PRELIMINARY DATA ON THE BREEDING OF THE GREAT SPOTTED WOODPECKER (*Dendrocopos major* L., 1758) IN THE CANARY ISLANDS

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SUMMARY: The first data on aspects of the reproductive biology of *D. m. canariensis* on Tenerife and *D. m. thanneri* on Gran Canaria, based on the observation of 11 nests in the island of Gran Canaria and 14 on Tenerife, are presented. All the clutches found on Gran Canaria had 5 eggs (n= 5), while on Tenerife the number was 4 or 5 ($\bar{x}$= 4.5; n= 6). The low breeding success of both subspecies is noteworthy (30% in *D. m. thanneri* and 40% in *D. m. canariensis*) with respect to other continental subspecies.

INTRODUCTION

The Great Spotted Woodpecker (*Dendrocopos major*) is the only representative of the family Picidae in the Canarian Archipelago. It is presently restricted to the islands of Tenerife and Gran Canaria, being represented respectively, by the endemic subspecies *D. m. canariensis* (Koenig, 1889) and *D. m. thanneri* Le Roi, 1911.

Both subspecies keep much to the forests of *Pinus canariensis*, being found in greatest numbers in these moderately well preserved pine forests which are situated in the southwestern areas of the above-mentioned islands. Volsøe (1951) rightly commented that the future of this species will be

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determined by the survival of these pine forests since it has already disappeared from localities cited in the past such as the pines above Santa Ursula (Koenig, 1890), Aguamansa (Lack & Southern, 1949), etc. Their absence is due to these forest having been cut back over the past centuries (Ceballos & Ortuño, 1976).The present population is estimated at around 100 pairs on the island of Tenerife (Martín, 1987), while that of Gran Canaria is possibly somewhat greater (Nogales, 1985).

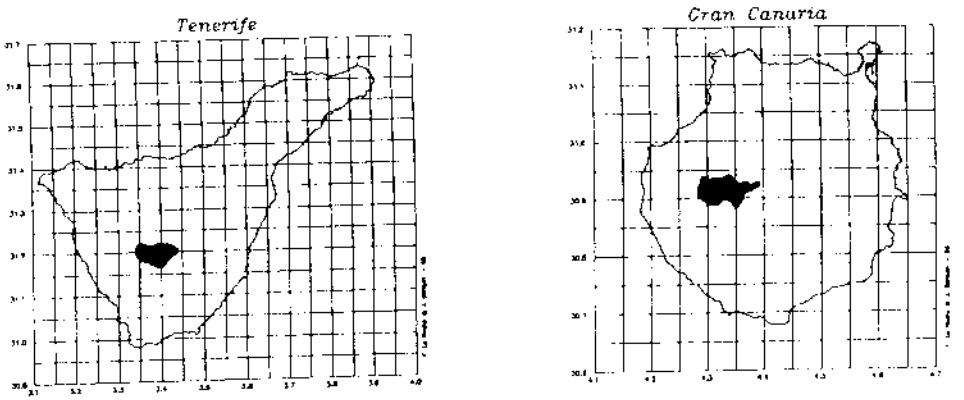

Figure 1. Situation and extension of the forests of Pajonales, Ojeda and Inagua in the island of Gran Canaria and of the Pinar de Vilaflor on Tenerife.

Few data are available about the reproductive biology of *D. major* in the Canary Islands and almost always consist of observations based mainly on *D. m. canariensis* (Bolle, 1857; Koenig, 1890; Thanner, 1903; Lack & Southern, 1949; Volsøe, 1951; Bannerman, 1963; Martín, 1987; Hernández, 1989). With regard to the population on Gran Canaria, the sole, brief references are those of Bolle (1857) and Bannerman (1912 and 1963).

Apart from this paucity of information, the few data on Great Spotted Woodpecker clutches reported prior to the research presented here vary greatly and are in some cases unreliable.

STUDY AREA AND METHODS

On Gran Canaria, the work was carried out in the mountains of Pajonales, Ojeda and Inagua, located in the SW region of the island, with an area of some 3.734 Ha and an altitude between 700-1.400 m (Figure 1). The vegetation can be defined as a sparse pine forest of *Pinus canariensis*, the undergrowth being comprised basically of *Micromeria benthamii*, *Cistus monspeliensis* and *Cistus symphytifolius*.

In the case of Tenerife, the study area was centred in about 1,000 Ha of the Pinar de Vilaflor located on the S-SW part of the island and lying between 1,400-2,200 m. The undergrowth is characterized by the presence of species such as *Cistus symphytifolius*, *Chamaecytisus proliferus* and *Adenocarpus viscosus*, among others.

The data on *D. m. thanneri* were obtained from 11 nests studied for three consecutive springs (1984-86). Those of *D.m. canariensis* where collected from 14 nests during the spring of 1990.

The information referring to the behaviour of the pair under study and their chicks was obtained by placing a "hide" at two of the nests on Tenerife and one on Gran Canaria, continuous 12 hour observations being made (8h-20h), in addition to periodic weekly visits.

RESULTS AND DISCUSSION

Formation of the pair

The onset of breeding behaviour in both subspecies takes place from December onwards, drumming being carried out mainly by the male on dry branches and trunks of the Canary pine. The courtship and copulation of *D. m. thanneri* were observed during the first fortnight of April, although the pair may have remained together since February (Bannerman, 1922).

One observation of courtship was made in the case of *D. m. canariensis* on 2nd December, 1989. The remainder of the observations were cited in March and April (28th and 29th April; 11th and 29th April, 1990). These data coincide with the references in the literature; Bolle (1857) found pairs of Woodpecker in

the month of April; Koenig (1890) observed courtship behaviour on 22nd April; Volsøe (1951) collected a male on 26th March, the testes of which were well developed but did not yet contain sperm; and Lack & Southern (1949) saw a pair copulating on 3rd April.

The nest

Both sexes take part in excavating the nest, which takes at least 28 days. On Tenerife, the nest holes are mainly chiselled out in the dry wood of the Canary pine, either in a dead tree (66% of cases) or in some dry part of a pine that is still green (33%). Martín (1987), on Tenerife, found a nest hole in a totally healthy pine on two occasions, while only one such case was detected on Gran Canaria. Furthermore, breeding has also been confirmed by us in a *Eucalyptus* sp. and in two *Prunus amigdalinus* in areas on the fringe of the pine forests on Gran Canaria.

The entrance hole is usually situated immediately below the axilla of the primary ramification branches of the trunk, 8 of the 11 nests studied on Gran Canaria presenting the entrance hole in this position (78%), while on Tenerife they were so located in 42.8% of cases (n= 14). The entrance hole of *D. m. thanneri* nests predominantly face S-SW (81.8%), only 2 being detected facing N (18.2%). This disposition varies for *D. m. canariensis*, possibly depending on the situation of the tree and on the predominating direction of the wind at that particular site.

The diameter of the trunk of the pine trees used for excavating nest holes on Gran Canaria, measured 1.5 m from the ground, ranged between 19.5 cm and 45.5 cm ($\bar{x}$= 34.4 cm; n= 11), while the range on Tenerife varied between 24.5 cm and 181.5 cm ($\bar{x}$= 98.7 cm; n= 14).

The distance from the ground at which the nests are situated varies greatly, fluctuating between 1.8 m and 16 m ($\bar{x}$= 5.1 m; n= 11), for the populations in the island of Gran Canaria, while for those of Tenerife the heights vary between 2.9 m and 16 m ($\bar{x}$= 8.8; n= 14). In this regard, Martín (1987) reported a slightly lower average (7.6 m) with a range of variation between 2 m and 15 m in 11 nests of *D. m. canariensis*. For the European subspecies, the elevations vary between 3 m and 8 m for *D. m. pinetorum* (Glutz & Bauer, 1980) and between 3 m and 5 m for *D. m. anglicus* (Cramp, 1985).

With respect to the dimensions of the nests, data were taken of 6 on Gran Canaria and 8 on Tenerife, the results being given in Table I. From these data

it can be seen that the entrance hole diameter is larger in *D. m. thanneri*. The greatest internal depth measurement is presented by *D. m. pinetorum*, while the measurements for both Canarian subspecies are similar. The internal diameter of the brood chamber is approximately the same in all the subspecies compared, with the exception of *D. m. thanneri* which is somewhat greater.

Table I. Biometric characteristics of the nests of some subspecies of *D. major*.

Subspecies	Author	Entrance hole diameter (cm)	Internal depth (cm)	Internal diameter (cm)
anglicus (Great Britain)	Hickin (1971)	5 x 5.31	27.8 - 30.3	12.6 - 12.8
pinetorum (Cent. Europe)	Glutz & Bauer (1980)	-	$\bar{x}$=34.8 n=23	$\bar{x}$=12.7 n=23
thanneri (Gran Canaria)	Present Study	5.5 x 10 $\bar{x}$=7.8, n=6	$\bar{x}$=28.9 n=6	$\bar{x}$=15.7 n=6
canariensis (Tenerife)	Present Study	$\bar{x}$=6.05 n=8	$\bar{x}$=31.3 n=8	$\bar{x}$=11.9 n=8
hispanus (Iberia)	Noval (1975)	5 x 6	30	13-14
mauretanus or *numidus**	Fry *et al* (1988)	4-6	23-45	11-15

* The authors fail to specify to which of the two subspecies the data correspond

The nesting holes can be reutilized year after year, the reoccupation having be confirmed for *D. m. thanneri* of 4 nests in 1986 of the 7 occupied in 1985 (57%), while reoccupation by *D. m. canariensis* was only 8% (n= 13). In this regard, Blume *fide* Glutz & Bauer (1980) detected a reutilization of 70.2% in *D. m. pinetorum*; Wesolowski (1986) observed in Poland a value of 3.8%; and Smith (1987) for *D. m. anglicus* reported very similar data (4.3%).

The material detected in the prospected nests holes was negligible, being composed in most cases of abundant sawdust, wood chips and shavings, elytra of coleopterous insects and some excrement; on a single occasion (Gran Canaria) leaves of *Pinus canariensis*, moss and fragments of a terrestrial mollusc were found.

Nesting has been verified on Tenerife in nest-boxes specially for woodpeckers, with one case of occupation in 1989 and another in 1990, although they probably correspond to the same pair (Rodríguez, pers. comm.).

The utilization of nests of *D. major* and of other Picidae by species such as *Sturnus unicolor*, *Parus* sp., *Upupa epops*, *Passer montanus*, etc. (Cox, 1926; Fraile, 1984) does not seem to be a frequent occurrence in the Canary Islands, although cases have been observed on the part of *Passer hispaniolensis* (Nogales *et al.*, 1987) on Gran Canaria and *Parus caeruleus* on Tenerife (Quilis, pers. comm.).

The clutch

The existing data on the size of the clutch of the Canarian woodpeckers are rather unreliable. Thus, Thanner (1903) reported completed clutches of 2 and 3 eggs for *D. m. canariensis*. Dresser *fide* Bannerman (1963) described a clutch of 3 eggs taken by Ramón Gómez (a Tenerifean collector). However, Koenig (1890) received a clutch of 5 eggs, also taken by R. Gómez, a fact which was latter questioned by Thanner (1903) and Bannerman (1963), both of whom were of the opinion that the eggs may have been from two independent clutches.

Table II. Results obtained in the observation of the 6 nests of *D. m. canariensis*.

Nest	Size of Clutch	Nº eggs hatched	Nº chicks 1st week	Nº Chicks 2nd week	Nº chicks 3rd week	Nº fledging
A	4	2	2	2	2	2
B	5	3	2	2	2	2
C	5	5	2	2	2	2
D	4	3	1	1	1	1
E	4	3	2	2	2	2
F	5	4	3	2	2	2
Total	27	20	12	11	11	11

In the course of the present research 5 completed clutches consisting of 5 eggs in every case were detected for *D. m. thanneri*, while in the case of *D. m. canariensis* 6 clutches were found, 3 of 4 eggs and the remainder of 5 eggs ($\bar{x}$= 4.5) (Table II).

Likewise, in Sweden the mean value of the clutch of *D. m. major* is 5.7 (n= 37) (Durango, 1945 *fide* Bavoux, 1985); in Czechoslovakia (in *D. m. pinetorum*) the mean value is 5.6 eggs (n= 49) (Balat *fide* Glutz & Bauer, 1980); while in France this value is 4.9 (n= 80) (Bavoux, 1985). In accord with the above, the number of eggs of the clutch of the Canarian subspecies has not diminished greatly with respect to that of the continental subspecies.

This phenomenon coincides with the ideas of Cody (1965), according to which the species that breed in nest holes where predation is low - the case of the insular woodpecker, which breeds in holes in the trees - the clutches remain quite stable with changes in latitude.

Incubation starts after the last egg has been laid and continues for about 10 days, at least in the case of *D. m. canariensis.* This time period is in good agreement with the 10-11 days observed by Glutz & Bauer (1980) for *D. m. pinetorum.*

Brooding is carried out by both sexes, as occurs with the other subspecies (Fry *et al.*, 1988; Cramp, 1985) and the frequency of one or the other sex varies with each pair. In the course of an 8 hours weekly observations made of those nests of *D. m. canariensis*, exchanges between both sexes took place every 97 minutes as mean value, ranging between 50 and 174 minutes. The female brooded 62.7% and 55.5% of the time for the first week, this percentage being 49.5% for one of the nests during the second week.

The earliest completed clutches in *D. m. thanneri* were detected on 26th April, 1985, and the last on 4th May, 1986. In *D. m. canariensis*, judging by the chicks that were newly hatched on 24th April, 1990, some clutches may be completed in the first 10 days of April, although another was culminated on 21st May, 1990. According to data available on other subspecies, it would seem that the phenology of the clutches of this species varies considerably, although the first recorded in *D. m. canariensis* seem to be among the earliest.

The chicks

Hatching of the eggs takes place 10 days after being laid. In *D. m. canariensis*, 74% of the eggs hatched (n= 27) (Table II), this percentage being unknown in the case of the subspecies *D. m. thanneri.* The above-mentioned percentage is in good agreement with that recorded by Averin & Ganya (1970) *fide* Cramp, 1985 in Moldavia (U.S.S.R.) for *D. m. candidus.*

In Table II it can be observed that the majority of chick mortality ocurred during the first week of life (88.9%), 11.1% during the second week and none during the third.

The data obtained during the observation of 3 nests are presented in Table III. It can be seen that in the case of *D. m. thanneri* the number of feedings ranged between 87 in the first week and 190 in the second. With regard to *D. m. canariensis* the number of feeds was somewhat smaller (49 in the first and 118 in the second), this difference possibly being due to the difference in the ages of the chicks.

Table III. Results obtained in the observation of the 3 nests while the chicks remained in the interior.

		Barranquillo de la Cañada del Escobón (Gran Canaria)	Mña. de Las Lajas (Tenerife)	Barranco del Cuervo (Tenerife)
Nº. of feeds (1st week)	♂ ♀ Total	41 (47.1%) 46 (52.9%) 87	21 (42.9%) 28 (57.1%) 49	25 (50%) 25 (50%) 50
Nº. of feeds (2nd week)	♂ ♀ Total	91 (47.9%) 99 (52.1%) 190	52 (46.4%) 60 (53.6%) 112	43 (33.4%) 75 (63.6%) 118
Feeds/hour (1st week)	♂ ♀ Total	3.4 (3-5) 3.8 (2-7) 7.3 (5-12)	1.8 (0-5) 2.3 (0-4) 4.1 (0-9)	2.1 (0-3) 2.1 (1-4) 4.2 (1-7)
Feeds/hour (2nd week)	♂ ♀ Total	7.6 (5-11) 8.3 (2-14) 15.8 (8-22)	4.3 (2-7) 5.0 (3-7) 9.3 (7-13)	3.6 (1-7) 6.3 (2-11) 9.9 (6-15)
Minutes between feeds (1st week)	min. max. x̄	<1 25 7'10"	1 65 14'04"	2 46 14'24"
Minutes between feeds (2nd week)	min. max. x̄	<1 21 3'49"	<1 23 6'20"	<1 27 5'48"

Moreover, a marked increase is noted in the amount of food provided in the second week with respect to the first, despite the drop in each case in the

number of surviving chicks after the first week. In Central Europe, this maximum of 190 feeds recorded during a 12 hour observation of *D. m. thanneri* is greatly exceeded by *D. m. pinetorum*, for which subspecies 253 feeds have been reported in a single day (Bussman, 1946). In the two insular subspecies, the male and female parents take approximately equal shares in the feeding of the young. The intervals detected between consecutive feeds varied greatly in both subspecies, a longer time elapsing during the first week (Table III).

The average length of time the adults remained inside or at the entrance to the nest, in the course of a visit, decreased as the chicks grew, the feeding site varying simultaneously. Thus, during the first two weeks the young were fed inside the nest while during the third week feeding took place at the entrance hole, which pattern was also reported by Blume (1961) for *D. m. pinetorum*.

The first observations of fledging (of *D. m. thanneri*) took place on 14th and 15th June, 1985, whereas those of *D. m. canariensis* were made on 6th June, 1990. However, some youngsters of the latter subspecies abandoned the nest in the second fortnight of May.

The breeding success is quite low in both subspecies (30% for *D. m. thanneri* and 40% for *D. m. canariensis*) (Table II). These values are in clear contrast with those of other European subspecies such as *D. m. pinetorum* (80.4%) (Glutz & Bauer, 1980), or *D. m. candidus* (60%) (Averin & Ganya, 1970 *fide* Cramp, 1985).

The tendency of the breeding success of both insular subspecies to decrease with respect to the European ones may be related to the absence of specific predators in the Canary Islands as well as to the limited charge capacity of the habitats of *Pinus canariensis* on Gran Canaria and Tenerife.

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