

THE DANCING DISPLAY AND COURTSHIP OF JACKSON'S WHYDAH (*COLIUSPASSER JACKSONI* SHARPE).

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INTRODUCTION.

The dancing display of Jackson's Whydah (*Coliuspasser jacksoni* Sharpe) is a familiar sight in many parts of the central highlands of Kenya Colony during May and June, in areas where suitable grasslands exist between 5,000 and 8,000 feet; in such areas several males may be seen in quite a small patch of ground bobbing up and down, resembling small black fountains spouting up in the grass. Each male has its own dancing rhythm which it appears to keep up with only short pauses for several hours a day.

This dancing habit has long been considered as a sexual display occurring in the breeding season only, but it has not been intensively studied in any way. Jackson (1938) gives an account of the dancing areas used by the males, and a good description of the male while dancing, while Moreau (1938) gives a short account of their call notes and the occurrence of dancing areas at Oldeani, Tanganyika. Delacour (1933-34) also gives an account of the appearance of the dancing area and of the males while dancing, as also does Percival in Bannerman (1910).

The function of these dancing areas and dancing habit in relation to the territorial concept has not been discussed. Related genera and species, which do not however dance, have been studied in respect of territory by Lack (1935) for *Euplectes hordeacea hordeacea* (Linn.) with notes on *Coliuspasser ardens ardens* (Bodd) and *E. capensis sabingo* (Reichnow); and also by Moreau (1937) in short notes on *Coliuspasser albonotatus eques* Hartl. and *E. nigroventris*.

While staying near Nyeri Station, Kenya Colony, in May 1944, my father first drew my attention to the number of male Jackson's Whydahs dancing in the grasslands on the roadside between Nyeri Station and Naro Moru; and at Mile 7 on this road, several males were found dancing in a quite small area of grassland on the east side of the road. From hides built about twelve feet away from two of these dancing rings, I was able to make a series of observations and photographic records at close quarters of this very interesting habit, but owing to the short time I had at my disposal in this district, the records are necessarily incomplete in several respects; these it is hoped later to complete at an area now under continuous observation at Kabete, Kenya Colony.

These observations at Mile 7 were made on—

- 8/5/44, 1300 to 1545 hours, no wind, dull, and threatening rain.
- 9/5/44, 1000 to 1200 hours, cold, slight east wind and dull till 1100 hours, thereafter bright sunshine. There had been very heavy rain during the night and the grass was very wet.
- 10/5/44, 1000 to 1400 hours, dull and misty with no wind up to 1030, then onwards bright sunshine.

THE DANCING RINGS.

The rings were situated in an area of open grassland with a slight slope westwards to the main road (Fig 1), the grass being mainly about 18 inches high with smaller open patches where the grass was shorter, about 6 to 12 inches high. The grasses were unfortunately not identified at the time, but the dominant was probably *Themeda triandra*, which is common in this part of the country, with *Panicum* sp. mixed in with it (Edwards, 1940), the seed heads of which appear to be used in the construction of the nests. In general, the longer grass was in patches of even appearance, the shorter grass areas appearing rather tussocky, and the rings were usually situated in this shorter grass. A few small *Acacia drepanolobium* trees up to 4 feet in height were sparsely scattered throughout the area.

Within this area of 8,029 square yards there were nine dancing rings, seven of which were in use, while two (very close to two others) appeared uncompleted. The maximum distance between two rings was 152 feet, the minimum (excluding the two half-completed rings) was 53 feet. In the area now under observation at Kabete there are at least 100 rings some of which are not more than 3 to 4 feet apart from each other.

Each ring consists of a central tuft of grass surrounded by a circular, beaten-down patch of grass (Fig. 2). Each central tuft is oval shaped, about 8 inches high, and 4 inches wide by 8 inches long, irregularly pointed with the tallest blades of grass usually to one end. On each side of the longest axis of the tuft, there is a cupshaped shallow depression or recess about 3 inches wide where the sides and bottom of the tuft have been hollowed out by the male as described below. Surrounding this central tuft there is a circular beaten patch of grass occasionally worn down to bare earth, of remarkably uniform size in all rings measured, from 24 to 28 inches in diameter, and usually very even and circular in shape. Occasionally this beaten ring has a "tail" of beaten grass at one side as if the bird had made a "run-in." In all except one of the rings examined the longest axis of the central tuft was orientated N.-S. (the one irregular one being N.W.-S.E.), and this may be correlated either with the direction of the wind while the bird is dancing as mentioned later, or else with the sun, this orientation providing shade on one or other side of the tuft during the day. This orientation of the central tuft, however, is not an entirely constant feature, as those now under observation at Kabete are orientated in several different directions, although the majority are N.W.-S.E. At two of these Kabete rings, about 4 feet apart from each other, there is a definite beaten runway connecting the two, but as they are now unoccupied I cannot say whether both rings were used by the same bird.

Jackson (*loc. cit*) mentions that occasionally the central tuft may have three recesses, but none of those I examined at Nyeri had more than two; but some of the Kabete rings have three, the third being at one end of the tuft. This author also mentions that the beaten ring is about 2 feet in diameter which agrees well with my measurements. He further states that the grass surrounding the dancing ring may occasionally be "snipped off, or broken down and graduated, apparently to enable a better view all round" up to 6 feet and more in diameter, but this feature I have not noted in any of the rings.

Moreau mentions that the coarse Eleusine grass at Oldeani may be beaten down to a ring a yard across, and Delacour records them as being almost one metre in diameter. The central tuft is a feature noted by all authors, but only Jackson notes the recesses. A small point of interest is that on none of the rings I have seen has any excreta been found, the

birds obviously defaecating somewhere outside the dancing area. The marks made by these dancing rings are extraordinarily persistent, and the grass does not seem to recover for over a year after it has been beaten down.

THE DANCING DISPLAY OF THE MALE.

According to observations made by my father, these males had been dancing for at least a fortnight previous to my visit, and continued for at least a fortnight after, but the actual length of time in weeks the males spend on the dancing grounds is not yet accurately known. Jackson has no information on this point, but it appears likely that the males display on these grounds for at least six weeks at the height of the breeding season.

As to the actual time each day spent dancing, I believe this is dependent on the weather and the state of the grass, whether wet or not. Jackson states that they dance on and off throughout the day, but more vigorously in the early morning and after four o'clock. I have no records for the early morning or late evening, but the birds under observation rarely commenced dancing at all vigorously until after 1030 hours when the grass was almost dry after the night's rain or dew, and ceased entirely after 1600 hours, when all the males flew off to the feeding grounds—banks of Mexican Marigold along the roadside.

Very shortly after I had settled in one or other of the hides and my companion had walked away, the cock bird would return to the vicinity of the ring, alighting first of all on the tops of the long grass stems nearby, but outside, the dancing ring. From here he would call fairly persistently for a short time, this call being what I term a "presence-announcing" note, as I heard them call thus only when in the vicinity of the ring. One male which I watched closely had a call rendered as a whistle followed by two clicks "tu-eee—sik-sik," these last two clicks being rather ventriloquial and often sounding as if they came from another bird at a distance. This call is made with the beak open, and is repeated in frequent succession while just outside the ring, the cock flaunting his curved tail plumes and pulling at bits of grass round about with his beak. The other male which I studied closely had a quite different "presence-announcing" note, rendered as "wit-trueee," the first syllable a click, the second a whistle, and unlike the other male he occasionally also used this while standing on the ring. For various reasons which I could not clearly determine this cock appeared to be more successful in attracting females than the former, and it is interesting to record that his call note was different, though his behaviour outside the ring was in general similar to the other, preening and plucking at the grass; he would often also sit on the branches of my hide from where he flew down to the ring, unlike the other male who would never use the hide as a perch. I could not see any difference in plumage between the two, however.

Occasionally when standing on the long grass outside the rings both birds made an extraordinary sound for all the world like a cow cropping grass followed by a swallowed click note—the whole very difficult to render on paper, and I found it very hard to believe at first that no cattle were grazing near, until I had completely satisfied myself that only the birds could be responsible for this amazing sound. There appeared to be no obvious reasons for this note to be made, and it is almost inaudible a few feet away, unlike the "presence-announcing" calls.

The alarm note when the birds are disturbed is a chattering, scolding "cik-cik-cik" note as the birds fly away from the rings, and this note is also used in relation to the behaviour of the females as mentioned later.

Having flaunted, preened and called outside the ring for a varying period of time, the male then flies down to the beaten ring and commences jumping, these jumps being of two types—a high jump about 2 feet up in the air above the level of the surrounding grass, and a short jump only a few inches in the air. The jumping is done from place to place in the ring, but always facing the central tuft of grass; and usually, if there is a wind, facing the direction of the wind as well, possibly to prevent being upset by the wind catching the long tail plumes broadside on. The short jumps have a bouncing appearance accompanied by a side to side twisting, but still facing the central tuft. High and low jumps alternate irregularly, about four or five high leaps followed by a few low ones then a rest, but this rhythm is not uniform, and the cock may perform with only low leaps for a period, or only high leaps, or low followed by high, but as Jackson also notes rarely more than six high leaps are made without a pause (Fig. 3).

The appearance of the bird while leaping is very characteristic; the head is thrown back so that the beak is held almost horizontal, the neck feathers are ruffed out conspicuously, the long tail plumes are arched upwards and forwards so that they almost touch the back of the head, the whole body also appearing to be curved upwards; but two of the tail plumes always hang sideways and downwards. These main tail plumes arched in a high deep curve with the two outer feathers pointing sideways and downwards give the whole tail a typical triangular appearance, the body appearing as a puffed-out ball at the lateral apex. The initial impetus for the spring appears to be given by the feet and legs which also beat rapidly while the bird is rising in the air, while the half-opened wings are worked with a quivering motion at the same time. The bird seems scarcely to touch the ground before it rises up again, and the whole performance is very gracefully done, reminding one strongly of the beautiful up and down rhythm of the "Yo-Yo" toys that children used to play with.

While rising and falling in the air, the bird makes a soft tinkling note rather like that of a small rather dull bell, and like a softer quicker edition of the tinkle made by *C. ardens suahelica* males as they fly from perch to perch.

When not leaping the bird struts about on the beaten ring, flaunting his tail from side to side, ruffling the neck hackles and posturing towards the central tuft with bows and scrapes (Fig. 4), particularly after the short leaps, but keeping silent while on the ground. He butts the recesses at the sides of the central tuft, taking short runs at them with lowered head, and then pressing into them and smoothing them out with his breast; this is undoubtedly how the recesses are first made. Occasionally the cock picks at, and arranges the grass in, these recesses, one of the cocks once picking out a long dry piece of grass and flying away with it, dropping it about 6 feet outside the ring as if its presence was unsuitable in the cup.

Never once did I see any male perch on top of this central tuft, which appears to be the whole centre of valence (Russell, 1938) of the ring, all postures and leaps being made facing it and particular attention being paid to the concavities on each side. I also formed the strong impression that this plucking at bits of grass and shaping of the recesses may be related to the false nest building as described by Howard for moorhens, and several of the buntings and warblers. The second male, which I considered more successful with females, was noticeably more vigorous in leaping and posturing than the first.

PLATE XXVIII.

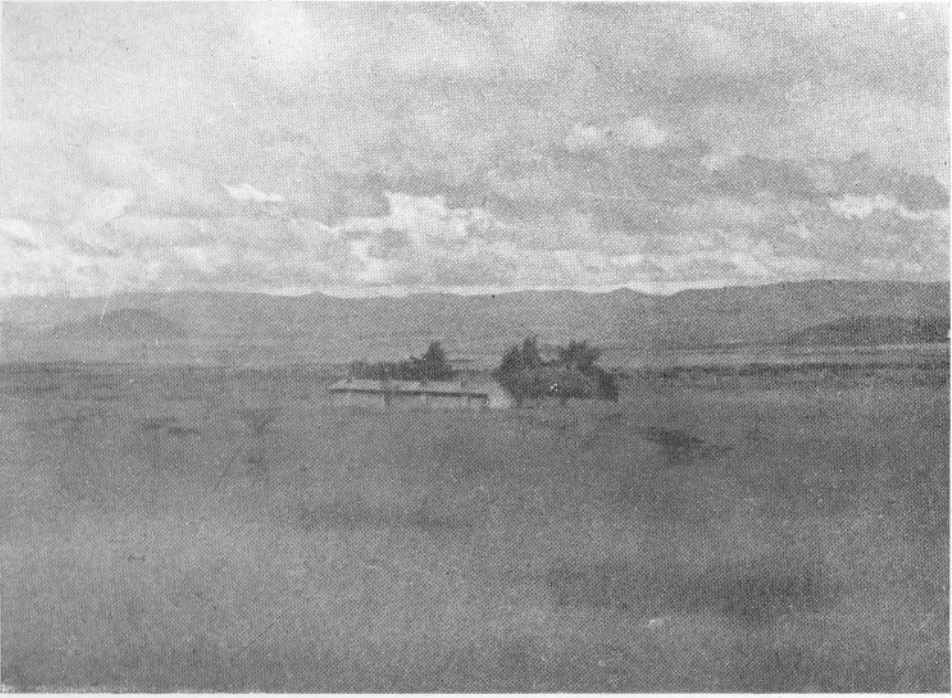


Fig. 1. Grassland area in which dancing rings of *C. jacksoni* occur.

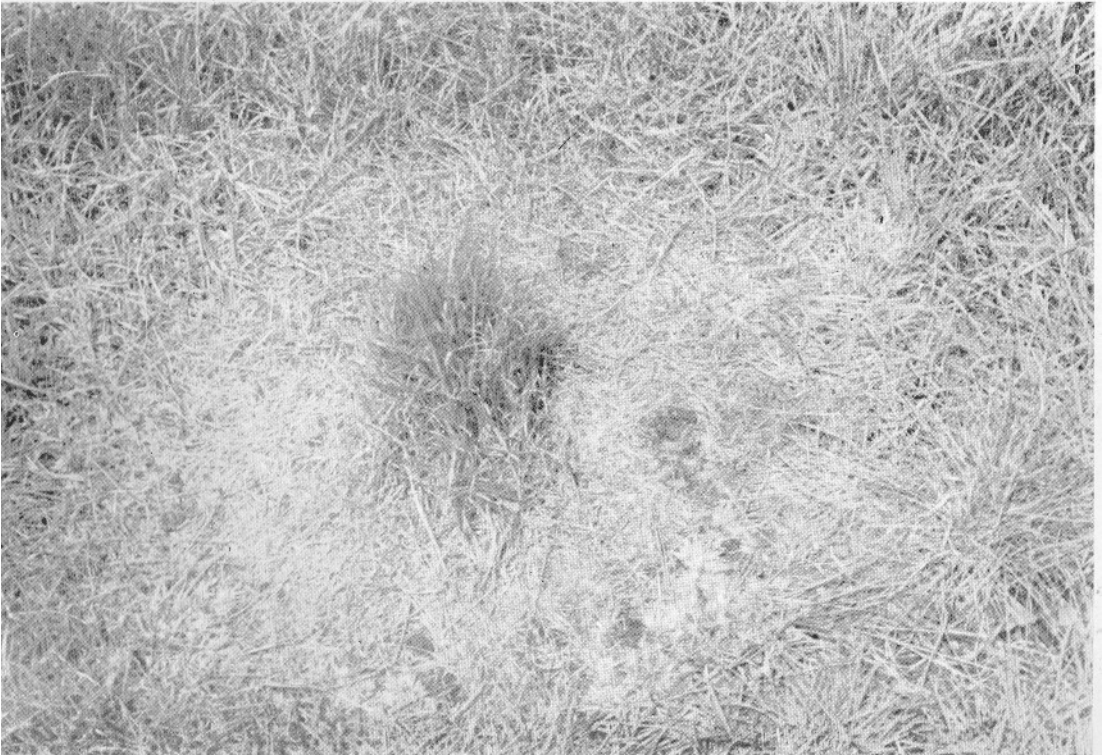


Fig. 2. Dancing ring of *C. jacksoni*, showing circular beaten patch of grass and central tuft with two recesses (the left hand recess not well seen).



Fig. 3. ♂ *C. jacksoni* on dancing ring, not displaying.



Fig. 4. ♂ *C. jacksoni* on dancing ring, showing attitude adopted during display and posturing.



Fig. 5. ♂ and ♀ *C. jacksoni* on dancing ring. The ♀ has just alighted, and the ♂ has commenced the quivering courtship display, on the opposite side of the tuft to the ♀.



Fig. 6. ♂ and ♀ *C. jacksoni* on dancing ring. The ♀ is examining the left hand recess of the central tuft, while the ♂ has again circled to the opposite side of the tuft to the ♀.



Fig. 7. ♂ and ♀ *C. jacksoni* on dancing ring. The ♀ has just alighted, the ♂ again displays on the opposite side of the tuft.



Fig. 8. ♂ and ♀ *C. jacksoni* on dancing ring. The ♀ closely examines the right hand recess, the ♂ continues quivering on the opposite side of the tuft.

PLATE XXXII.



Fig. 9. ♂ *C. jacksoni* on dancing ring. The ♀ has just flown off and the ♂ immediately droops his plumes and stops quivering, looking up at the ♀ as she leaves.

THE BEHAVIOUR OF THE MALES IN RELATION TO FEMALES.

For various reasons discussed later, I cannot believe that this dancing display is in any way connected with a threat, and it appears to me much more likely that, teleologically speaking, it is directed towards attracting the females to the males—in other words a simple advertisement of the male presence. Jackson regards the evidence against polygamy in this species as being conclusive on the basis of a count made of nests found within an area occupied by a known number of dancing males, on no occasion the number of females with discovered nests equalling the number of males although the area was searched thoroughly. Lack (*loc. cit.*) and Moreau (*loc. cit.*) have, however, shown that two species of a closely related genus, *Euplectes*, and another species of the same genus, *C. albonotatus eques*, are definitely polygamous, and I believe from these observations that *C. jacksoni* is also polygamous, though more work is required yet on this aspect of the breeding cycle.

I could not count the total number of females present in this area of this species, as there appeared to be a greater number of females than males, but some of these may have been, and probably were, the females of *C. ardens suahelica* and *C. progne delamerei*, two species also frequenting this area. The observations, however, in relation to *jacksoni* females were as follows:—

Female birds are definitely attracted to the rings and dancing males, flying down and alighting on the ring while the male is posturing on it, but only one female at any one time; most interesting however, is the fact that on 9/5/44, a single female alighted on the ring I was watching while the male was several yards away, having been scared off shortly before; this hen bird then spent a short while inspecting the central tuft, flying off before the male returned. Single females have also been seen round other untenanted rings, and it would appear as if these rings themselves are valent for the females even when untenanted by a male.

On several occasions a female would fly down to a tenanted ring, be courted by the male, then fly off, to be immediately followed by another female who had been perched on the grass a few feet away flying down to the ring and also being courted by the male. More observations are required on this point, but it seems very significant that each male may attract several females; and particularly since the dancing may continue for several weeks it would seem strange if only one female was being courted the whole time.

On several occasions I watched a female fly down to a ring the male of which was perched on the long grass (or in the case of the second male, my hide) a few feet away, settle on the ring and be immediately followed down by the male who commenced courting her on the ring.

On other occasions the male while dancing would look about from side to side as if looking for passing females, and also while posturing on the ring. If no female appeared in a short time, the hackles would be lowered, the tail folded, and a scolding "cik-cik" note made facing away from the central tuft and looking about; to venture upon rather dangerous anthropocentric terminology, the male appeared "annoyed" at the absence of females.

I could not, in the short time at my disposal, make any clear-cut observations on the behaviour of the females in relation to particular areas; it appeared to me as if the females flew at random singly or in

twos or threes over the whole area, dropping occasionally to a ring; but whether any females were related to any particular males, or whether their whole behaviour was completely promiscuous I could not determine.

The second male I had under close observation undoubtedly took an interest in passing females. If one came at all near, he would either fly down to the ring and start dancing at once, or if he was already on the ring would commence high and quick low leaping and bouncing about, stopping at once and lowering tail and hackles if the female passed over without dropping down.

On two occasions, however, on 9/5/44, while I was watching the male from the hide, a single female alighted on the ring and the behaviour of the cock changed most dramatically. Jumping ceased at once, he circled to the opposite side of the tuft from the female, stiffened up with his head well back, neck hackles ruffed out, tail spread up in a deep curve with the two long, lower plumes pointing outwards and downwards, and quivered all over with hackles and tail plumes shivering, and making the low tinkling note used when leaping; always circling with short quick steps on the opposite side of the tuft to the hen as she moved about, but keeping her just visible over the tuft. (Figs. 5 and 6). The hen on each occasion appeared rather unconcerned at this display, not appearing to notice the quivering cock, but taking a considerable interest in the central tuft and particularly the concavities on the sides, picking at the grass in them and examining them closely all round (Figs. 7 and 8). On each occasion also another hen was sitting on the long grass a few feet away but the cock now took no notice of these, concentrating all his attention on the one on the ring.

After a few seconds each time the females flew away, never once coming round to the same side of the tuft as the cock bird, who immediately drooped and looked up at the disappearing hen (Fig. 9). It is of interest to note that the leaping stops the moment the hen alights on the ring, strutting and quivering taking its place; and also how little interest the hen appears to take in the cock—much more interest being shown in the central tuft with its recesses.

On 10/5/44, this same cock was again visited on three occasions by a female, the behaviour of both being as on the previous day, but on two of these occasions when the hen appeared to be indifferent for too long to the cock's display, the cock moved round the tuft to the hen's side, became if anything even more puffed out and quivered more violently, making a curious hissing noise with his beak wide open while making short rushes and prances at the hen. On each occasion the hen flew off without further happening, the cock then subsiding with a scolding note. On other occasions I have seen the cocks rise up and chase the females for a short distance as they fly away from the rings. On this date the cock bird spent much more time than previously in adjusting the grass on the central tuft, and occasionally plucking at the grass outside the ring.

Although I have never actually observed it, I have little doubt that copulation occurs on the rings as a culmination of this display, as on several occasions on more distant rings I watched what seemed to be copulation in progress on the ring, although I could not see clearly on any one occasion what was happening.

At Kabete on 26/6/44, an interesting example of what appeared to be end-of-season behaviour was noted. A mixed flock of males and females was feeding in the grass round a ring of this year, when a

male who was on the ring started making a few low jumps and one high, but the females round about, within only a few inches, took no notice whatsoever, though the cock actually displayed to one female who settled on the ring, who also ignored him. Another male was present in almost full plumage about 2 feet away, but appeared unconcerned, and was of no concern either to the male on the ring. The dancing male finally flew off with the whole flock, about 20 strong, when it left the area. This has been almost the last effort at dancing I have seen in this area, all the birds now being in large flocks (25/6/44) with mixed males, females and young on the wing, the males having nearly all shed their tail plumes. The whole incident appeared to be a very half-hearted end-of-season effort by a male whose gonads had probably not regressed as much as the remainder of the birds, as the majority of males on this date are now feeding in the mixed flocks and showing no signs of sexual activity at all.

THE FUNCTION OF THE CENTRAL TUFT.

I have mentioned previously that the central tuft with its recesses appears to be a feature of the ring possessing a special valence for the cock, the posturings and dancing leaps being directed towards it, the recesses also being butted and smoothed and arranged from time to time. It is evident also that the recesses in particular possess a special valence for the hen bird when on the ring, her attention being mainly directed towards these.

In order to determine something of the nature of this valence, during the course of the morning of 10/5/44, when the second male was dancing well, I cut down the central tuft of his ring completely, leaving the ring as a plain flat surface and removing the cut tuft some distance away.

The behaviour of the cock thereafter was somewhat surprising. He returned within a few minutes to the ring after I had settled in the hide again, and took practically no notice at all of the altered ring beyond a somewhat "inquiring" look at where the tuft should have been; thereafter continuing dancing and posturing just as previously except that all the leaps and postures were now directed towards a non-existent tuft! However (and this is an act which I had not seen him do before), after a short while dancing he left the ring for the grass a foot or so outside the circle, and for a few seconds only crouched before and buffeted another tuft of grass outside the ring, as if it was the central tuft; then returned to dancing on the proper ring just as usual.

While still hiding by this altered ring, a female (or two separate females, one after another, I could not be sure which), flew down to the ring, but would not alight on the ring itself, one standing on the grass just outside it while the cock who was on the ring displayed and quivered at her; she then flew off. The "other" female slanted down to the cock on the ring, but suddenly sheered off without landing at all. I then left the hide, stripping it of all possibly alarming features such as the camera, and retired to watch from a distance, leaving the surroundings again normal apart from the altered ring on which the male continued dancing. In a short while another hen apparently refused to land on the ring, circling round it and then flying off, vigorously chased by the cock over the grass for some distance. The cock then returned to the ring, and a second hen appeared to land on the ring for only a second or two, then she flew off. A third female then appeared, making as if to land on the ring but she also sheered off without actually alighting.

It certainly seemed from these observations as if the altered ring was more alarming to the females than to the male, the central tuft perhaps possessing more significance for the hens than the cocks, but it is difficult at the moment to discuss this further. The curious implications of this experiment with regard to *Gestalt* and the pattern concept of animal behaviour will require much further experimentation before they can be made definite.

THE RINGS AND DISPLAY IN RELATION TO THE TERRITORIAL CONCEPT.

It is not yet clear with only these few observations as a basis, what interpretation to place on the formation of these rings and the type of behaviour shown on them by the cocks, in relation to the territory concept of the nesting cycle. A very significant observation appears to be the fact that although there were nine males with rings in this relatively small area I did not on any occasion see the various males taking any notice of each other whatsoever, even when flying over the grass by another occupied ring; nor was there any form of territorial pugnacity between any of the males, nor did any male ever try to land on the ring of another male. At Kabete, however, on 20/6/44, when all the birds were in mixed flocks and showing no sign of sexual behaviour in any form, having lost much of their breeding season plumage, I noted one cock who was on a ring suddenly commence displaying and quivering before another almost full-plumaged cock who alighted on the same ring; but this second male did not appear to take any notice, finally flying off and being chased for a short distance by the displaying male. This was the only occasion I have ever noted any reaction between males, but it is difficult to say whether this was a form of territorial reaction, or merely an inverted response to a "bird-on-ring" pattern shown by a cock at the end of the breeding season.

These dancing rings are not comparable to the leks of the blackcock, since they are used by one male only, nor do they appear to be used as threat areas between males; they are perhaps more comparable in some ways with the bower-bird playgrounds. It is hoped shortly to conduct a series of controlled experiments on the actual territorial aspect of these rings by the use of stuffed males and females, as has been done for the Robin by Lack.

With regard to nest-building, I have as yet no information, and very little in respect of actual nesting in relation to the rings and dancing areas.

In the whole of this area I found only one nest of this species, 20 feet away from the second cock's ring, in the grass and close to my hide. The nest was of the typical form, and contained two eggs, but the female was extraordinarily elusive and I was unable satisfactorily to identify her or study her behaviour, or to determine to which cock she was related. This scarcity of nests was a very puzzling feature, but it may be that the females nest some distance away from the dancing grounds.

In the closely related genus and species *Euplectes hordeacea hordeacea* studied by Lack, he has shown that the males are polygamous and hold very rigidly defined territories, averaging about 925 square yards and Moreau (1937) states that these features are even more marked in *Euplectes nigroventris*, while *C. albonotatus eques* males hold very large territories, about 2,000 square yards in size, the males also being polygamous. Lack believes that the territories held by male *hordeacea* are unconnected with food supply, their chief function appearing to be that of achieving isolation for the different cocks, a feature which is, of course, biologically advantageous in any species; and he also considers that possibly in the first place the females seek out the males in these territories.

Although apparently as far as my observations have gone, they are uncharacterised by typical territorial behaviour, I believe that these *jacksoni* rings may be a further advance on the isolationism of the *hordeacea* males, whereby the male *jacksoni* are completely isolated from one another, each to his own particular very small area, thereby possibly rendering the attraction of females even more certain. In agreement with Lack's ideas concerning *hordeacea*, I believe that the dancing of the male *jacksoni*, leaping above the level of the surrounding grass, and the use of the "presence-announcing" note (like the colours, song and display of male *hordeacea*) are used solely as a means of advertising his presence, but unlike the similar characters of *hordeacea* they appear to be used in no way in defence of his territory.

The actual courtship is more complicated than in *hordeacea*, full use being made of the secondary sexual plumage such as the neck hackles and tail plumes while quivering in front of the hen on the ring—this is a different phase entirely to the dancing itself.

Jackson (*loc. cit.*, p. 1527) has mentioned the fact that the related genus and species *Vidua macroura* also shows a "dancing" habit which is more aerial in nature than that of *jacksoni*, but the breeding male appears also to show a marked territorial pugnacity in addition. It may be possible later to form a graded series in respect of territory and behaviour in the *Coliuspasser-Euplectes-Vidua* group, and this species *C. jacksoni* in particular would appear to offer most suitable material for assessing the "success" of individual males. There is, however, one point in connection with this aspect of the behaviour, and that is that while I have occasionally seen individual males dancing by themselves some considerable distance away from any other rings, the majority of rings are concentrated within a relatively small area, one ring with its male certainly being visible from several other rings at the same time; this may introduce the social sexual stimulus postulated by Darling (1938) and a possible form of communal courtship such as this author has shown occurring in species of gulls.

ACKNOWLEDGMENTS.

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SUMMARY.

1. The appearance of the dancing rings of *Coliuspasser jacksoni* Sharpe is described, these being situated sometimes only a few feet from one another in grass varying from 6 to 18 inches high. The essential feature of each ring is a circular beaten-down patch of grass about 2 feet in diameter in the centre of which is left an oval tuft of grass, the sides of the long axis of which are hollowed into two recesses, one on each side, with occasionally a third recess along one of the short sides.

2. From the grass surrounding the circular dancing ring, the cock bird calls with a "presence-announcing" note which may vary with individual birds. Having called for a short period, the cock then dances for a while on the ring, leaping in the air either high above the surrounding grass to a height of about two feet, or with short leaps only a few inches in the air, making a special tinkling note while leaping. The appearance of the

leaping bird is described, the bird making full use of the secondary sexual plumage characters. All these leaps are made facing the central tuft.

3. The cock also, while on the ground on the ring, postures before the central tuft, butting and smoothing and arranging the grass in the recesses on each side.

4. The species is believed by the present author to be polygamous, and females are attracted one at a time to the ring—either when the cock is present or sometimes when the cock is not present.

5. On the arrival of a hen on the ring, the cock's behaviour changes to a courtship type of behaviour, again involving the use of the secondary sexual plumage; this behaviour is described and differs in consisting only of posturing and quivering before the hen, no leaps being made. It varies in intensity with the behaviour of the hen, and probably culminates in copulation on the ring.

6. The hens observed appeared to take little interest in the display of the cock, their attention being mainly directed to the central tuft and particularly the recesses.

7. Removal of the central tuft does not appear to affect the dancing display of the cock bird, but appears to affect the hens more, the latter seeming alarmed at the altered appearance of the ring.

8. The relation of these rings and behaviour to territory is discussed, the rings probably achieving a successful biological isolation of the cock, being an advance on the rigid but fairly spacious territorialism shown by the related genus *Euplectes*.

9. Nothing, however, of territorial pugnacity appears to be shown by the males, the dancing appearing to be simply an advertisement of the male presence for the purpose of attracting the females who are then courted on the rings, the male showing a different type of behaviour during this courtship.

10. The proximity of several rings occupied by dancing males may involve a social sexual stimulus such as has been postulated as occurring in communally nesting gulls.

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ADDENDUM.

Subsequent to writing the above paper, detailed observations have been carried out on a mixed flock of *C. jacksoni* males and females at Kabete over the last twelve months. These have shown that true territorial behaviour becomes evident early in the sexual break-up of the flock. The males, isolating themselves on rings, establish a well-defined territory of small extent, of which the ring itself is the focal point; the territory extends all round the ring at a radius of 6 to 10 feet from the central tuft.

A female alighting anywhere within this territory may be solicited by courtship behaviour by the male on the ring, even though she may not alight on the ring itself. Another full-plumaged male alighting in this territory is treated in one of two ways, depending on the attitude of his tail as he alights. If he alights with his tail arched and the two outer plumes drooping as in the dancing attitude, he is attacked with pursuit flight if the owner is present in the territory. If however, the intruding male alights with his tail folded in the normal flight attitude he is usually solicited and displayed to by the owner as if he was a female. It is very noticeable that when a male returns to his territory from outside it, the tail is arched and the two outer plumes drooped the moment he crosses the boundary; the bird alights in the dancing attitude, and thus shows his ownership by his appearance. Thus the attitude of the tail is a most clearly marked behaviour recognition signal (Tinbergen) or releaser (Lorenz) in this species of bird.

Where two or more rings are found within a few inches of one another these observations have established that they are all formed by the one male, who may use them alternately while dancing, and keep them all in good order. Owing to the establishment of these fairly rigid territorial boundaries, rings occupied by two *separate* males are not found closer than about 12 feet. These boundaries are accepted by the other members of the flock early in the break-up, hence territorial squabbles are seldom seen late in the season. This explains the absence of rivalry in the Nyeri observations. This territory is related purely to sexual functions and has no food significance; feeding is carried out in a mixed flock even in the height of the dancing season, on neutral ground where sexual rivalry is notably absent.

Furthermore, this territory appears of no significance to the females apart from the fact that they are attracted to the rings; they are unaware of the boundaries of the male territories. At nesting time, the males cease dancing vigorously and the main dancing area may become completely deserted; the females nest in a different area which is usually some distance away from the dancing grounds. The nests tend to be grouped together, and are usually about 20 to 30 feet away from the nearest ring if males have been dancing previously in the neighbourhood, i.e., well outside the territory boundaries.

Polygamy appears to be general, and seems to arise because of the imperfect correlation between the maturation of the males and females. Some males mature early, others late, and the early males may cease dancing and start moulting while later males are just beginning to assume breeding plumage and dance. This irregular maturation of the males may be spread over several months, while by contrast, the females mature almost simultaneously, and all the nests are found at the same stage of building or incubation within a few days. Since the sex-ratio of the mixed flock is almost 50:50, late maturing males are thus able to mate with several females, because the mature females probably now outnumber the mature males. Males may commence dancing some four months before the first nest is found, but these early males are probably unsuccessful at mating because of the unready state of the females. Males may start dancing while still in non-breeding plumage, but the behaviour pattern of these immature males is undeveloped in several respects.

It is hoped later to publish a full account of these observations on the development of the sexual break-up in a mixed flock.

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