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AN ACCOUNT OF THE HABITAT, FEEDING HABITATS, DENSITY, BREEDING AND NEED OF PROTECTION OF THE LONG-TOED WOOD PIGEON, COLUMBA TROCAZ

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With 1 figure and 1 table

SUMÁRIO. Desde que *Columba trocaz* foi primeiramente descrito por Heinen em 1829, muitos ornitólogos descreveram os seus esforços para obter mais informações sobre esta ave a qual é assustadiça e difícil de contactar no seu habitat natural, a Laurisilva da Madeira. Os autores, que vivem na Madeira, observaram esta ave não só no seu habitat natural mas também, em certas alturas do ano, fora da floresta.

A sua principal fonte alimentar são os frutos das árvores da Laurisilva. Quando esta fonte escasseia, a ave sai da floresta e desce aos terrenos cultivados onde provoca grandes estragos especialmente nas plantações de couves. Neste trabalho é dada uma descrição das destruições bem como da caça efectuada a estas aves por esta razão.

C. trocaz nidifica principalmente nos ramos das árvores da Laurisilva e algumas vezes no chão ou próximo dele. Põe apenas um ovo, em qualquer mês do ano e pode provavelmente nidificar mais de uma vez por ano. Uma ave em cativeiro a quem foi retirado o ovo pôs quatro ovos em 47 dias. É sugerida uma relação entre a abundância de alimento e a intensidade da nidificação.

É impossível calcular o efectivo total da população de *C. trocaz* na Madeira mas, em 1985, antes de se efectuar a sua caça, é provável que mais de 1000 aves existissem. Espera-se que com a entrada de Portugal na C.E.E. seja dada a esta ave uma total protecção durante todo o ano.

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INTRODUCTION

Columba trocaz was first described by Heineken (1829) in the Edinburgh Journal of Science, where he explains that he «cannot, ..., reconcile it with any species given by Wagler in his Systema Avium;» and tentatively proposes the name «Trocaz», its local name, as specific designation in case «it proved to be hitherto undescribed». He also points out its shyness and the difficulty this presents to observe its habits. Regarding its food, he says that «the berries of *Persia foetens* [*Ocotea f.*] are found in its stomach; and during the berry season the birds are fattest and best flavoured». This short supplementary account is fitting 157 years later.

While Heineken stated that both the tarsus and middle toe (including the nail) each measured $1\frac{1}{2}$ inches*, it was Harcourt (1851) who first pointed out that the length of the middle toe was more than one inch longer than that of the ring-dove. Hence Harcourt referred to it as the «Long-toed Wood Pigeon».

Du Cane Godman (1872) was another ornithologist to give a vivid description of what he had learned of the habits of *C. trocaz* and the difficulty he experienced in obtaining specimens during a visit he paid to Madeira in March. Since everything he wrote could also apply to the present day, it is worth-while quoting him verbatim: «*Columba trocaz* frequents the high laurel forests of Madeira where it breeds, only coming down occasionally to feed in the cultivated lands. It is very shy, and not easily got at by the natives, who are acquainted with its habits. I was out after them for 2 or 3 days without getting a shot, though I saw several. The only plan is to go early in the morning or late at night and sit under the Til Trees (*Oreodaphne foetens*) [*Ocotea f.*] which they frequent and take the chance of their settling above your head without observing you. Even then they are not easily killed, as the foliage is so thick, and the trees so high, as well as being usually placed on such a steep slope of the mountainside that, when shot, they sometimes fall more than 100 yards below you, smashing themselves to pieces in their fall; hence it is not easy to get good specimens for ones collection. I have, however, procured eleven fair skins. They feed on the fruit of the Bay and Til Trees, for which they search amongst the dead leaves on the ground. The flesh has a strong flavour, in consequence of the aromatic nature of the food». Since he obtained 11 fair skins one must conclude that there was a good-sized population at the time. However, as will be seen later, at certain times there are easier methods of obtaining specimens.

Other prominent ornithologists such as Ogilvie Grant (1890), Hartwig (1886, 1891, 1893), Schmitz (1893, 1894, 1895, 1897, 1899, 1903, 1905, 1907, 1908, 1909, 1910), Meinertzhagen (1925), and Bannerman and Ban-

* In point of fact the long toe measures ± 5 cm (2 in.) and the tarsus ± 5.5 cm ($1\frac{3}{4}$ in.) (see Tab. 1).

nerman (1965), have all described their observations of this bird. However, with the exception of Schmitz, who lived and worked in Madeira for a total of 26 years between 1878 and 1908, and who was a keen observer of bird life on the island, all those who wrote of Madeira and its birds visited the island for short periods only and consequently were unable to study the birds in depth. Our knowledge of this bird is, therefore, incomplete and much remains to be learned.

Since on many occasions over the past seven years we have visited some of the remotest parts of Madeira, often accompanied by men who are very well acquainted with both the bird and the forest in which it lives, we have had the opportunity, not only of making many personal observations, but also, through our contacts, finding out where the birds are at different times of the year, why they are there and what they are doing. The object of this paper is to add a little more to what is already known of this bird which, due to its remote habitat, is often difficult to find and always more difficult to follow and study.

HISTORY

The descriptions of the voyages of Cadamosto, (ca. 1507) refer in part to the year 1455 (1445?) when he visited Madeira. He specifically mentions pigeons and writes: «And I say, because I was told this by some inhabitants of the island worthy of credit, that in the beginning there was a large quantity of pigeons and there are still some which are hunted by means of a kind of noose attached to a pole. The pigeon was caught by the neck and then pulled down from the tree. Since the pigeon did not know man it showed no fear» (Collar and Stuart, 1985).

Gaspar Frutuoso (1591), describing the birds which were found in Madeira mentions «pombos troquazes pretos e brancos», Trocaz pigeons both black and white. That he should mention both black pigeons and white pigeons is not surprising, for until its recent disappearance, *Columba palumbus* was known as Pombo Claro, or Pombo Branco (White Pigeon), while *C. trocaz* is still sometimes called Pombo Negro (Black Pigeon) (Bannerman and Bannerman, 1965).

Already Heineken (1829) had stated that *C. palumbus* was much rarer than *C. trocaz*. Schmitz (1903) remarked that *C. palumbus* was a rare breeding bird of Madeira while Meinertzhagen (1925) believed that nobody seemed to know about its status. In Bannerman's time (1965) this bird had already become extinct on the island.

The fact that in remote times *C. trocaz* existed in far greater numbers than *C. palumbus* is borne out from the study by Pieper (1985) of fossil bones found in Madeira and Porto Santo. He discovered fossil remains of *C. trocaz* both in Madeira and Porto Santo, which leads him to the conclusion that before the colonization of these islands by man, several other types of forest could have been inhabited by this bird, and that the relatively inaccessible forests of northern Madeira represent a refuge after 1419,

the year Madeira was discovered. The vast majority of the pigeon bones which he found were of *C. trocaz*. *C. palumbus* bones being rarely found in Madeira and Porto Santo (Pieper, in litt. 1985). This leads one to the conclusion that the pigeons mentioned by Cadamosto were in fact *C. trocaz* and not *C. palumbus*, but possibly, even if only remotely so, both.

HABITAT

There can be no doubt that in those early days the island consisted entirely of dense forest. Frutuoso (1591) goes on to say that Zarco, when he discovered the island in 1419, sent men into the forest to ascertain whether there were any wild animals, but none were found, «only birds of various kinds, which were taken by hand because they were not used to see people, nor did they have any contact with the outside world». He mentions the enormous trees which had been there «since the world began» and states that shortly after the island was discovered, in order to enable the settlers to plant their crops, large areas of this forest were burned to the ground and that this fire lasted for 7 years.

Over the centuries most of this forest has been destroyed, many of the larger trees being felled for their valuable timber, which was exported and also used for local construction. Several old houses which have recently been demolished for rebuilding have shown that the massive beams, mostly of Til, used several hundred years ago, are still in perfect condition. Nevertheless, several large areas of the original forest still remain intact forming the last remnants of the Macaronesian forests which centuries ago covered the Canary Islands, the Azores and Madeira. These remaining areas of the Laurisilva consist mainly of the more or less large-leaved trees such as Loureiro (*Laurus azorica*), Til (*Ocotea foetens*), Vinhatico (*Persea indica*), Barbusano (*Appolonias barbujana*), Faia (*Myrica faya*), Folhado (*Clethra arborea*) and Pau Branco (*Piconea excelsa*), as well as the two needle-leaved heaths Urze molar (*Erica arborea*) and Urze durázia (*E. scoparia*).

It is here, among these trees, that the Long-toed Pigeon, *C. trocaz* still lives and breeds. By far the greater part of this habitat is to be found in the mountainous northern slopes of the island, but there are also a few isolated pockets to the south where this shy bird can be regularly seen.

C. trocaz is difficult to follow in its natural habitat. It may sit in a tree for long periods without moving, but at the least noise or movement, it will fly off. Its flight, especially when it has been disturbed, is very fast, and it either moves rapidly within the cover of the trees, or then it makes a long flight outside the forest, sometimes from one side of a valley to the other.

Where the Laurisilva descends to near sea level, as is the case in the northwestern part of the island, near Seixal and Ribeira da Janela, the birds are also occasionally seen. We have observed them there on more than one occasion.

FOOD

The principal source of food of *C. trocaz* is the berries of the various Madeiran trees of the Laurel family which it finds in its natural habitat. Of these, the Bay tree (*Laurus azorica*) is by far the most common and thus the most important of them all. For several months the birds eat the berries off the trees, and later, when the last ripe berries have fallen, they continue eating them off the ground. In early March 1986 there were still a few berries on the bay trees but the majority of trees were in full bud. The birds also eat those seeds on the ground which are found on dry leaves, for those that fall on moist ground soon sprout and in this condition are not touched. They also eat the flowers and leaves of Serralha (*Sonchus spp.*) and Rabaça (*Apium nodiflorum*) and have a particular liking for Agrião (*Nasturtium officinale*) which grows in the mountain streams. While there is a sufficient supply of food in the Laurisilva the bird tends to remain within the forest. On 11 January 1986 we were able to observe several birds feeding in a Bay tree in a deep valley below Ribeiro Frio. When we arrived, we saw about 15 birds in this large tree which still held many berries. As we sat hidden watching the birds feed, a further covey of pigeons arrived followed by yet another until there were about 40 birds feeding off the same tree. The tips of the branches were constantly moving as the birds fluttered from one spot to another searching for berries.

When there is a shortage of food in the forests the birds leave their natural habitat and descend to lower levels to feed on agricultural land. It is here that problems arise concerning their safety for, without doubt, they cause enormous damage to the crops, especially to cabbages* and fruit trees, and are consequently shot, either legally or illegally, or then poisoned.

This was the case in early 1984 and 1985 when very large numbers of birds left the forest and descended to lower levels to feed on the surrounding agricultural land. We were informed by several people that on 27 January 1985 in one area alone, Chão da Ribeira, which lies at the foot of the Laurisilva, 'clouds' of *C. trocaz* had been seen, estimated at between 150 and 200 birds. These numbers are certainly justified by the total destruction of the large cabbage plantations in that area which we later personally verified. Whole fields of this vegetable had been

* The «cabbage» referred to is a Portuguese variety on which the very dark-green leaves are loosely placed, not forming a closed head, and it is the long, tender and erect flowering-stalks, growing during the cold season of the year, that are in great demand by the population of this island and, unfortunately, also among the population of *C. trocaz* when the normal crop of their regular food fails. The large leaves are normally hand-picked and fed to the cattle. The pigeons also eat these leaves after eating the flowering-stalks.

eaten down to the stalk. It is interesting to note that on that very same day F.Z. visited the upper end of Ribeira da Janela, near Rocha Vermelha, which lies in the heart of the laurel forest, well above Chão da Ribeira, and there he saw but one single bird. Further down the valley, near the village of Ribeira da Janela, we witnessed 16 *C. trocaz* laying waste a cabbage patch. On 3 February F.Z. saw several coveys, totalling about 60 birds, proceeding in the same way. Again on 27 February, in the same area, we attempted to photograph the birds as they fed. We watched 15 pigeons systematically eating their way through a plantation of cabbages with up to 4 birds feeding off a single plant at the same time. They ate very fast and never seemed to have enough, flying off only when disturbed. We also observed them eating the flowers of a plum tree nearby which was in full bloom. In April 1984 F.Z. had seen them eating loquots. They are also known to do considerable damage at Curral das Freiras, where they feed on cherries and in 1985, for the first time, we heard reports that they were eating vine shoots, which if confirmed, would be an added reason for farmers wishing to destroy them.

In January and February 1985 F.Z. examined the stomach contents of several pigeons which had been shot by various hunters. In most cases they were empty, for the majority of the pigeons had not yet started eating, but the stomach of one bird contained 25g of cabbage and another 30g.

It is interesting to note that our guide and companion on many of these mountain trips, António dos Santos, a resident of Ribeira da Janela and a man with a profound knowledge of the forest and its birds, repeatedly told us that the cause of the very large number of pigeons on agricultural land was the lack of berries in the laurel forest, which forced the birds to find food elsewhere. The same view was expressed by João Gouveia, a forestry warden in Ribeiro Frio with over 30 years' experience. Gouveia has lived in this village all his life and is well acquainted with the ways of *C. trocaz*; he knows when and where the birds are to be found and their source of food at different times of the year.

In the summer of 1985 both Santos and Gouveia told us that since the Bay Trees were so full of berries, it was unlikely that the pigeons would leave the forest the following winter. On 26 January 1986 we visited Chão da Ribeira, almost a year to the day since 'clouds' of pigeons had been seen. The bottom of the valley was full of untouched cabbages. There was no sign of damage anywhere. We scanned the laurisilva with binoculars and not a single bird was seen. A man collecting fodder for his cow informed us that no pigeons had yet been seen that year. As predicted, in 1985/86 there had been an exceptionally large crop of laurel berries, so the pigeons had no need to leave the forest. The amount of berries on the Bay Trees had in fact been so great that the country folk collected many tons which they pressed to make laurel oil which is then sold to the pharmacies at a very high price.

While these birds in their natural habitat are wary and difficult to observe, when they leave the forest and feed on agricultural land they appear to lose much of their shyness, possibly through hunger, and we have observed them at their ease amid the peripheral houses of the village of Ribeira da Janela feeding on the vegetable patches.

An unusual observation was made on 23 November 1985 when a *C. trocaz* was seen in our own garden in the hotel area of Funchal. We followed it to the garden across the road where, together with G.E. Maul, we observed it closely as it ate the berries of Japanese Privet (*Ligustrum lucidum*). After that date it was observed many times, sometimes within ten metres distance, without showing fear. Twice it was seen drinking from a fountain in front of the house and it was last seen on 16 January 1986. This seems to be the first time *C. trocaz* has been observed within the town of Funchal.

DENSITY OF POPULATION

Due to the nature of its habitat it is impossible to assess accurately how many birds there are on the island at a given time. From the literature one concludes that over the years numbers vary considerably. Du Cane Godman (1872) at first found difficulty in making contact with the birds but he eventually managed to obtain eleven specimens. Ogilvie Grant (1891) was «fortunate enough to get 8 specimens of this fine pigeon, which is still fairly common in the north of the island». Hartwig (1886) wrote: «From the birds which were destined for the kitchen I was able to observe the exceptionally long middle toe, which was nearly twice as long as that of a ring-dove», so one may conclude that they were not rare at the time. Hartwig (1891) wrote: «They are fairly common on the north side of the island especially in the mountains above Faial and S. Anna». However, Schmitz, a resident on the island, who was trying to obtain specimens for Hartwig, wrote to him in 1891: «In late Spring 1891 Dr. Hicks of Funchal, after a lot of trouble, managed to obtain a single specimen for 4 pounds sterling» (Hartwig 1891). A considerable sum indeed in 1891 and even in 1986! Meinertzhagen in May 1925 searched in vain for this pigeon. He «neither saw one nor heard a 'coo'». (Meinertzhagen, 1925)

It would seem that although the population probably varies to a certain degree according to the food available in the forest, the success of an ornithologist in obtaining specimens depended a great deal upon the contacts he made on the island and the methods employed to obtain them. In the last century it must have been an adventure for a visitor to travel deep into the mountain forests in search of pigeons but nowadays, there are many roads into the Laurisilva, so it is far easier to find the birds in their habitat. However, it is still difficult to calculate the total population by the birds seen in the forests and only when they come out of their natural habitat can a better estimate be made of their total numbers.

Whereas in 1982 we calculated that the population was in excess of 500 birds, following the numbers seen and shot outside the forests in 1984 and 1985, it would seem that the number was in fact over 1000. Whether the population has recovered from shooting and poisoning remains to be seen.

SEXUAL DIMORPHISM

A comparison of meristic characters taken from 25 birds consisting of 14 males and 11 females show practically no difference in measurements of length, wing span, wing, tarsus and the long toe. (See table 1). On the other hand there is a distinct difference in weight between the two sexes, which in the males amounts to 420-520 g and in the females to 390-440 g. Curiously, the difference in the total length is insignificant, from which we must conclude that in the present series the males were on average more corpulent than the females.

BREEDING

On 16 April 1893, Schmitz obtained a young pigeon which was «new proof that it breeds nearly all the year». In 1897 he stated: «It breeds at all times of the year; February, March, June, August, September and December». Bernström (1951) surveyed the literature on Madeiran ornithology and found that eggs had been found in all months except January, March, June and August. This does not agree with Schmitz who might have been referring to finding young birds and not eggs. (Schmitz, 1897)

Schmitz always found it difficult to obtain eggs of *C. trocaz*. In 1891 he wrote to Hartwig: «Despite offering ½ pound for an egg I was unable to obtain one». In 1894 he mentioned that after years of unsuccessful attempts, in 1892 he had been fortunate enough to obtain 3 eggs. «So far as I know, Madeira Pigeon eggs have only been known since 1892. The Madeira Pigeon lays only one egg».

Schmitz (1897) wrote: «After searching for over one year for such a rare egg as that of *Columba trocaz*, I was fortunate enough to find another on 1 February. According to my notes, this is only the 10th specimen ever found». The measurements in mm of 8 of the 10 eggs are:

40 x 30	50 x 31	50 x 33	44 x 29
48 x 30	47 x 31	45 x 29	48 x 31

Schmitz left Madeira in 1898 and returned in 1902. Between 1903 and 1907 he recorded a further 10 eggs whose measurements in mm are:

46.5 x 34	45.5 x 31.5	45 x 31.8	45 x 31	47.5 x 32
45.5 x 33.6	47 x 30.5	47 x 34.5	50.3 x 31.7	45.8 x 33.7

Average measurements of these 18 eggs: 47 x 31.57 (44-50 x 29-34.5)

Table 1.— Comparison of weights (gm.) and measurements (mm.) of 14 males and 11 females of *Columba trocaz*.

	27th JANUARY			3rd FEB.		10th FEB.						10th FEB.			
	RIBEIRA DA JANELA			RIB. DA JANELA		CHÃO DA RIBEIRA						BOA VENTURA			AVERAGE
WEIGHT	460	455	465	520	515	450	450	450	460	420	450	420	460	460	459.64gm.
LENGTH	495	461	465	475	464	475	490	477	465	460	472	480	474	481	473.8mm.
WING SPAN	736	730	723	764	743	760	740	750	765	748	752	745	728	746	745.0mm.
WING	250	235	245	250	243	245	254	255	259	246	241	243	246	249	247.2mm.
TARSUS	44	44	48	47	49	44	45	45	47	445	48	43	46	46	45.8mm.
LONG TOE	50	53	48	55	52	52	53	51	52	50	50	49	51	53	51.4mm.

MALES

	10th FEB.										17th FEB.	
	CHÃO DA RIBEIRA										RIB. DA JAN.	AVERAGE
WEIGHT	440	410	425	415	400	410	420	390	420	390	440	414.54gm.
LENGTH	470	465	455	470	465	450	475	467	454	446	465	462.0mm.
WING SPAN	740	725	770	770	720	730	735	710	708	726	744	734.3mm.
WING	245	230	257	247	249	243	241	243	239	238	248	243.6mm.
TARSUS	46	47	47	46	44	45	46	45	445	43	44	45.3mm.
LONG TOE	51	53	52	51	48	525	48	47	50	515	50	50.4mm.

FEMALES

The nests are made of dry twigs roughly heaped one upon the other and are mostly built on one of the trees of the forest which it inhabits. They can be built high in the trees or just above the ground and occasionally they are also found on the ground in cavities in mountain cliffs. (Schmitz 1894, Zino 1969).

P.A.Z. (1969) followed a nesting bird in the wild from discovery of the egg to eventual fledging. The egg hatched on 1 May and the chick flew 28 days later. Although there are no records from the wild, it is probable that, as in other pigeons, *C. trocaz* will breed more than once in a season. If this is so, it would help to account for the relatively large number of birds which are still to be found. The 3 eggs found by Schmitz in 1892 came from the same nest at intervals of 14 days (Schmitz, 1894) which may lead one to believe that they were laid by the same bird, but Hartwig (1893) referring to the same eggs, stated: «The people who were there said that different couples use the same nest, but each couple lays only one egg». While no further evidence has ever been found that different couples use the same nest, it is indeed probable that if the first egg is lost another egg is laid. Schmitz (1910), in what was probably his last communication on Madeira birds, written in Jerusalem, to where he had been transferred in 1908, stated that Gregorio Ferreira, a resident of São Vicente, had finally succeeded in breeding *C. trocaz* in captivity. On 4 November 1908 an egg was laid which was removed; whereupon 14 days later a second egg appeared which was also removed. On 5 December a third egg was laid. When this was removed a fourth egg appeared on 16 December which was left on the nest. None of these eggs survived since of the first 3, given to foster parents, only 2 hatched and the chicks died. The fourth egg was soon abandoned by its parents. The following year Ferreira did not remove the egg when it was laid and it hatched on 12 February and by the middle of April the bird was fully developed and independent. The incubation period was 19 to 20 days. During that year Ferreira succeeded in rearing 4 pigeons in captivity.

Other attempts had been made earlier to breed *C. trocaz* in captivity. In 1891 Lord Lilford obtained 4 Madeira Pigeons at great expense and took them to England to try to breed them (Schmitz 1983 b) and on 21 May 1907 2 pigeons which had been taken from their nests and brought up with chickens in a wire enclosure were sent to the Azores for the same purpose. (Schmitz 1908). Nothing is known of the results.

On 23 February 1986 we visited a nest of *C. trocaz* at Ribeira da Janela which had been discovered by Santos. It was on a steep slope on the border of the Laurel Forest and within 10m of a mountain road. The nest was built on a branch of Folhado (*Clethra arborea*) which was alongside and intertwined with a Faia (*Myrica faya*). Towering above two trees was a large Eucalyptus (*Eucalyptus globulus*) a branch and leaves of which had broken off a long time ago and had fallen onto the branches of the Faia. The leaves of the Eucalyptus branch had been caught among the leaves of the Folhado and now formed a dry compact mass in the bran-

ches of this tree. The heavy end of the Eucalyptus branch hung loosely down. The nest had been built alongside this mass of dried leaves, about 4 metres from the trunk of the Folhado and about 8m above the steep slope (Fig. 1).

As we approached the bird flew away and we were able to photograph the nest with its single egg. While we were attaching the camera to a branch about 2 m from the nest, the bird made several attempts to return to the nest. When we returned 2 hours later and released the shutter from a distance the bird flew away. On 1 March we were about to revisit the site when Santos informed us that due to a heavy storm which had struck the island the previous day the whole nest had been blown away. The egg contained a nearly fully developed chick.

On the same day as we had visited this nest, about 200m further along the same earth road, we found feathers of a young *C. trocaz*. It seemed as if a Buzzard (*Buteo buteo*) may have taken this bird from its nest. A little further on we found more feathers; we looked up and in the branch of a tall Pine Tree (*Pinus pinaster*) overhanging the road, we saw a nest of *C. trocaz*. It was probably from this nest that the bird had been taken. The egg had most probably been laid in January. Santos further informed us that on about 20 January 1986 he had found a nest with a half grown chick the egg of which must have been laid in early December. The eggs of these 3 nests, therefore, must certainly have been present, one in December, one in January and the other in February.

F.Z. examined the gonads of 25 birds in January and February 1985 all of which proved to be undeveloped, indicating that in a period of lack of food breeding is probably reduced. No nests were found in those months. No birds were examined in 1986, but finding 3 nests in a limited area indicating that eggs had been present in December 1985 and January and February 1986 adds weight to the supposition that when there is an abundance of food in its natural habitat *C. trocaz* breeds at any time, while breeding is greatly reduced when there is a shortage of food.

Why there should be a dearth of berries, and especially of Bay Tree berries, in certain years, is difficult to understand. we thought that this may have been due to a periodic lack of rainfall in the forests, but having obtained the rainfall figures from 3 widely spread weather stations within the laurel forests, Queimadas, Encumeada de São Vicente and Ribeiro Frio, we found that the minimum annual rainfall during that period was 1660 mm while the average annual rainfall during all those years was 2367 mm at Queimadas, about 2585 mm at Encumeada and 2567 mm at Ribeiro Frio. It would seem, therefore, that lack of rain is not the reason for lack of berries, but possibly excessively heavy rain and high winds during the flowering period may cause the loss of flowers and consequent lack of berries later in the season.

KILLING OF THE BIRDS

The normal shooting period in Madeira for all game is from mid-



Fig. 1. — Bird on nest, with egg. Head hidden by leaf.

September or early October through to December. Since most hunters prefer shooting rabbits and other game, this has afforded *C. trocaz* a certain protection by default. In 1984 and 1985, in view of the indisputable damage that was being caused by the pigeons, considerable pressure was put on the authorities to permit the birds to be shot out of the normal hunting period. As a result, a special shooting period was established of 5 consecutive Sundays in January and February. Shooting of these pigeons during the normal hunting period was then not permitted.

Although the special shooting period was restricted to *C. trocaz* only, F.Z. saw Rock Pigeons (*Columba livia*) being shot during this period, and whereas this could possibly have been a case of mistaken identity, rabbits and partridges (*Alectoris rufa*) are certainly shot illegally. By the same argument, during the 1984 and 1985 September to December shooting seasons when the shooting of *C. trocaz* was not permitted, they were, without doubt, also shot.

In 1985 an exceptionally large number of birds was killed. Having discussed numbers with various hunting groups, we estimate that over 300 *C. trocaz* were shot in January and February during 5 shooting days, with a possibility of a further 150 to 200 being killed by poison. One party of 4 guns at Chão da Ribeira shot 64 birds in 4 days and over 140 were shot in this valley during the 5 Sundays. These figures are very disturbing regardless of the total population.

Within its own habitat *C. trocaz* does no damage. There, its main natural predators are buzzards and rats, the latter of which are sadly plentiful and certainly eat the young and probably also the eggs. The predation of *C. trocaz* by man within its own habitat is relatively small and is practised by a group of 'specialists' who know where to find the really big trees in the forest, when they are full of berries and precisely when the birds will come there to feed. These men, who have little regard as to whether shooting is permitted or not, will spend a whole day sitting under a single tree and shoot the birds when they come in to feed as they did in the time of Du Cane Godman (1872). These spots are so isolated and deep in the forest that there is little chance of the forestry officials finding them. We have a report of a man from Ribeiro Frio shooting 26 birds in a single day in 1983, and another of 17 birds being shot by one man at Boa Ventura in 1985. Fortunately, such large numbers are rare and they are normally lucky to get 3 or 4 birds.

Considering the amount of damage which *C. trocaz* does to various crops, it is difficult to correctly assess the degree of protection it should be given. To add to the problem of how best to protect the bird, there is legislation in force which permits farmers, irrespective of hunting regulations, to destroy any animal doing damage on his arable land at any time of the year.

We know that outside its habitat, when it is hungry, *C. trocaz* falls easy prey to man and his gun but that inside the forests it is more dif-

difficult to kill. It is our opinion that the shooting of this bird within its own habitat should be totally forbidden at all times of the year for it does no damage there. If the authorities should insist on permitting shooting, this should be only on cultivated land and during the normal September to December shooting season. Poisoning should be dealt with severely at all times. The most commonly used poison is Endrine applied on cabbages and watercress. Hopefully, with the entry of Portugal into the EEC., this product will disappear from the market. While it would be best to forbid all forms of hunting and poisoning of *C. trocaz*, at the moment, due to the damage done to agriculture in certain years, this would seem to be beyond the power of the most well intentioned authorities.

Portugal ratified the Bonn Convention in 1981 and the Bern Convention in 1982 and in January 1986 acceded to the Treaty of Rome and thus should implement Council Resolution of 2 April 1979 concerning the directive 79/409/EEC on conservation of wild birds. It is to be hoped that with all these legal powers to support the authorities, they will be able to provide *C. trocaz* with adequate protection.

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