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# Why do Nightjars sit on the roads at night?

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**ABSTRACT:** Observations have shown that nightjars (*Nyctidromus albicollis*) sitting on the roads at night almost always sit nearer the edge than the centre and face the centre. Numbers on the road are influenced by moon phase being greatest near full moon and least at new moon. From these and other observations arguments are developed to show that nightjars frequent the roads primarily to feed but also to use them as stations from which to call in establishing territories or in attracting mates.

That nightjars sit on the roads at night is well known to naturalists. Their eyes shine red as they reflect the light from motor vehicles and the birds can usually be seen as they fly off on the approach of the car. When I went to live in Talparo in June 1982 I saw them regularly as I travelled at night. I noticed that the birds always seemed to sit near the side of the road facing the centre so that in flying off they flew in front of the car from one side of the road to the other. Was this behaviour constant I wondered and why do the birds sit on the roads? French (1973) says of the Lesser Nighthawk, *Chordeiles acutipennis*; "At night they commonly sit on the warm pitch roads which cross the more isolated savannahs" which suggests that they can detect the warmth of the roads and that they like it. Chapman (1894) says of the Pauraque, *Nyctidromus albicollis*: "they feed at night in the roads and footpaths". Here were two ideas to explore.

For the next six months I would be travelling back and forth from Talparo to Petit Valley mainly at night and about five times a week. This seemed to provide opportunity enough for a study. This phase ran from 1 July 1982 to 31 Dec. 1982 after which travelling became slightly less frequent and the series of observations was discontinued. However, other series were begun later and there were many observations that were not part of the main series.

## METHODS

Methods were simple. For the first series of observations a table was drawn up and the observations recorded by ticking or writing in the appropriate column. The column headings were as follows: Date, Time, Place, Day wet or dry, Road (at observation) wet or dry, Bird nearer centre or side, Bird facing centre or side, Remarks. The first three headings need no comment; some of the others do. Observations on the weather and the state of the road were meant to determine if birds sat on the road less frequently after wet days or on wet rather than dry roads. Observations on the position of the bird on the road were meant to determine if in fact the birds always stayed nearer the side than the centre and

always faced the centre. The remarks column came to contain additional information about the weather or the state of the road at the site of observation eg. whether there was grass growing at the centre. All the observations were memorized and written down immediately on returning home. Although on one occasion eight observations had to be memorized usually there were far fewer at any one time. The burden on the memory was lessened by the fact that the day's weather would be the same for all and usually also the state of the road. In time the one word "standard" would signify a position nearer the edge and the bird facing the centre and this too eased the burden on the memory. There were occasions when some detail or other was forgotten and these suspect data were omitted from the record or entered with question marks and treated appropriately in the analysis. Although most observations were made from a moving car some were made from a stationary car some on foot and three from my study window.

Most of the observations (161, 77%) were made on Leotaud Trace or the roads of Haven Hill Farm situated about 1 km from the main road on Leotaud Trace. Others (29, 14%) were made on the 1 km stretch of the Tumpuna Road passing through El Carmen Estate and some (17, 8%) on the Caroni South Bank Road at Las Lomas. One bird was seen on Lady Young Road but no birds were seen on the Churchill-Roosevelt Highway between Port of Spain and Arima, the Old Southern Main Road, the Caroni South Bank Road other than at Las Lomas and the Tumpuna Road between the Churchill-Roosevelt Highway and Brazil Village.

Arising out of the first series of observations a second series was made in which records were kept of the estimated distance of the car from the bird at the instance it flew. In this series a mini tape recorder was used for recording the observations. This series was begun on 31st Oct. 1983 and ended on 13th Feb. 1984. The observations were confined to Leotaud Trace where the state of the road made slow travel desirable. This restriction was imposed to reduce variation in the speed of the car. Lights were always on high beam.

A third series of observations on the sex ratio of birds seen on the road was confined to Leotaud Trace and the roads of Haven Hill Farm. This was because on these roads it was possible to approach a sitting bird slowly and stop the car just in front of it without courting danger from other cars. The bird could then be examined carefully in the light from the car. By this time (see later) I had concluded that all the nightjars in the area were Pauraques and I had also learned how to determine the sex of the

bird if it was clearly seen. The sex of each sitting bird was noted together with other information such as location, time and whether the determination was made from the bird when sitting or flying or both.

Leotaud Trace and the roads of Haven Hill Farm are about half the width of the other roads where observations were made. Leotaud Trace is paved in patches which make up perhaps half its length. There are numerous ruts and depressions and grass grows in a strip at the centre in many places. The roads of Haven Hill Farm are mostly dirt roads but the driveway to the house is paved with oilsand. Here too grass grows along the centre.

### Species and sex identification

In the first series of observations I simply recorded any nightjar on the road and thought for a time that there were two species, a larger one with prominent white wing bars and a slightly smaller one with less conspicuous and narrower wing bars and with no white stripes in the tail. I now believe that all the observations, with the possible exception of the one on Lady Young Road, refer to the Pauraque, *Nyctidromus albicollis*. The evidence is as follows.

Despite the fact that many of the observations were made from a moving car there were times when I could approach the bird very closely, stop the car less than a metre from it and study its shape, colour and pattern for several seconds in the light from the car. In every such instance the bird was a long-tailed species that conformed in appearance with the descriptions and illustrations of the Pauraque in Herklots (1961), French (1973) and Dunning (1982) and with the specimens of the Pauraque in the collection at the Caribbean Epidemiology Centre, formerly the Trinidad Regional Virus Laboratory. The white bib was rarely seen because of the bird's "hunched down" posture on the road and the fact that it always presented its lateral aspect in these situations. On the other hand, the white wing bars and the white stripes in the male's tail were often clearly seen as the bird flew. I have several times watched birds on my driveway from my study window and they all conformed to the description of the Pauraque and those that called gave the characteristic call of the species. (The white bib can be more easily seen on calling birds because the throat swells outward with the call). My notes record that on one occasion, on 24th Sept. 1982, a bird on Leotaud Trace in front of my car gave the characteristic call of the Pauraque as I approached. There is the further fact that in three years of living at Haven Hill Farm I have never heard the call of any other member of the Caprimulgidae. I have heard the call of the Common Potoo, *Nyctibeus griseus*, which is a larger bird of different habits that, as far as I know, has never been reported to sit on the roads.

This evidence leads me to believe that all the observations made at Leotaud Trace and Haven Hill Farm (77%) refer to the Pauraque. The stretch of the Tumpuna Road that passes through El Carmen Estate where 29 observations (14%) were made is only 2 km from Leotaud Trace and Las Lomas where 17 observations (8%) were made is only 5 km away and at both localities the habitat is much like that at Leotaud Trace. Although the birds at these localities were not studied as intensively as those at Leotaud Trace they were apparently the same species. It is reasonable to conclude, therefore, that most if not all the observations can be attributed to the Pauraque. This conclusion had been reached before the second series of observations was begun.

By the time the third series was begun the appearance of both sexes was familiar to me. According to Herklots (1961) the wing bars of the male are white whereas those of the female are

buff. In the light from a car the bars of both sexes may appear white at a distance but the bars of a female in flight appear to be narrower. If a sitting bird allows a close approach the wing bar of the male can be seen to be brighter than that of the female. Also the white feathers of the male's tail can almost always be seen so that the determination of the sex of a sitting bird can be made if it is seen from close up i.e. from the driver's seat of the car if the bird is within a metre of the front of the car. When the bird flies an opportunity occurs for confirming the determination from the width and brightness of the wing bars and the presence or absence of the white stripes in the tail. It should be noted, though, that when birds are approached that closely they often do not fly in front of the car but quickly turn and fly off the near side of the road and outside of the illuminated area.

## RESULTS

### Position on the road

In the first series there were 208 observations. Eleven with some uncertainties are now omitted from the analysis; the remaining 197 are shown on Table 1. In 141 observations (70%) the birds sat nearer the edge than the centre and in a further 16 they were halfway between edge and centre. In 195 observations (99%) the birds faced the centre. Only two birds (1%) were nearer the centre than the side and faced the side. No bird in this series was seen nearer the side than the centre and facing the side but one was seen in this position after the series was completed. Also, no bird was ever seen facing down the road i.e. with its body axis parallel to the edge.

Table 1

Numbers of nightjars observed on the roads in the positions indicated.

Facing	Sitting	nearer side	nearer centre	halfway	Total
	Centre		141	38	16
Side		0	2	0	2
Total		141	40	16	197

### Influence of the weather

Twenty observations with some uncertainties are now ignored. The remaining 188 observations are divided between the different combinations of weather and road conditions at the time of observation as shown in Table 2. Numbers on wet and dry roads were practically identical indicating no preference for dry roads. Forty two (22%) of observations were made after wet days when there was little or no chance of the roads being detectably warm. Sixty seven (46%) of the remaining 146 were made after midnight when any warmth in the road would have been largely dissipated, so that in 68% of the observations the roads (in my view) would not have been warm enough to influence the birds' behaviour.

Table 2.

Numbers of birds seen on the roads in relation to weather conditions.

Road \ Day	Wet	Dry	Showers	Total
Wet	36	5	54	95
Dry	6	73	14	93
Total	42	78	68	188

Influence of the moon

During the course of the study it began to seem that moonlight was influencing the birds' behaviour. When the observations are plotted with respect to moon phase the histogram shown in Fig. 1 is obtained. In this figure details of shape, such as the trough between two peaks at full moon, are unimportant. These details would have been influenced by the frequency of trips when observations could be made and the amount of disturbance of birds on the road by traffic ahead of me. It is the general shape that is important and this shows clearly that the birds are indeed influenced by the moon. Birds were seen much more frequently

at or near full moon than at new moon.

As my familiarity with their behaviour increased I came to believe that the birds always flew on to the roads at dusk regardless of moon phase and thought that this would show up if only the observations made early in the evening were plotted. Figure 1B shows the distribution obtained when observations made up to 1930 hrs are plotted against moon phase as before. There are still more birds on the road near full moon than near new moon but the difference does not seem to be so pronounced. However, only 31 observations are available and these are really too few to establish the birds' behavioural norm.

It should be noted that 207 of the observations were made between dusk and 0140 hrs. The remaining one was made at 0535 hrs – a bird on the driveway that called repeatedly just before dawn. What happens between 0140 hrs and 0535 hrs and how it might influence the shape of the histogram is unknown. It should be noted too that no records were kept of whether the moon was actually visible at the time of observation.

Flight in relation to the car

Sometimes the birds allowed such a close approach I was afraid I might run over them. At other times they flew when the car was many metres off. This behaviour also appeared to be related to moon phase with the closest approach being allowed

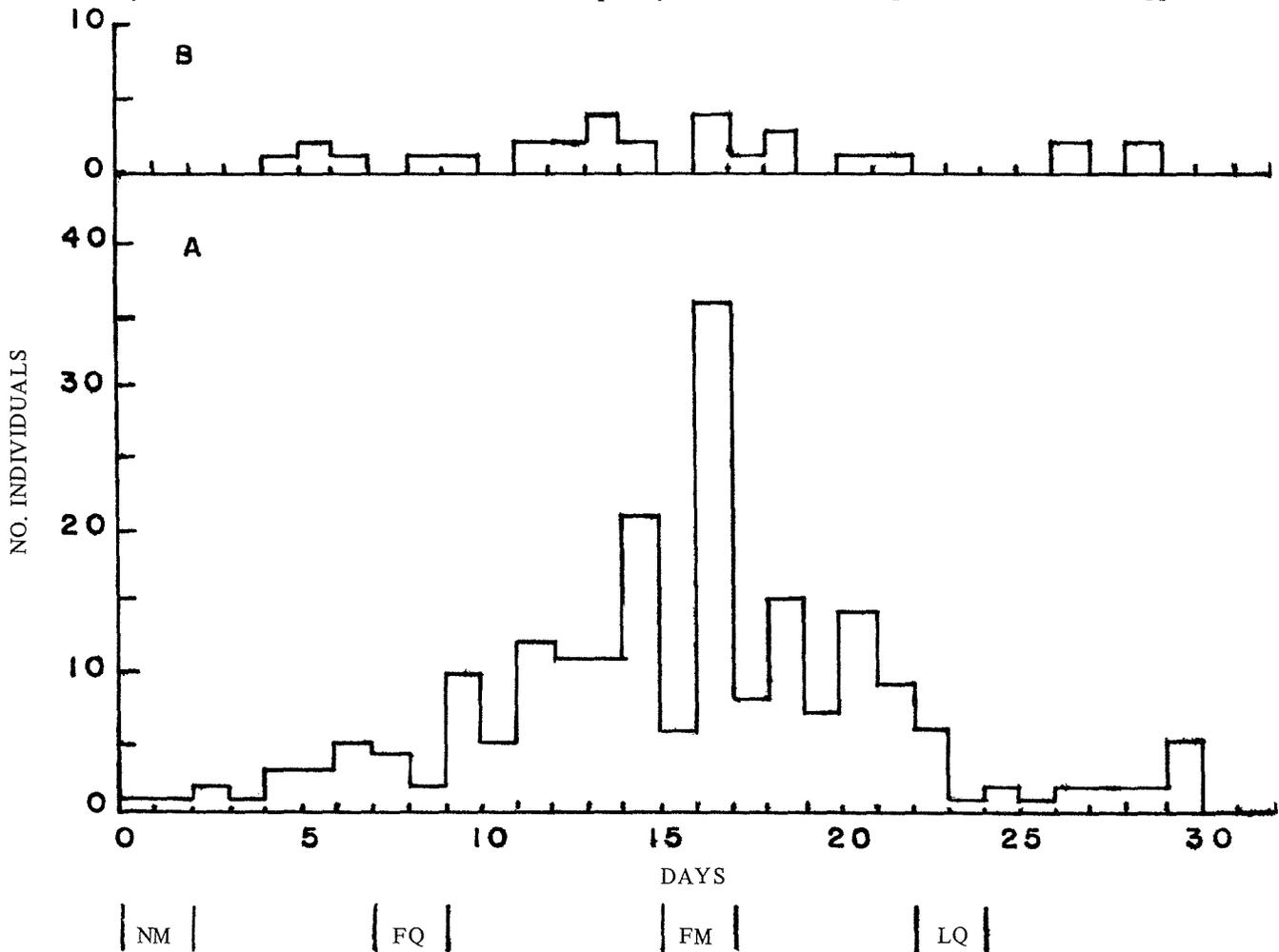


FIG. 1

Numbers of nightjars seen on the roads at different phases of the moon. (A) All observations. (B) Observations between sunset and 1930 hrs only. The cycle begins with new moon on day 1. The other phases vary over two days because the synodic lunar period of 29.53 days is not evenly divisible by 4 and because the actual moment of new moon on day 1 varies within a 24 hr period.

at full moon. The second series of observations was made to test this possibility. The speed of the car (and the noise of the engine) are obvious factors in the situation and for this reason the observations were restricted to Leotaud Trace where the condition of the road demanded a speed no greater than 24 kph. Even with this restriction I was not at all sure that meaningful results would be obtained. The distance from the car at which the bird flew was plotted as before against moon phase. The points were so scattered that no trend could be detected.

However, except at or near full moon the birds would not be in moonlight for the whole night. The observations were therefore divided into 3-hr periods of each day of the moon's phase and those made when the moon would be visible to the birds were compared with those when the moon would not be visible. Again, no difference was seen. The distance from the car at which the birds flew varied widely for all conditions. Hence, the hypothesis was not supported.

The lights of the car must surely seem less bright at full moon than at new moon. If the speed of the car could be kept absolutely constant would a difference show up? Such a study has not been attempted. However, other observations made after the second series had been completed suggest that individual birds might react differently. Thus, when birds were seen at the same point on the road night after night and the probability is high that the same bird was being observed repeatedly, flight seemed to occur at more or less the same distance from the car regardless of moon phase. This aspect requires further study.

## DISCUSSION

It is clear from the observations recorded above that the Pauraque habitually sits nearer the edge of the road than the centre, faces the centre rather than the edge and never sits with its body axis parallel to that of the road.

Forty seven of the observations were made on major, paved roads and the remaining 161 on Leotaud Trace or the roads of Haven Hill Farm. In only two of the 47 observations (4.3%) was the bird nearer the centre than the edge. The other 36 observations of birds nearer the centre than the edge (Table 1) were therefore made on the minor roads and constitute 22% of those observations. Therefore, sitting nearer the centre than the edge is much more common on minor roads than on major roads. In fact, although not rigorously documented, it is clear that on major roads the birds usually sit very near the edge i.e. within one or two body lengths of the edge.

One reason for this may be the simple fact that traffic is heavier on the major roads than on the minor roads; perhaps the birds have learned to keep out of the way. If this is so they are not always successful for French has seen dead birds on the road (pers. comm.). Their behaviour on large open spaces where there is no traffic is therefore relevant but I have made no observations on this aspect of their behaviour. A second possibility is that the birds need to be near cover. Eighteen of the 36 birds (50%) seen nearer the centre than the edge on minor roads were at locations with grass growing at the centre. This may not have been accidental. The other eighteen, though not near grass at the centre, were nearer the grass on the other side than they would have been on a major road twice as wide. There is thus some evidence for the second possibility. To consider a third possibility it is necessary to try to answer the question why does the Pauraque sit on the roads at night?

One answer may be that it likes warm roads. This arises out of the observation of French (1973) quoted earlier. The second answer may be that of Chapman (1894) that they are on the roads to feed. A third may be that the birds use the roads as

places to sing from in proclaiming their territories and a fourth as places for courtship and mating. Each will be discussed in turn.

It has been shown above that in only 32% of the total number of observations was there any reasonable chance that the birds were responding to the warmth of the roads. A consideration of the influence of moonlight further reduces the possibility that the warmth of the roads is important. Figure 1 clearly shows that the birds are on the roads in greatest numbers at our near full moon and in greatly diminished numbers at new moon. Now, various studies in different parts of the world have shown that rainfall tends to be greatest just before first quarter and just after last quarter (Quesnel 1972) and this seems to be true for Trinidad as well (Quesnel, unpublished obs.) The driest days coincide roughly with full moon and new moon. Thus, the two times of the lunar month when warm night-time roads would be most common (full moon and new moon) are associated with both the maximum and minimum numbers of birds on the roads. Clearly then the warmth of the roads is unimportant and the degree of moonlight is the major factor influencing the birds' behaviour.

Why is this so? Possibly, roads, especially dirt roads, reflect light better than foliage (chlorophyll, after all, is designed to absorb light) and the brighter the moon the greater the difference in the amount of reflected light. Unfortunately, light meters in cameras are not sensitive enough to respond to this reflected light and I have not been able to test this possibility. I assume that insects respond to the reflected light in the same way they respond to electric light i.e. they fly towards it. Thus, the numbers of insects flying over roads should be greater than over foliage and the difference should be greatest at full moon and least (perhaps negligible) at new moon. This then, is the attraction of the roads for the birds. In my view Chapman (1894) is right and the birds sit on the roads to feed.

Terres (1980) says of the Pauraque in the United States: "frequently flies low along road in front of car for 100 yds. or more and can be seen feeding on insects in beams of car headlights." This statement supports the conclusion just reached but I am not sure I have ever seen a bird feed when flushed from the roadside by an approaching car. In my experience the bird almost always flies across the road in front of the car because it almost always faces the other side. Only occasionally does it turn and fly along the road or over the near side.

It is now possible to see why the birds sit at the edge of the road facing the centre. If I am right about the road attracting insects then in this position the bird is best placed to see the maximum number of them. If the birds were responding to the warmth of the roads there is no obvious reason why the orientation on the road should be so constant.

We can now return to the question "Why are birds nearer the centre more often on minor roads than on major roads?". My suggestion is that in this position they can detect both flying insects and those in the grass both in the centre of the road and at the far side. If this is correct then the Pauraque must feed at ground level as well as in the air. I know of no report that it does but Terres (1980) gives evidence of other nightjars feeding on the ground. Thus, of the Common Nightjar, *Chordeiles minor*, he says that one bird's stomach contained 2175 ants. (Were these flying ants or not?). Of the Lesser Nightjar, *Chordeiles acutipennis*, he says "after dark also feed in open on ground" and of the Poor-will, *Phanaenophilus nuttalis*, "many insects picked up from ground or by leaping from ground into air for them". Thus, it is possible that the Pauraque, too, feeds on the ground or picks insects off low vegetation. This is obviously a subject for further study.

The birds fly out on to the roads at dusk and for some minutes they may be observed before they become invisible in the gathering darkness. At such times I have watched the Pauraque from the window of my study and seen it "leap" into the air (presumably to catch insects) as described by Terres for the Poor-will. The "leap", really a short flight, usually takes the bird across the driveway and it returns to its position near the side of the road turning as it alights so as to face the centre once more. The fact that this manoeuvre has taken place at every return to the road from the opposite side confirms the conclusion arrived at from the first series of observations viz. that the bird habitually faces the centre of the road.

A bird will frequently return many times to the same spot. however, it may also shift its position at every return. It can be seen, too, that a bird often sits in the same location, within a few centimetres, night after night for a week or ten days. It is reasonable to suppose that it is the same bird. Eventually it disappears and may not return to the same spot. However, the bird that haunts my driveway has sat on the road opposite a conspicuous white stone in the centre for several months.

Although this discussion has shown that feeding is the primary purpose for the presence of the Pauraque on the roads it is not the only activity that takes place there. The Pauraque on my driveway calls repeatedly from its station opposite the stone and I have seen and heard others call from positions on roads. Roads seem to serve the same function for them as songposts for passerines in the establishment of breeding territories. Observations now in progress indicate that the birds also use roads for courtship and possibly mating.

After the first draft of the paper had been written and the conclusion reached that feeding was the main reason for the presence of the Pauraque on the roads at night, it occurred to me that a sex ration far from 1:1 for birds on the road would be evidence against the conclusion. This was the reason for begin-

ning the third series of observations. It is still in progress at the time of writing but the observations already made indicate that both sexes are present with males being slightly more common than females. This is the result expected if the roads are used both for feeding and for territorial advertisement.

A final question may be raised. Did the Pauraque seek out open spaces before there were man-made roads or has the Pauraque changed its habits (and habitat?) as roads became available? We may never know the answer but the attempt to discover it would surely reveal a lot more about the bird's biology.

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