset 31st March and 1st April, and frequently at guelta; one trivialis netted 7th April and cervinus netted on 8th and 9th April. At Chott many Anthus, mainly cervinus 25th-27th April and trivialis 28th and 29th April.

* Motacilla spp. Wagtails.

One alba seen at In Guozzam 30th March. M. flava seen in numbers at Tamanrasset 31st March and 1st April, and frequently at guelta with greatest numbers present on 7th and 8th April; twenty-three M. f. flava were netted 7th-11th April; five M. f. thumbergi 8th-13th April.

At Chott many present, mainly M. f. flava, with greatest numbers present 28th April; a few cinerocapilla 28th and 29th April; one iberiae netted 29th April.

At Beni Abbas seen frequently 2nd-4th May; four M. f. flava netted 2nd and 3rd May, one of which had been ringed in Italy (Viserbella Rimini, 44° 06'N.; 12° 32'E.) on 7th May 1965; one iberiae netted 3rd May; one cinerocapilla netted 3rd May (see Table I.).

* Lanius excubitor Great Grey Shrike.

Seen north of Agadez 29th March. Seen occasionally at Chott (including one juvenile) 23rd-27th April.

* Lanius senator Woodchat.

One L. s. senator seen at guelta 11th April. Seen infrequently at Chott 25th-29th April. Seen at Beni Abbas 3rd and 4th May. L. s. badius seen once at Chott 28th April and Beni Abbas 5th May.

* Rhopocchys githaginea Trumpeter Finch.

Several pairs watered daily at guelta; one male identified by B.M. as R. g. zedlitzi. At Chott many (mainly juveniles) present.

* Emberiza striolata Saharan House Bunting.

Several pairs at guelta; one nest with two young in rock crevice at base of cliff 3rd April; free-flying young seen elsewhere 8th April; one female identified by B.M. as E. s. saharae. At Beni Abbas many present 2nd-5th May.

Passer spp. Sparrows.

A few at Tamanrasset were not properly identified but may have been P. simplex Desert Sparrows. Also many at Ain Sallab. Near the Chott many P. hispaniolensis Spanish Sparrows had just completed breeding in bushes; many were present at Beni Abbas.

Migrant and local birds ringed during the trans-Saharan crossing.

	Guelta, 35 miles NNE of Taman-rasset, 23° N., 05° 30' E.									Chott Daïet Tiour, 31° N., 02° W.									Beni Abbes, 30° N., 02° W.					
	A	P	R	I	L	A	P	R	I	L	A	P	R	I	L	M	A	Y						
	2	3	4	5	6	7	8	9	10	11	12	13	23	24	25	26	27	28	29	30	2	3	4	5
<i>Tringa hypoleucos</i>													1											
<i>Calidris minuta</i>																								
<i>Caprimulgus europaeus</i>																						1		
<i>Merops superciliosus</i>																					2			
<i>Calandrella cinerea</i>																								
<i>Galerida cristata</i>																								
<i>Hirundo rustica</i>				1	3	2	2	2				1												
<i>Riparia riparia</i>																								
<i>Delichon urbica</i>																								
<i>Saxicola rubetra</i>																								1
<i>Phoenicurus phoenicurus</i>																								
<i>Luscinia megarhynchos</i>										1														
<i>Acrocephalus arundinaceus</i>																								
<i>Acrocephalus scirpaceus</i>																								
<i>Acrocephalus schoenobaenus</i>																								
<i>Hippolais icterina</i>																								
<i>Hippolais pallida opaca</i>																								
<i>Sylvia borin</i>																								
<i>Phylloscopus trochilus</i>																								
<i>Anthus trivialis</i>																								
<i>Anthus cervinus</i>																								
<i>Motacilla flava flava</i>																								
<i>M. f. thunbergi</i>																								
<i>M. f. cinereocapilla</i>																								
<i>M. f. iberiae</i>																								
<i>Lanius excubitor</i>																								
<i>Lanius senator senator</i>																								
<i>L. s. badius</i>																								
<i>Rhodopechys githaginea</i>																								
<i>Emberiza striolata</i>																								

* One caught in roosting hole at night.

DISCUSSION.

General Movements.

Small numbers of palaeartic migrants were seen on the Hoggar Massif as would be expected from the small area of the guelta; nevertheless eighteen palaeartic species seen in twelve days at over 6,000 ft. a.s.l. (and much of the Hoggar Massif lies at that altitude) adds weight to Moreau's suggestion (1961) that trans-Saharan migration occurs over a broad front, and also confirms an observation made fifty years ago by Geyr von Schweppenburg (1917) that the Hoggar Massif does not deflect migrants.

Had I stayed at the guelta beyond mid-April I might well have seen additional species; some species (Spotted Flycatcher, Icterine Warbler) do not pass through central Nigeria in numbers until the second half of April and early May (Smith, 1965; Elgood *et al.*, 1966), thus could not be expected to appear in the desert until later still.

One noticeable feature during the entire stay at the guelta was the total absence of waders, though conditions were favourable for them; it is unlikely that they bypass the Hoggar; more probably they overfly.

At the guelta swallows and wagtails were seen to depart in a northward direction before dusk. No ringed birds were recaptured on subsequent days (though two wagtails were recaptured the same day), so the populations appeared to move on daily.

Moon-watching indicated some movement at night. On 4th April four birds were seen in one hour all passing northwards, though accurate interpretation of direction could not be confirmed because of inadequate equipment. On 6th April only one bird was seen in one hour.

Influence of wind.

Persistent southerly winds caused a number of migrants (wagtails and Phylloscopi on the Hoggar) to appear, whereas northerly winds stopped movement on a large scale. No signs of disorientation were noticed; even in the face of strong northerly 'sand winds'* , individual swallows were seen making purposeful movement northwards.

* 'sand wind' -- a wind sufficiently strong to stir up sand to a height of several metres, reducing visibility at ground level, though above several metres the air remains clear.

Table 2.

The weights of palaeartic migrants taken during the journey. Where there are more than five weights in any one period, the mean weight is shown with range and number in sample in brackets.

<i>Tringa hypoleucos</i>	25.iv - 38 gm.
<i>Calidris minuta</i>	28.iv - (6) 26.5 gm.; range, 24-31 gm.
<i>Caprimulgus europaeus</i>	3.v - 46 gm.
<i>Merops superciliosus</i>	2.v - 42 gm.; 44 gm.
<i>Calandrella cinerea</i>	28.iv - 22 gm.
<i>Galerida cristata</i>	28.iv - 41 gm.
<i>Hirundo rustica</i>	5-12.iv (11) 16.7 gm.; range, 14-21 gm. 22.iv-13.5 gm.; 2.v - 14 gm.; 17 gm.
<i>Riparia riparia</i>	3.v - 10.5 gm.
<i>Delichon urbica</i>	2.v - 13 gm.; 14 gm.
<i>Saxicola rubetra</i>	26.iv-5.v(7) 13.9 gm.; range 12-19 gm.
<i>Phoenicurus phoenicurus</i>	29.iv - 10.5 gm.
<i>Luscinia megarhynchos</i>	4.iv-23.3 gm.; 11.iv-26.5 gm. 26.iv-17 gm.
<i>Acrocephalus arundinaceus</i>	29.iv - 29.5 gm.
<i>A. scirpaceus</i>	^{Less} 2-4.v - (7) 9.3 gm.; range, 7.5-12 gm.
<i>A. schoenobaenus</i>	^{Large} 2.v - 10.5 gm.; 9 gm.; 9.5 gm.
<i>Hippolais icterina</i>	28.iv - 12.5 gm.
<i>H. pallida opaca</i>	2.v - 10 gm.; 3.v - 10.5 gm.
<i>Sylvia borin</i>	12.iv - 20 gm.; 25.iv - 15 gm.; 26.iv - 15 gm.
<i>Phylloscopus trochilus</i>	7-9.iv (5) 9.1 gm.; range, 8.4-10.5 gm.
<i>Anthus trivialis</i>	7.iv - 19 gm.
<i>Anthus cervinus</i>	8.iv - 19 gm.; 9.iv - 25 gm.
<i>Motacilla flava</i>	7-13.iv(30)* 18.3 gm.; range, 14.5-22 gm. 25.iv-2.v(15) 14.8 gm.; range, 12-20 gm.
<i>Lanius excubitor</i>	26.iv - 50 gm.
<i>Lanius senator</i>	28.iv - 28 gm.; 5.v - 26 gm.

* Including two recapture weights.

Table 3.

The mean weights and ranges (numbers in each sample shown in brackets) of some palaeartic species weighed in Vom (9° 50'N.; 8° 50'E.) during the spring (Extracted from Smith, 1966)

<i>Saxicola rubetra</i>	15.iii-24.iv (57)	19.8 gm.; 13.5 - 26.5 gm.
<i>Phoenicurus phoenicurus</i>	12.iii-14.iv (11)	15.8 gm.; 13.0 - 19.8 gm.
<i>Hippolais icterina</i>	14.iv-25.v (24)	15.6 gm.; 11.0 - 19.0 gm.
<i>Sylvia borin</i>	9.ii-23.v (71)	21.4 gm.; 16.5 - 33.0 gm.
<i>Phylloscopus trochilus</i>	23.iii-11.iv (4)	8.1 gm.; 6.6 - 10.3 gm.
<i>Anthus trivialis</i>	19.iii-4.v (42)	29.2 gm.; 21.0 - 37.5 gm.
<i>Lanius senator</i>	14.iii-9.iv (4)	33.3 gm.; 28.0 - 39.0 gm.

Weights. (Table 2).

The Hoggar Massif lies north of Nigeria so it is reasonable to compare weights taken at the guelta with the weights of the same species taken in Vom, central Nigeria (some 13° further south) prior to their departure from Nigeria in the spring. The Chott lies some 20° north of Vom but 11° to the west; nevertheless it is interesting to record that the M. f. flava recovered in Beni Abbas near the Chott was ringed in Italy in the same place where a Vom-ringed bird was recovered (Smith & Ebbutt, 1965) so there must be considerable diversity of flight paths and intermingling of populations.

The mean (18.3 gm.) of thirty M. flava weighed between 7th and 13th April at the guelta was 3.1 gm. (15%) less than the mean (21.4 gm.) of twelve caught at Vom on 7th April (Smith & Ebbutt, 1965). The mean weight (14.8 gm.) of fifteen M. flava caught in the vicinity of Beni Abbas between 25th April and 2nd May is 6.6 gm. (31%) less than the last mean weight (21.4 gm.) obtained in Vom.

Table 3, showing the mean weights of some species caught in Vom prior to their departure in the spring, has been included to allow comparison of some of the individual weights shown in Table 2. On the whole, the weights on the Hoggar (at approximately the half-way point of the crossing) are still comparatively high (except, perhaps, with the Tree Pipit caught on 7th April, weighing 10 gm. less than the mean spring weight in Vom). In fact the five Willow Warblers caught at the guelta have a greater mean weight than four caught in Vom.

Since the guelta represented such a small area, it is probable that birds stopped there because it was on their line of flight and they will not miss an opportunity to refuel even though their reserves are still adequate. It is unlikely that birds flying two miles either side of the guelta would have seen it.

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