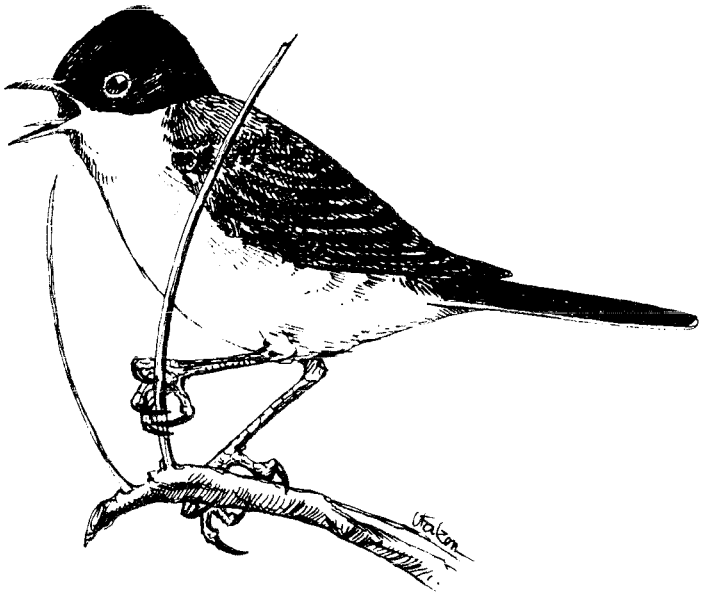
Il-Merill

The ornithological journal of BirdLife Malta

No. 30 **2002**



Sylvia melanocephala

BirdLife MALTA

Il-Merill is the official scientific journal of Birdlife Malta. It serves as a medium for the publication of articles and short notes dealing with any aspect of ornithology having a bearing on the Maltese Islands and the Mediterranean. It also carries Systematic Lists of birds recorded in the Maltese Islands as well as bird-ringing reports, both of which are collated by the Research group of BirdLife Malta.

The Editor welcomes articles and short notes for publication. These should be addressed to:

The Editor,
Il-Merill,
BirdLife Malta
57/28 Abate Rigord Street, Ta' Xbiex MSD 12, Malta

Advice and notes to contributors are to be found on the inside of the back cover of this volume.

As from next issue (Number 31) all major articles submitted for publication will be peer-reviewed prior to publication.

Production Joe Sultana & John J. Borg

BirdLife MALTA

BIRDLIFE MALTA was founded as The Malta Ornithological Society (MOS) in 1962 to work for the protection and study of birds and their habitats in Malta. BIRDLIFE MALTA is a partner of BirdLife International and it is the oldest and largest environmental NGO in the country. Among its commitments, the Society co-ordinates a research group to carry out bird studies in Malta. The group also runs the Valletta Bird Ringing Scheme, which is a member of EURING. BIRDLIFE MALTA publishes a bimonthly Newsletter *BirdTalk* and its annual review *Bird's Eye View* for its members. It has a junior section Klabb Huttaf, with its own activities and a bimonthly magazine *Il-Huttafa*. BIRDLIFE MALTA manages two nature reserves – Ghadira and Is-Simar.

Subscription in BIRDLIFE MALTA is LM4 for Adults (overseas £st 13) per annum. Please write to:

BirdLife Malta
57/28 Abate Rigord Street, Ta' Xbiex MSD 12, Malta
Tel: (+356) 21347646 Fax: (+356) 21343239
Email: info@ birdlifemalta.org
Website: www.birdlifemalta.org

Post-breeding Dispersal and Adaptation of the Sardinian Warbler *Sylvia melanocephala* in the Maltese Islands

Charles Coleiro

Abstract

The population of the Sardinian Warbler Sylvia melanocephala *in the Maltese Islands is stable and appears to be localised, although a number of individuals disperse in the post-breeding period. During the summer months and immediately after the breeding season a large number of individuals, mostly juveniles, congregate in habitats with an abundance of food. From the analysis of ringed individuals trapped in these habitats, it is evident that this species is engaged in an internal migration within the islands. In fact, some individuals ringed in summer were retrapped a year later at the same site, thus suggesting a yearly cycle. During the winter, these birds either return to their former natal/breeding site or else will search for other suitable breeding habitats. These individuals, mainly second-year birds, will then probably integrate in communities only when places become vacant.*

Introduction

The Sardinian Warbler *Sylvia melanocephala* breeds in the Mediterranean zone generally at low elevations, mainly in dry coastal regions and on islands (Cramp 1992). Generally it frequents habitats that contain low shrubs, garigue and maquis, but is also indifferent to proximity of dwellings and human activities. Its diet consists mainly of insects but it also feeds on fruit in autumn and winter. The Sardinian Warbler varies from partially migratory to sedentary in different parts of its range, with the island and coastal populations being sedentary to a greater extent than the mainland and northerly populations. Winter quarters include much of the breeding range (Cramp 1992).

In the Maltese archipelago this species is present and found breeding on the three main islands of Malta, Gozo and Comino. It established itself in the late nineteenth century when the first breeding record was reported in the summer of 1884 (Sultana & Gauci 1990-91). It is now a common breeding resident frequenting most habitats; maquis and garigue habitats are particularly preferred during the breeding season which generally extends from February to July (Sultana & Gauci 1982). The population is often augmented by immigrants during autumn and winter, a few of which apparently overwinter (Sultana & Gauci 1975, Gauci & Sultana 1978).

Individuals from the local population seem to disperse particularly in the post-breeding period and are probably involved in an internal migration. This can be confirmed by analysing data from a number of individuals identified by a numbered ring. Large numbers were captured from five different habitats on Malta and Gozo. This demonstrates that the presence of the Sardinian Warbler in the various habitats is correlated to breeding necessities and later to food availability in the post-breeding months.

Data

Capture and recapture data of ringed Sardinian Warblers for the years between 1987 and 1993 were compiled from the Birdlife Malta Bird Ringing Scheme data base. These data were gathered in the field by various ringers from five different localities in Malta and Gozo.

Study Areas

Buskett is predominantly a semi-natural woodland having a permanent fresh water stream. Main vegetation includes Lentisk *Pistacia lentiscus* and Mediterranean Buckthorn *Rhamnus alaternus* with bramble *Rubus ulmifolius* and Ivy *Hedera helix* dominating the undergrowth. The dominant trees include Aleppo Pines *Pinus halepensis* together with Evergreen Oaks *Quercus ilex* and White Poplars *Populus alba*.

Bingemma is a valley dominated by a secondary maquis vegetation as well as cultivated land. Vegetation is characterised by Carob *Ceratonia siliqua*, Fig *Ficus carica* and Olive-leaved Buckthorn *Rhamnus oleoides*, with the Ivy and Bramble *Rubus ulmifolius* being the main climbers. Various fruit trees and seasonal crops are cultivated. Fresh water flows year round through irrigation canals.

Ghadira is a managed nature reserve situated about 100m inland from the coast. The area consists of a permanent pool of brackish water lying at sea level and bounded by cultivated fields and a rocky karstic area. Tamarisk *Tamarix africana* bounds the pool, while Fig trees are found in the agricultural area. Groves of afforested Aleppo Pines and Acacia *Acacia* spp. are found on the arid limestone habitat further north of the area.

Simar is situated about 50m inland from the sea. It consists mainly of small groves of Tamarisk *Tamarix* spp. and Olive *Olea europaea* with scattered Acacia *Acacia* spp. An artificial canal runs through with vegetation such as the Common Reed *Phragmites australis*. Agricultural land surrounds the site, while to the north is a ridge with afforested Aleppo Pines.
(ed. note: since this article was submitted Simar has been turned into a managed reserve).

Lunzjata is located in Gozo. This valley has running fresh water with the Great Reed *Arundo donax* being the main vegetation. It is mostly an agricultural habitat with scattered Olive, Fig and various fruit trees. Carob dominates the area above the agricultural land while a garigue vegetation has developed on the inaccessible land.

Field Method
During the years under review and for the specific sites chosen, ringing sessions were conducted in an unsystematic but uniform effort. In the field, details of the birds were noted and included sex, age, and various measurements of which only the weight and wing length are utilised here. Known plumage criteria were used to age and sex the birds following Svensson (1984; 1992). The age is given as a number according to the Euring Age Code.

Results
The number of Sardinian Warblers ringed in the five sites from 1987 to 1993 amounted to 2643, whilst the total birds retrapped from this amount was 760 or 28.2%. For the purpose of this study, these totals were divided into three four-month periods according to the approximate annual cycle of the bird (Table 1). Thus period A (pA) includes the months from February to May (main breeding season); period B (pB) from June to September (immediate post-breeding months); and period C (pC) from October to January (main wintering months).

Table 1
Total numbers of ringed & retrapped birds at 5 different sites from 1987 to 1993

		Period A (Feb-May)	Period B (Jun-Sep)	Period C (Oct-Jan)
Buskett	**Ringed**	95	685	172
	Retrapped	21	229	44
Ghadira	**Ringed**	161	138	176
	Retrapped	38	42	34
Lunzjata	**Ringed**	95	129	201
	Retrapped	23	59	56
Simar	**Ringed**	33	50	67
	Retrapped	5	30	18
Bingemma	**Ringed**	72	491	78
	Retrapped	24	114	23
Total	**Ringed**	456	1493	694
	Retrapped	111	474	175

The three periods A, B, and C are separated according to the annual cycle of the Sardinian Warbler. A includes the main breeding season; B the post-breeding months; and C the main wintering months.

Ringed and Retrapped Birds

The highest number of Sardinian Warblers was ringed in pB (with 56.5% of all the birds captured), followed by pC (26.3%) and pA (17.2%) (Table 1). Buskett and Bingemma were the main contributors to the amount of birds ringed in summer (78.77%), whilst the highest number in the other sites was in winter (pC). During the breeding season a relatively high number of birds, compared to the other sites, were ringed at Ghadira. From the 760 (or 28.2%) retrapped birds, 62.4% were ringed in pB where 72.4% of these birds originated from Buskett and Bingemma. The rate of retrapping between periods A and C is relatively similar where the mean percentage difference is about 2%, while that in pB was notably higher (Table 2). Approximately half (46.7%) of the 28.2% retrapped birds were trapped again within a few days or weeks, but not more later than four months (Table 3). Buskett with 53.7% and Bingemma (61.5%) have the highest percentages of the birds that were trapped in only one period (i.e within four months).

Table 2
The percentage of ringed birds that were retrapped in each period and site

Site	pA	pB	pC
	(Feb-May)	(Jun-Sep)	(Oct-Jan)
Buskett	22.10	33.40	25.60
Ghadira	23.60	30.40	19.30
Lunzjata	24.20	45.70	27.80
Simar	15.10	60.00	26.80
Bingemma	33.30	23.20	29.50
Mean Total	**23.66**	**38.54**	**25.80**
Standard deviation	6.50	14.49	3.90

Percentages of Sardinian Warblers that have been retrapped from the number of birds ringed in the four month periods of the years between 1987 and 1993.

Table 3
Totals of retrapped birds for the five different sites, for the period 1987 to 1993

	Total retrapped birds for each site (1987-1993)	Birds retrapped only in the same period* of ringing	Birds retrapped regularly indicating breeding/resident	Birds retrapped only in the same year of ringing	Birds retrapped after one year or more after ringing
Simar Total (%)	53	23 (43.4)	15 (28.3)	12 (22.6)	3 (5.7)
Lunzjata Total (%)	138	54 (39.1)	23 (16.7)	37 (26.8)	24 (17.4)
Buskett Total (%)	294	158 (53.7)	34 (11.6)	45 (15.3)	58 (19.7)
Bingemma Total (%)	161	83 (51.6)	27 (16.8)	20 (12.4)	29 (18)
Ghadira Total (%)	114	52 (45.6)	24 (21)	16 (14)	11 (9.6)
Mean %		46.7	18.9	21.7	10
Standard Deviation		5.98	6.23	6.18	6.09

Percentages refer to the number of birds retrapped from the corresponding total at each site.
*** refers to the three four-month periods.**

This could imply that at these two sites Sardinian Warblers generally only stayed for a brief period of time. For the rest of the retraps, 18.9% were retrapped regularly (some for 2-3 years) thus indicating that they are resident. Other birds were retrapped in the same year of ringing and these represent 18.2% of the total re-captured birds. Another group of retraps are those that were not recaptured during the first year after being ringed but only later. These amounted to 125 or 14.8% of the overall retrapped birds. These were mainly ringed at Buskett, Bingemma, and Lunzjata.

Retrapped Birds that were Ringed in the Post-breeding Months

Buskett and Bingemma with 77.9% and 70.8% respectively, scored the highest amount of recaptured birds originally ringed in the post-breeding period (Table 4). In the other sites the amount is much lower with a variation between 36.8% and 56.6%. Almost half of all the birds retrapped in pB (i.e. 45.1%) were exclusively retrapped within the post-breeding period and the highest amount in this category were at Buskett and Bingemma. This signifies that in these sites such birds were never retrapped again after the post-breeding season. Another 21.7% were not retrapped beyond the end of that particular year when being ringed, whilst about 10% were recaptured again only in the post-breeding months of the following year. Bingemma and Buskett have the highest amount of these birds with 19 (16.7%) and 33 (14.4%) respectively. On the other hand, at Ghadira, only one individual was recaptured a year later in this period, indicating that birds do not return to this site in summer.

Table 4
Retrapped Birds in the Post-Breeding Months (PB)

	Total re-trapped for each site (1987-1993)	Total re-trapped birds ringed in pB (1987-1993)	Ringed and retrapped only in pB	Ringed in pB and retrapped in the same year	Ringed in pB and retrapped after one year	Ringed in pB and retrapped after more than one year	Resident or breeding ringed in pB
Simar total (%)	53	30 (56.6)	14 (46.7)	6 (20)	2 (6.7)	1(3.3)	6 (20)
Lunzjata total (%)	138	59 (42.7)	16 (27.1)	28 (47.5)	6 (10.2)	4 (6.9)	7 (11.9)
Buskett total (%)	294	229 (77.9)	129 (56.3)	41(17.9)	33 (14.4)	11 (4.8)	16 (7)
Bingemma total (%)	161	114 (70.8)	71 (62.3)	12(10.5)	19 (16.7)	4 (3.5)	7 (6.1)
Ghadira total (%)	114	42 (36.8)	14 (33.3)	5 (11.9)	1 (2.4)	1 (2.4)	6 (14.3)
Mean %		57	45.1	21.6	10.1	4.2	11.9
Standard deviation		17.61	14.89	15.04	5.76	1.75	5.68

Birds ringed in the post-breeding months divided according to when they were retrapped

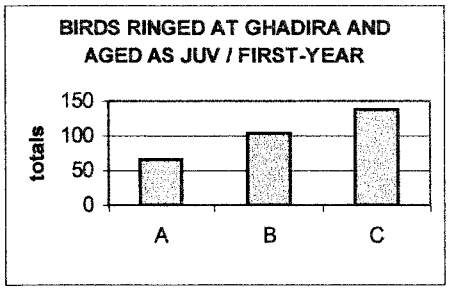
Controlled Birds

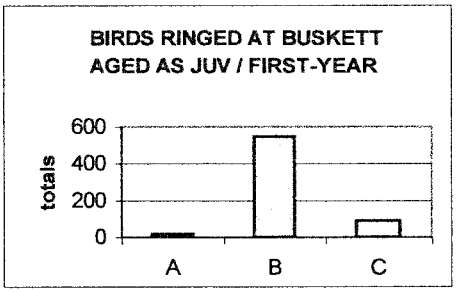
Five birds, all aged and sexed as juvenile males, were recovered between 1987 and 1993 in areas distant from the original site of ringing. Four of these were ringed in the post-breeding period (single birds at Lunzjata, Simar and two at Bingemma) and then retrapped the following winter in a different site. The longest movement was from Bingemma to Ghadira, about 6-7km away. The other bird was ringed at Ghadira in autumn and then retrapped the following spring in a site about 2km away. One bird ringed at Simar was retrapped at Ghadira 26 days later, but was recaptured again at Simar after 17 days.

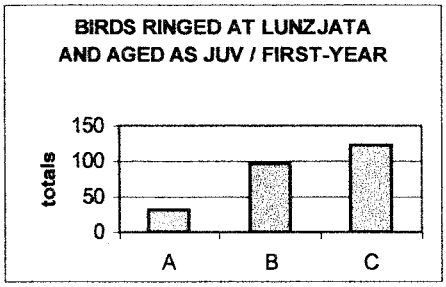
Percentage of Juveniles / First-years & Pulli

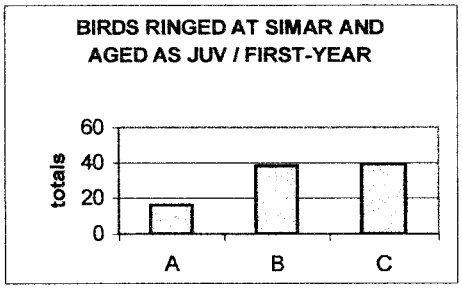
When all the ringed birds are separated according to age, it is obvious that the juvenile / first-years are captured during the post-breeding months mainly from Buskett and Bingemma (Fig 1). At Bingemma there are always over 80% of the ringed birds that are from this age group (Table 5). During the rest of the year, juveniles or first-years are generally either absent or else below the 66.7% at these two sites, with the exception of three winters with 70.5% - 85.7%.

In the remaining three sites, birds from this age class were mainly captured during the winter months. In fact, at Ghadira, this age group dominated the wintering months when 84.2% and over, were caught each year. Juvenile birds were sometimes also captured during the latter part of the breeding season and the highest numbers were again at Ghadira. In the remaining two sites, there is no specific time of year when this age class is particularly ringed. Meanwhile, the total amount of pulli ringed was 179, representing 6.8% of all the birds ringed. These were mainly ringed at Buskett, Bingemma, and Ghadira.









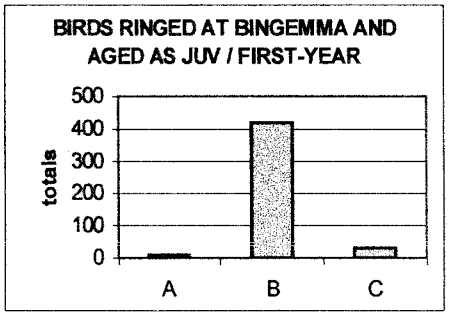


Fig 1: Totals for Sardinian Warblers ringed at the five sites and aged as juv/first year (1987 – 1993). The total number of birds aged as juveniles and first-years are separated into each period (A, B & C) for each site.

Table 5

	Period*	1987	1988	1989	1990	1991	1992	1993
Buskett	**A**	-	-	-	-	15.1	40	-
	B	87.5	86.7	79.7	86	76.5	79.5	74.4
	C	42.8	70.4	53.3	53.1	75	54.3	25
Ghadira	**A**	58.8	55.5	21	43.7	23.5	52.6	45.4
	B	80.7	66.7	57.1	76.2	73.9	75	88.9
	C	92.3	91.1	84.2	92.1	85.7	86.9	87.5
Lunzjata	**A**	-	44.4	-	33.3	57.1	33.3	8.3
	B	85.7	78.6	69.2	78.6	61.1	100	66.7
	C	65.5	78.6	71.4	64.9	73.7	71.4	44.4
Simar	**A**	-	60	42.8	50	100	20	-
	B	62.5	90.9	80	70	72.7	75	100
	C	62.5	61.5	83.3	55	25	50	-
Bingemma	**A**	-	19.2	100	-	-	8.3	-
	B	81.9	80	87	81.8	97.9	91.2	93.7
	C	44.4	58.8	85.7	33.3	66.7	50	66.7

Percentages of juveniles / first-years and pulli ringed at each site (1987-1993). This table gives an indication of the total number of juvenile / first-years and pulli in each year of the study. These are given in the corresponding period of the year when the birds were ringed.
***refers to the three four-month period of the year according to the life-cycle of the bird. A is the main breeding season, B is the post-breeding period and C are the wintering months.**

Sex Ratio

From the total number of birds ringed, 1729 or 65.4% were sexed. The remaining birds were not sexed as most of them were still in their juvenile plumage when trapped. 859 were males and 870 were females thus giving a ratio of 1:1.01 (Table 6).

Table 6
Total number of ringed male and female Sardinian Warblers at the five sites for each year and the sex ratio (the ratios are given as males to females)

	1987	1988	1989	1990	1991	1992	1993	1987-93 total
Buskett								
male	6	29	33	66	72	85	27	318
female	9	42	26	68	56	74	29	304
ratio	**1:1.5**	**1:1.45**	**1:0.79**	**1:1.03**	**1:0.78**	**1:0.87**	**l:1.07**	**1:0.69**
Ghadira								
male	18	27	11	38	19	21	21	155
female	19	38	20	39	26	23	22	187
ratio	**1:1.05**	**1:1.41**	**1:1.82**	**1:1.03**	**1:1.37**	**1:1.09**	**1:1.05**	**1:1.21**
Lunzjata								
male	16	42	22	33	18	18	19	168
female	13	45	23	17	20	14	14	146
ratio	**1:0.81**	**1:1.07**	**1:1.04**	**1:0.51**	**1:1.11**	**1:0.78**	**1:0.74**	**1:0.87**
Simar								
male	7	20	7	12	9	4	-	59
female	11	18	8	16	6	6	-	65
ratio	**1:1.57**	**1:0.9**	**1:1.14**	**1:1.33**	**1:0.67**	**1:1.5**	-	**1:1.1**
Bingemma								
male	54	35	23	12	13	15	7	159
female	46	37	29	28	15	8	5	168
ratio	**1:0.58**	**1:1.06**	**1:1.26**	**1:2.33**	**1:1.15**	**1:0.53**	**1:0.71**	**1:1.06**

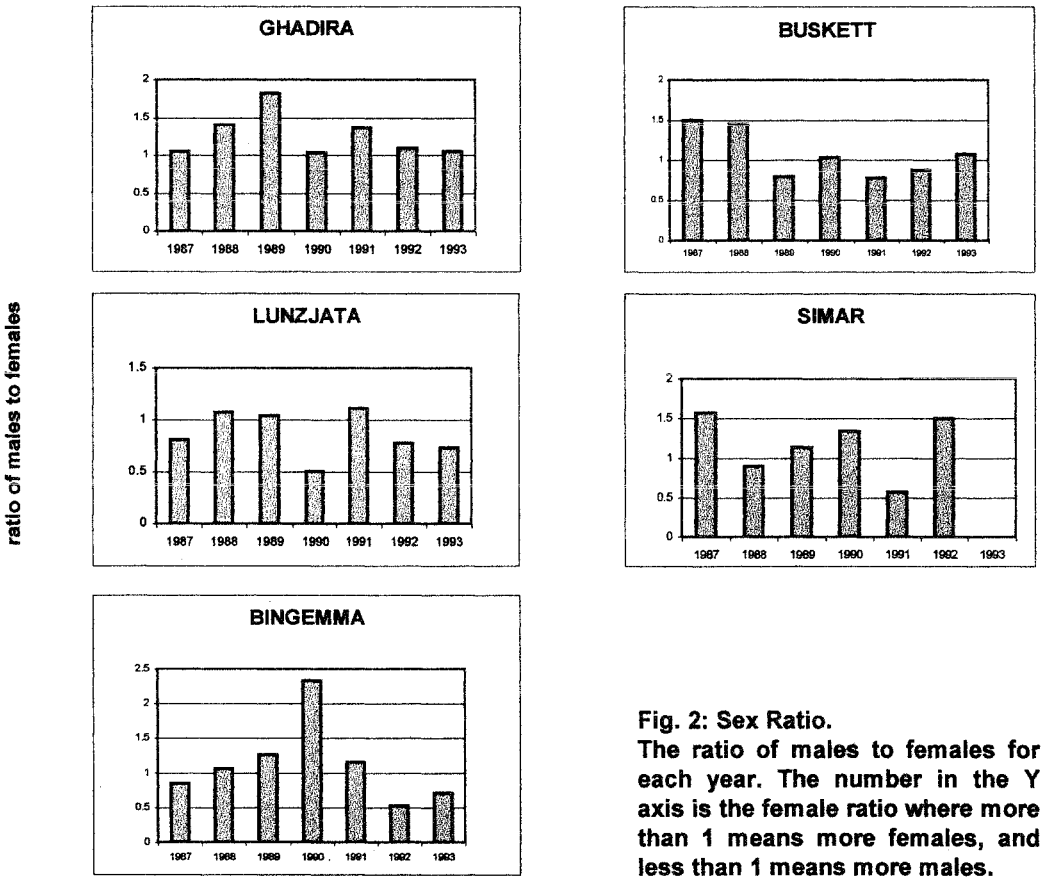


Fig. 2: Sex Ratio.
The ratio of males to females for each year. The number in the Y axis is the female ratio where more than 1 means more females, and less than 1 means more males.

The ratio of males to females in each site approximated the overall ratio, with only slight differences. Males were slightly more represented at Buskett and Lunzjata, while more females were caught in the other three sites. When the ratios for each year are considered, it results that Ghadira was the only site were one particular sex – female – was captured more frequently during each year. This even reached a maximum ratio of 1:1.82 in 1989. The ratio in the other sites fluctuated with extremes of 1:0.51 and 1:2.33.

Wing Length & Weight

For all the birds ringed – except the pulli – the wing length and weight were the two main measurements taken. The variation in wing-lengths is from 53 to 64mm with a mean of 58.38mm (n = 2300) (Table 7), whilst that of the weights is from 8.6 to 17g with a mean of 12.08g (n = 2258) (Table 8).

Table 7

Locality	Mean	S.D.	N	Range
Lunzjata	58.67	1.41	333	56-63 mm
Bingemma	58.71	1.30	590	53-63mm
Simar	58.38	1.51	140	55-62.5mm
Buskett	58.18	1.40	838	53-62mm
Ghadira	57.9	1.30	397	55-64mm

The wing lengths of the Sardinian Warblers including all sexes and ages. Mean, standard deviation (s.d.), sample size (n), and range of wing lengths are given for each locality.

Table 8

Locality	Mean	S.D.	N	Range
Lunzjata	12.3	0.99	303	10.0-17.0gm
Bingemma	11.82	0.86	608	9.6-15.9gm
Simar	11.92	1.06	144	9.9-15.0gm
Buskett	11.92	0.91	811	8.6-16.8gm
Ghadira	12.74	1.05	392	10.6-17.0gm

The weights of the Sardinian Warblers including all sexes and ages. Mean, standard deviation (s. d.), sample size (n), and range of weights are given for each locality.

From the comparison between the periods of the year at each site, it resulted that the highest mean of the wing-length was always in the wintering months, whilst the lowest mean was found to be in the post-breeding period. The lowest mean coincides with the time of moulting and therefore when the remiges are the most abraded. The mean wing-lengths of the males were longer than those of the females in all the sites and each period, except in one case. The non-sexed juveniles generally had the shortest wing lengths.

When the mean weights of each period of the year from each site were compared, it resulted that the weights of the wintering months were the heaviest – except at Lunzjata – whilst the lowest were in the post-breeding period. The mean weight of the females during the breeding season was always more than that of the males in all the sites, except at Bingemma (due to a single male weighing 15.1g!). In the wintering months, the males were generally the heaviest but at Ghadira it was the opposite. In fact, this was reflected in the total mean of pC because in this site were recorded the heaviest overall weights.

Discussion

As expected the highest number of birds ringed was during the post-breeding period i.e. between June and September. This coincides with the population increase of this species, primarily due to the presence of juveniles. A higher than usual presence can then be noted in some areas of the Maltese Islands and Buskett and Bingemma are typical areas were this species congregates in summer. These localities contain

a habitat that is rich in food during summer. Fruit from various wild plants is particularly abundant during this time of year and individuals can be observed feeding, mainly on the abundant fruit of the Bramble, Lentisk and the Olive-leaved Buckthorn (see also Casha – this volume).

Post-breeding Dispersal

It can be assumed, therefore, that after the breeding season Sardinian Warblers prefer these type of habitats. In fact, some birds even returned to the these habitats year after year which suggests that an internal migration is taking place within the islands. From the retrapping data (Table 4), it was established that a small amount of birds are recaptured at yearly intervals at such sites in the post-breeding season. This could be an indication that a part of the population winters and breed in a type of habitat and then returns to a different but favourable habitat already visited in previous years in the post-breeding season.

The Sardinian Warbler breeds in various places, including urban habitats. Most of these habitats are not ideal for birds to survive the summer and eventually most birds, especially juveniles, will have to disperse to locate food. Hence, these birds locate such habitats where conditions are apparently more ideal and sufficient food would not be lacking, so that starvation is avoided at least during the summer months. Lack (1966) maintains that starvation outside the breeding season is the most important density-dependent factor in wild birds because it helps to balance losses against recruitment. This maintains a population at about the same density. Food availability is, therefore, a significant element in population control.

After the summer months, the number of birds captured at Buskett and Bingemma decreases especially from October. This coincides with the decrease in food abundance, and therefore birds are either urged to move on or else their survival rate is low. An individual that has not been observed for some time may have survived and escaped recapture by chance or for biological reasons (temporary emigration e.g., Nichols *et al.*1987). Most of the birds that were ringed in summer were not recaptured again and only a small proportion were recaptured more than four months later. Although when studying an animal population in the field it is rarely possible to follow all the individuals of an initial sample over time, even if they are uniquely marked (Coulson & Wooler 1976), it can be also assumed that most of the birds are actually moving on. These could be either returning to their natal site or else are spending the winter searching for ideal breeding habitats.

In contrast to Buskett and Bingemma, less birds are caught at Ghadira as summer approaches and, therefore birds seem to be deserting the area. Following a good number of birds present in the breeding season, many seem to abandon this habitat in the post-breeding period. This could be primarily due to lack of sufficient food supply associated with the seasonal climate. In fact, most birds ringed before July are generally not recaptured during the following few weeks but only in winter. Therefore, these dispersed birds might be returning to those habitats which they abandoned after the breeding season. This could be an indication that at least some individuals are actually leaving the area only to return back when conditions are better.

Wintering and Migration

The number of wintering Sardinian Warblers in the Maltese Islands is often augmented by migrant birds. Sultana & Gauci (1982) state that there is sufficient evidence to confirm this. Measurements of the weights and wing-lengths of the wintering birds in this analysis also suggests such an occurrence. The weights of almost all the birds in winter were slightly heavier than the mean weight of this species. Although this is normal in winter, when birds tend to increase their weight to cater for an increase in heat loss, any increase in weight is also associated with migratory birds that lay down fat reserves. Therefore, it is highly probable that migrant birds are also present during the winter months.

When comparing the mean weights of Sardinian Warblers in Cyprus and SE France (Cramp 1992) with those from Malta in winter it is clear that they are similar. For example, the mean weight at Ghadira for both sexes is more than that of those wintering in Cyprus, but almost equal to the migrant birds. Even the mean wing length of the wintering birds is longer than the average, but are similar to those for Cyprus and SE Italy in winter (Cramp 1992). These measurements also suggest that wintering birds in the Maltese Islands often include migrants. It seems likely that these then leave the islands after winter and in fact, two locally ringed birds were recovered abroad after being ringed in the Maltese Islands the previous winter (Sultana & Gauci 1988). Locally born birds could also be emigrating but as yet there is no sufficient evidence to confirm this.

Site Fidelity & Integration into the Community by the Juveniles/Pulli

According to Sultana and Gauci (1982) most birds, especially from first broods, seem to remain in their natal area. In this analysis only one bird ringed as a pullus (at Ghadira) was found breeding in its natal site, while a small number of other pulli remained in their natal site only for a few months. Some of the juveniles ringed in

summer also seemed to remain in some of the sites but then were not recaptured for a long period of time. Eventually, a year or more after natality, some of the juveniles were found breeding in the site where they were ringed. It is probable that these birds integrate themselves in the community only if a place is left vacant by other individuals. Therefore it seems that any particular habitat has a limited number of resident birds – particularly in the breeding season – and new individuals are accepted only when the population goes beyond the threshold number.

Another factor of juvenile bird integration could be the sex ratio factor. It is evident that each year the number of males and females is almost balanced. When in a particular year one of the sexes is more common than the other, the following year this difference is often balanced. So juvenile birds seem to wait for this opportunity to integrate themselves in that population. Till this happens most juveniles will disperse to locate other habitats, although these could be of suboptimal conditions especially for breeding necessities. This dispersal is, in fact, substantiated by the recovery in winter of a few individuals - ringed as juvenile males the previous summer - in other habitats notably in coastal zones.

The Sardinian Warbler seems to have adapted itself to most habitats found in the Maltese Islands. This study was a brief insight into this species adaptations which might have evolved in a different way owing to different characteristics of the Maltese Island's habitats.

Acknowledgements
The author would like to thank Charles Gauci who provided the ringing data on behalf of the Ringing Scheme of Birdlife Malta. The ringing data was collected throughout the years by various qualified ringers to whom I am obliged. I also thank Alex Casha, Manuel Mallia and Mark Gauci who often accompanied me during ringing sessions at Bingemma.

References

Coulson, J.C. & Wooler, R.D. 1976. Differential survival rates among breeding Kittiwake Gulls *Rissa tridactyla*. *J. Anim. Ecol*. 45 : 205-213.
Cramp, S (ed). 1992. *The Birds of the Western Palearctic*. Vol. VI. Oxford University Press, Oxford.
Gauci, C. & Sultana, J. 1978. Evidence of spring passage of Sardinian Warbler through Malta. *Il-Merill* 19 : 18-19.
Gauci, C. & Sultana, J. 1980. Breeding biology of the Sardinian Warbler. *Il-Merill* 21 : 1-8;
Lack, D. 1966. *Population studies of birds*. Oxford University Press, Oxford.
Nichols, J.D., Hepp, G.R., Pollock, K.H. & Hines, J.E. 1987. The husting dilemma: a methodological note. *Ecology* 68 : 213-217.
Sultana, J. & Gauci, C. 1975. Influxes of Sardinian Warbler. *Il-Merill* 15: 3-4.
Sultana, J. & Gauci, C. 1982. *A new guide to the birds of Malta*. The Ornithological Society, Malta.
Sultana, J. & Gauci, C. 1988. Ringing report for 1986-87. *Il-Merill* 25 : 41-50.
Sultana, J. & Gauci, C. 1990-91. The year of the first confirmed breeding record of the Sardinian Warbler in the Maltese islands. Il-Merill 27 : 26.
Svensson, L. 1984. *Identification guide to European passerines*. 3rd ed. The Author, Stockholm.
Svensson, L. 1992. *Identification guide to European passerines*. 4th ed. The Author, Stockholm.

Charles Coleiro - 74 St. Michael Flats, Flat 2, Triq Paris, Zebbug ZBG 05, Malta. ccol@global.net.mt

Status and Distribution of the Breeding Procellariiformes in Malta

John J. Borg & Joe Sultana

Abstract

Three species of the order Procellariiformes, namely Cory's Shearwater Calonectris diomedea, *Levantine Shearweater* Puffinus yelkouan *and European Storm-petrel* Hydrobates pelagicus melitensis *breed in the Maltese Islands. This work presents an update of their status and an estimation of their population.*

Introduction

Three species of Procellariiformes breed in the Maltese islands, namely Cory's Shearwater *Calonectris diomedea*, Levantine Shearwater *Puffinus yelkouan* and European Storm-petrel *Hydrobates pelagicus melitensis*. Due to their nocturnal habits and the choice of nesting sites their breeding numbers can only be estimated roughly. Shearwaters and petrels usually lay their single egg in holes and burrows in cliffs and sea caves and in rubble screes below sea cliffs, thus rendering accessibility to the nesting sites extremely difficult.

Geological Features and Description of Breeding Areas

The Maltese Islands are situated in the centre of the Mediterranean Sea, 83km south of Cape Passero (Sicily) and 334km north of the Libyan coast, at approximately 36°N and 14'E. The main islands are Malta (245.7 km²), Gozo (67.1 km²), and Comino (2.8 km²). Cominotto and Filfla are much smaller but are of great ecological importance. A number of smaller rocks and stacks complete the archipelago. The total length of the coastline is 190 km, 38 km of which consist of sheer cliffs. The seacliffs bordering the southern coasts of Malta and Gozo reach a maximum height of about 230 metres. In most areas, the cliffs are 'honey-combed' with caves, crags, and fissures, situated at various heights and offering ideal nesting sites for the shearwaters. In some areas, large boulders and debris have accumulated throughout the years at the foot of cliffs as well as on ledges, increasing the availability of nesting sites.

Comino, Cominotto, Fungus Rock, and Filfla are the only four offshore islands hosting one or more breeding species. Comino is the only one of these that holds a small permanent human community. The eastern shore of Cominotto is visited by bathers during the summer months. Comino and Cominotto are bird sanctuaries, where hunting and trapping are prohibited, while Fungus Rock and Filfla are legally strict nature reserves where landing is prohibited.

Breeding Colonies

The Maltese Islands may be considered either as one loose, but widespread, colony or as a number of colonies significantly separate from one another within the same archipelago. If we take the latter concept in consideration, than we find five colonies of Cory's Shearwater (Malta, Gozo, Fungus Rock, Comino and Filfla), four colonies of Levantine Shearwater (Malta, Comino, Cominotto and Gozo) and two colonies of European Storm-petrel (Filfla and Gozo) (Table 1).

Island	Species	Total surface area	Biotope
Malta	*C.d, P.y.*	245.7km²	cliffs-boulders
Gozo	*C.d, P.y, H.p.*	7.1km²	cliffs
Fungus Rock	*C.d., P.y?*	0.7ha	cliffs
Comino	*C.d., P.y.*	2.8km²	cliffs-boulders
Cominotto	*P.y.*	9.9ha	cliffs
Filfla	*C.d, P.y?, H.p.*	2.0ha	screes & boulders

Table 1. Island size, biotope and distribution of the three breeding Procellariidae in the Maltese Islands.

Material and Methods

The islet of Filfla was the main seabird research station in Malta from 1968 to 1982. The first visits were initiated by members of the Research Group of BirdLife Malta in 1968 and from these visits it was found that the islet hosted a large colony (8,000-10,000 breeding pairs.) of European Storm-petrel, around 200 pairs of Cory's Shearwater and some Levantine Shearwaters (Sultana & Gauci 1970, 1982).

An accessible part of a Levantine Shearwater colony was discovered on the north-eastern coast of mainland Malta in 1969, and this site has since been regularly monitored to the present day. Another accessible area this time on the south-western coast of Malta was found in 1975. This area has been estimated as holding around 20-25 pairs of Cory's Shearwaters and single pairs of Levantine Shearwaters. A long-term study on the breeding biology and ecology of the Cory's Shearwater was initiated in 1983 (Cachia Zammit & Borg 1986-87, 1988, Borg & Cachia Zammit 1996, Borg 1999, Borg & Sultana 2000).

A survey of the lower parts of the cliffs was started in 1994 along the southern cliffs of Gozo from a boat. The main aim of this survey was to identify the possibility of nesting colonies of the European Storm-petrel. In the course of these visits, a small colony of European Storm-petrels was discovered in a cave, while the breeding of Levantine Shearwater along the Ta'Cenc cliffs was confirmed (Borg & Sultana 1992-94).

When counting the breeding birds, attention was given to the presence of non-breeders, which may consitute over 50% of the birds visiting the colonies in certain periods of the year. Lunar phases were also taken in consideration when counting Cory's and Levantine Shearwaters, as fewer numbers visit colonies on moonlit nights. The first three days after a full moon proved to be optimal as the majority of the breeding birds enter colonies in a short period right up to moon rise. European Storm-petrels appear to be unperturbed by moonlight.

Criteria used for estimating numbers

The following criteria were used to obtain results that were as accurate as possible:

- counting flying and rafting birds in front of colonies soon after the egg-laying period;
- direct observations of the birds arriving at the colonies at night up to three days after the full moon;
- use of play-back recordings;
- counting calling birds in suitable but inaccessible areas;
- ringing and recapture of breeding and non-breeding birds at colonies;
- ringing and recapture of breeding pairs in accessible nest sites;
- ringing of pulli.

Most members of the order Procellariidae nest in crevices, underground, and amongst boulders, making accurate counts very difficult. The numbers presented are minimal figures as the total for the three breeding seabirds on the Maltese Islands has been estimated to amount to between 12,515 and 16,715 breeding pairs (Table 2).

Species	Malta	Gozo	Comino	Filfla	Fungus Rock	Total
C. diomedea	2,500-3000	3,500-4,000	15-20	50-80	25-30	6,090-7,130
P.yelkouan	800-900	550-580	50-80	?	?	1,400-1,560
H. pelagicus	?	>25	?	5,000-8,000	0	5,025-8,025
Total	3,300-3,900	4,075-4,605	65-100	5,050-8,080	25-30	12,515-16,715

Table 2. Estimated number of breeding pairs of the three Procellariidae in the Maltese Islands.

UTM grid maps "Malta East, Malta West and Gozo and Comino", scale 1:25,000, were used to map the sites. The Maltese Archipelago is included in the UTM zone 33S, where it falls within one basic 100-kilometre-grid square called "VV". The 10-kilometre-grid squares involving the entire surface of the islands are thirteen. The one kilometre-grid squares amount to 515 in total.

Species Account

Cory's Shearwater *Calonectris diomedea diomedea*

The Cory's Shearwater is a breeding visitor from late February to late October (Sultana & Gauci 1982, Cachia Zammit & Borg 1986-87). It breeds on sea-cliffs on Malta, Gozo, and Comino and on Filfla. All past authors have listed the Cory's shearwater as a breeding bird, but the numbers given varied from a few scattered pairs to several hundreds (Schembri 1843, Wright 1863, Despott 1916, H.L.C.1953, Roberts 1954, Sultana & Gauci 1970, Borg & Sultana 1990-91, James 1984).

The main breeding concentrations on Malta are situated along the south and south-western coast. Benghisa Point on the western part of Marsaxlokk bay is the extreme limit of its breeding range, and the colony extends all the way up to Ghar Lapsi. An estimate of 1000 to 1500 pairs nest along this stretch of cliff. Only single pairs have been found in the Dingli Cliffs area where Bannerman & Vella-Gaffiero (1976) mentioned 'several large colonies'. Breeding birds have also been located along the north-western cliffs in the Mtahleb-Fomm ir-Rih area. Some 200 pairs are estimated to breed there. On the north-eastern cliffs, single calling birds have been heard for several years, but actual breeding had not been confirmed before 1993, when a pair, which raised a chick successfully, was located. At least three other pairs have been observed in the area (Borg & Mallia 1992-94).

Wright (1864) and Bannerman & Vella-Gaffiero (1976) claimed that a small colony existed on Comino. In the summers of 1993-97, single birds were heard calling along the eastern coast of Comino and the west coast of Cominotto, and in the spring of 1998 a small colony of about 10-15 pairs was discovered on the north-eastern cliffs of Comino (Borg 1999).

Gozo holds the largest number of breeding pairs, with the highest concentrations situated at Ta' Cenc Cliffs, in the south of the island. This area is estimated to hold between 1,000 and 1,500 pairs, possibly more. Further to the west, towards Xlendi Bay, it is estimated that the area holds 100 to 300 pairs. A small colony at Xlendi Bay was reported to have been abandoned when electricity was introduced (Sultana *et al.* 1975). In the summers of 1994-96, single birds were seen alighting in front of the crevices, but in 1997, the colony was again deserted (pers.obs.). A sub-colony of about 12 pairs was found in crags and amongst boulders to the west of Xlendi Bay in 1994. Several small sub-colonies exist between Xlendi and Wardija Point where numbers have been estimated to be in excess of 1,000 pairs. Breeding was also confirmed on Hagret il-General (Fungus Rock) at Dwejra (Sultana & Cachia Zammit 1988). During recent visits by the present writers in 2000-2001 the population was estimated at 25 to 30 pairs. Along the north-western coast, between Dwejra and San Dimitri, the estimated number of breeding pairs is 300 to 350 pairs, possibly more.

H. A. Trail, who visited Filfla in late July 1949, located 22 occupied nests of shearwaters (presumably Cory's Shearwater, considering the time of year). At night Trail estimated the number of incoming birds at over a thousand, possibly twice as many (Trail 1949-50). Sultana *et al.* (1975) suggested that this figure was exaggerated as a small number of calling birds make enough noise to lead an inexperienced ear into overestimating numbers. On the other hand, if Trail was correct, the sharp decline can only be attributed to be the bombing practice on the islet (Sultana & Gauci 1970). In late July, Trail must have witnessed a large arrival of non-breeders, which at this time of year are usually visiting the colonies (Cachia Zammit & Borg 1986-87). The colony on Filfla was estimated to be less than 30 pairs in the fifties by E.L. Roberts (1954) but 25 years later the colony there was estimated to be about 200 pairs (Sultana *et al.* 1975, Sultana & Gauci 1982).

The population on Filfla was noted to be on the decline and it has been estimated to be in the figure of around 50 pairs, possibly less (Sultana 1986, Borg & Sultana 1990-91). Several morning visits to Filfla carried out between 1991 and 1999 by the present writers resulted in locating 22 accessible nesting sites. Faecal droppings and other signs of breeding were located in front of other deep crags. In the following two summers (2000 and 2001) a slight increase in the breeding colony was noted there.

Levantine Shearwater *Puffinus yelkouan yelkouan*

The Levantine Shearwater is a breeding visitor from early December to mid-July (Borg & Cachia-Zammit 1986-87) with birds visiting land from late October (Borg *et al.* this volume pp. 20-23). Egg laying occurs during the last days of February and the first week of March (pers. obs.) while fledging takes place between the last two weeks of June and the first week of July (Sultana & Gauci 1982 and pers.obs.). After the breeding season the birds, particularly the fledged ones, move into the Black Sea (Sultana & Gauci 1982) but an unknown number of birds remain near the colonies while undergoing moult (Borg *et al.* this volume).

This shearwater was found to be less numerous but with a wider distribution than Cory's Shearwater, as was noted elsewhere (Iapichino & Massa 1989). In Malta, it was found breeding in deep inaccessible narrow crevices, several metres deep. Nests less than a metre deep are rarely found. Nesting crevices are situated from two metres above sea level up to the top ledges of cliffs. Sultana & Gauci (1982) stated that numbers are very hard to estimate, while Bannerman & Vella-Gaffiero (1976) claimed that the breeding population is in excess of 100 pairs.

Calling birds have been heard along the south and southwestern cliffs in areas which are also occupied by Cory's Shearwaters. Only three areas hold double figures. It is estimated that the number of breeding pairs in the Benghisa-Hal-Far area (south-east) is more than 200 pairs, while more than 100 pairs nest between Zurrieq and Ghar Lapsi. Double figures breed along the cliffs at Dingli. Although single birds have been heard along the northwestern cliffs, breeding there has not yet been confirmed. The largest breeding concentration is located in the Rdum tal-Madonna area on the northeastern part of Malta, where the population has been estimated at around 500 pairs, possibly more. An accessible part was estimated to hold about 250 pairs (Sultana *et al.* 1975).

The Levantine Shearwater was noted as most common on Comino and Gozo (Schembri 1843). No large concentrations have been found on Gozo although its distribution is wider than that of *C. diomedea*. Birds have been observed along the southern cliffs from Mgarr ix-Xini to Ta' Cenc, at Is-Sanap, from Xlendi to Wardija Pt., and from Dwejra to San Dimitri Point. Breeding has been confirmed in all of these sites. On the northern coast, where the Cory's Shearwater is absent, the Levantine Shearwater was found breeding in natural crevices between Marsalforn and Ramla Bay and between San Blass and Wied ir-Rihan. Evidence of birds visiting narrow crevices on Fungus Rock was noted in spring 2001. The population breeding between Mgarr ix-Xini and San Dimitri is estimated to be in excess of 500 pairs. Some 50-80 pairs breed on the northern cliffs.

Breeding on Comino was mentioned by Schembri (1843), but Roberts (1954) doubted the species' presence on Comino. Breeding there was confirmed by Sultana & Gauci (1982) who also found birds breeding on Cominotto in 1970. From a number of visits carried out by the authors between 1990 and 1998, signs of breeding were found in six areas, while flying birds were noted in front of two deep caves. During a visit to Cominotto in late spring 1995, two chicks, one of which had been killed by rats *Rattus sp.*, were found. Along the same ledge, about ten entrances to nesting chambers were identified. The number of breeding pairs on Comino and Cominotto is estimated to be in the figure of 50-80 pairs.

Becher (1884) found this Shearwater breeding on Filfla in some numbers in a very restricted area. H.L.C. (1953) stated that he found it breeding under a tangle of growth at the foot of the cliffs. The colony on Filfla was noted to be declining by Sultana & Gauci (1970) when only three pairs were found. They did not exclude the possibility of other birds present deep within the debris. Since at least the early 1980's, this bird was noted to be absent from Filfla. It is worth noting that because of adverse weather conditions visits to Filfla are usually carried out between the end of May and early September.

European Storm-petrel *Hydrobates pelagicus melitensis*
The European Storm-petrel is a very common localised breeding visitor, breeding in very large numbers in the boulder and rubble screes of Filfla (Sultana & Gauci 1970,1982). It has recently been discovered breeding in a cave in Gozo (Borg & Sultana 1992-94). It makes landfall by the end of February (Borg 1989), and it is assumed that egg laying occurs between late April and late June. On 12th May 2000, six birds were incubating while the egg could be felt ready to be laid with several females which were handled for ringing. A first year bird was picked up at Marsalforn Bay on 24th July 2000, while a two-day-old chick was found on 11th August 1995, and other downy unfledged chicks were still in the nest in mid-September 1995 (pers.obs.). Late fledging may take place in early October as reported elsewhere (Massa & Catalisano 1986, Iapichino & Massa 1989).

Schembri (1843) was informed that the European Storm-petrel does not breed on the south side of Malta, Gozo and Comino, but only on the island of Filfla. Wright (1864) noted the species to be sedentary, very common on the south side of the islands, and to be found breeding on Filfla. Despott (1916) was of the same opinion, but fifteen years later he (1932-34) noted that it was becoming rare on the mainland. Both Wright and Despott failed to give any locality on the mainland. Gibb (1951) recorded it as rather common, to be found breeding only on Filfla. During a visit to Filfla, H.L.C. (1953) described the colony as rather small, while Roberts (1954) noted that it had formerly been a common resident, but was now depleted in number. He found only two pairs on Filfla in June 1952. De Lucca (1969) listed it as an uncertain breeding resident, in small numbers and a summer breeding visitor in May. Sultana & Gauci (1970, 1982) estimated the colony at 10,000 pairs, but Massa & Sultana (1993) noted that numbers were on the decline. Present

estimates show that the number of breeding pairs on Filfla is between 5,000 and 8,000 pairs.

The European Storm-petrel has not yet been confirmed breeding on mainland Malta. Single birds have been observed during the summer months where a freshly dead bird and a live, calling bird were found at Ghar Lapsi, facing Filfla, on 29 August 1978. Sultana & Gauci (1982) suggested that these may have been recently fledged birds from Filfla. In recent years, single birds have been observed from the same locality. At least four birds were seen flying in front of a narrow deep cave between 1993-1995. Another bird was seen at sea in the early morning of 05 September 1994, coming from the direction of the southern cliffs of Malta. Other birds have been observed along the southern cliffs between 1983-1999 (pers. obs). Recently fledged birds have been found washed inshore along the southern coast of Malta.

The Gozitan historian, Canon Agius de Soldanis (1746) reports that he had found a "strange" bird breeding in a cave between Xlendi and Ta' Cenc (Gozo). From his description, the bird can be none other than *H. pelagicus*. This was the only observation of this bird from Gozo for over 200 years. In summer 1973 a long dead corpse was found in a cave at Ta' Cenc (Sultana & Gauci 1982). In 1994, a cave in the vicinity of the Ta' Cenc cliffs was found to harbour a small colony of this bird (Borg & Sultana 1992-94). From a number of visits in the years 1994-99, the population was found to be in excess of 25 pairs (pers. obs.). Single birds have also been observed during the night along the northwestern cliffs .

Conclusion

Information for determining changes in status is less than satisfactory, particularly for the cliff breeding shearwaters. The presence of mammalian predators such as feral cats and rats is highly detrimental to the health and stability of the colony. Disturbance by human visitors is also an ever increasing problem. Carefully designed and continuous studies of seabirds at specific locations may reveal long term trends in environmental conditions. Further data collection should be actively encouraged as this provides a continuous assessment of the relative abundance of these Procellariiformes

References:

Agius de Soldanis, G.P. 1746. *Il Gozo Antico-moderno e Sacro-profano Isola Mediterranea adiacente a Malta Africana.* National Library of Malta, Library MS 145.

Bannerman, D.A. & Vella-Gaffiero, J. 1976. *Birds of the Maltese Archipelago.* Museums Dept. Valletta, Malta.

Becher, E.F. 1884. Shearwaters on the rock of Filfla. *Zoologist* (3) 8:467-468.

Borg, J. 1989. The Storm Petrel *Hydrobates pelagicus* in the Maltese Islands: A review. *Nat. Sicil.* S. IV. XIII (1-2):44-52.

Borg, J.J. 1999. Philopatry in Cory's Shearwater in the Maltese Islands. *Il-Merill* 29: 11-15.

Borg, J.J., Bonaccorsi, G. & Thibault, J-C. 1999. Note on the wintering of the Cory's Shearwater *Calonectris diomedea* in the Mediterranean. *Il-Merill* 29: 15-18.

Borg, J., Cachia Zammit, R. & Sultana, J. 1992-94. Predation by Yellow-Legged Gull *Larus cachinnans* on Storm Petrel *Hydrobates pelagicus* on Filfla. *Il-Merill* 28: 19-20.

Borg, J. & Cachia Zammit, R. 1986-87. Analysis of Yellow-legged Herring Gull Pellets from Filfla Island. *Il-Merill* 24:19-20.

Borg, J.J. & R. Cachia Zammit. 1998. In Walmsley, J., V. Goutnier, A. El Hili & J. Sultana (Eds.). Cory's Shearwater in a hostile environment: the Maltese Islands. *Ecologie des oiseaux marins et gestion intégrée du littoral en Mediterranée.* MEDMARAVIS Hammamet, Tunisia, 1996.

Borg, J. & Cachia Zammit, R. 1986-87. Arrival dates of Manx Shearwaters at colonies in Malta. *Il-Merill* 24: 15.

Borg, J. & Sultana, J. 1990-91. The present status of the Cory's Shearwater *Calonectris diomedea* on Filfla. *Il-Merill* 27: 15-16.

Borg, J. & Sultana, J. 1992-94. Storm Petrel *Hydrobates pelagicus* found breeding at Ta' Cenc, Gozo. *Il-Merill* 28: 23-24.

Borg, J.J., Sultana, J., Heidrich, P. & Wink, M.1999. First record of the Manx Shearwater *Puffinus p. puffinus* in Malta - Evidence from morphometric data and DNA analysis. *Il-Merill* 29: 18-20.

Borg, J.J., Sultana, J. & Coleiro, C. 2002. Pre-breeding movements and early land visits by the Levantine Shearwater in the Maltese Islands. *Il-Merill* 30: 20-23..

Borg, J. & Mallia, M. 1992-94. Cory's Shearwater *Calonectris diomedea* found breeding on the east coast of Malta. *Il-Merill* 28: 23.

Cachia Zammit, R. & Borg, J. 1986-87. Notes on the Breeding Biology of the Cory's Shearwater in the Maltese Islands. *Il-Merill* 24: 1-9

Cachia Zammit, R. & Borg, J. 1988. The Presence of a brood-patch in non-breeding Cory's Shearwaters *Calonectris diomedea. Il-Merill* 25: 11.

Cachia Zammit, R. & Borg, J. 1988. Cory's Shearwater *Calonectris diomedea* breeding in its second year. *Il-Merill* 25:11.

De Lucca, C. 1969. *A Revised Checklist to the Birds of the Maltese Islands.* Classey, Middlesex.

Despott, G. 1913. La Berta Maggiore del Mediterraneo *Puffinus kuhli* - Ciefa: Una specie che si estingue. *Arch. Mel.* (2) 13-16: 91-92.

Despott, G. 1916. The breeding birds of Malta. *Zoologist* (4) 20: 161-181

Despott, G. 1932-34. Ornitologia delle Isole Maltesi. *Riv. Ital. Orn.* (2) 2: 5-16, 65-77.

Gibb, J. 1951. The Birds of the Maltese Islands. *Ibis* 93: 109-127.
H.L.C. 1953. A visit to Filfla Island. *The Oologists' Record*, March 1953: 7-9.
Iapichino, C. & Massa, B. 1989. *The Birds of Sicily*. B.O.U. Checklist No. 11.
James, P.C. 1984. The Status and Conservation of Seabirds in the Mediterranean Sea. In Croxall, J.P., Evans, P. G. H. & Schreiber, R.W. *Status and Conservation of the World's Seabirds*. ICBP Technical Report No.2.
Massa, B. & Catalisano, A. 1986. Status and conservation of the Storm Petrel *Hydrobates pelagicus* in Sicily. In Med-MARAVIS & Monbailliu, X. *Mediterranean Marine Avifauna Population Studies and Conservation*. Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo.
Massa, B. & J. Sultana. 1990-91. Status and Conservation of the Storm Petrel *Hydrobates pelagicus* in the Mediterranean. *Il-Merill* 27: 1-5.
Roberts, E.L. 1954. *The Birds of Malta*. Progress Press, Malta.
Schembri, A. 1843. *Catalago Ornitologico dell Gruppo di Malta*. Anglo-Maltese, Malta.
Sultana, J. 1986. Seabird conservation problems in the Maltese Islands. In MEDMARAVIS & Monbailliu, X. *Mediterranean Marine Avifauna Population Studies and Conservation*. Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo.
Sultana, J., Gauci, C. & Beaman, M. 1975. *A Guide to the Birds of Malta*. Malta Ornithological Society, Malta.
Sultana, J. & C. Gauci. 1970. *Bird Studies on Filfla*. Malta Ornithological Society, Malta.
Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Malta.
Sultana, J. & Cachia Zammit, R. 1988. Cory's Shearwater *Calonectris diomedea* breeding on Hagret il-General. *Il-Merill* 25: 12.
Thibault, J-C., Borg, J.J. & Ristow, D. 1996. Vergleich der Überlebenstrate zwischen drei Kolonien des Gelbschna belsturmtauchers. *Deutsches See-und Küstenvogelkolloquium, Wilhelmshaven*.
Trail, H.A. 1949-50. Shearwaters on Filfola Island. *Sea Swallow* 3: 12-14.
Wright, C. 1863. A visit to the island of Filfla on the south coast of Malta. *Ibis* (20) 15: 432-440.
Wright, C. 1864. List of the birds observed in the Islands of Malta and Gozo. *Ibis* (1) 6: 42-73, 137-157.

John J. Borg – 13, The Catacombs, Rabat , RBT 07, Malta. diomedea@onvol.net
Joe Sultana – Dar Gajdoru/3, Gajdoru Street, Xaghra, Gozo XRA 104, Malta. jsultana@global.net.mt

Populations of Common Chiffchaffs *Phylloscopus collybita* occurring in the Maltese Islands

Charles Galea Bonavia & Charles Gauci

Abstract

The wing shape of a sample of Common Chiffchaffs Phylloscopus collybita *was quantified using indices for wing pointedness and convexity. An analysis of the results confirmed the occurrence of* P.c.abietinus *and also identified a sub-population of* P.c.collybita *with very blunt wings.*

Introduction

Wing shape varies in migratory avian species depending on distance travelled, long-distance migrants having longer, more pointed wings than short distance migrants and residents more rounded wings than either (Lockwood *et al.* 1998, Norberg 1995). This differentiation is also seen intraspecifically in those species having populations showing a gradient of migratory effort: sedentary populations have more rounded wings than migratory populations e.g. Copete *et al.* (1999), Gaston (1974), Io Valvo *et al.* (1988), Perez-Tris and Telleria (2001). This intraspecific difference in wing shape has been used to characterise separate populations of a species migrating through a particular locality (e.g. Lovei 1983). However Tiainen and Hanski (1985) and Pilastro *et al.* (1995) are sceptical about their suitability for such a purpose if the relevant information about wing-shape variation in age/sex classes were lacking.

In the Maltese Islands the Common Chiffchaff *Phylloscopus collybita* is a common autumn and spring passage migrant and winter visitor, occurring mainly from mid-October to late March (De Lucca 1969, Bannerman and Vella-Gaffiero 1976, Sultana and Gauci 1982; Roberts 1954 gives its autumn passage as commencing in late August but he has obviously mixed up the Common Chiffchaff with the Willow Warbler *Phylloscopus trochilus*). Our aim is to use wing shape, supplemented with other morphometrics, to reveal the presence if any, of different populations of this species that occur in the Islands, notwithstanding the limitation noted above.

Materials and methods

We collected various morphometrics of a sample of 108 Common Chiffchaffs, consisting of first time trapped and retrapped birds (Table 1), caught in mist-nets during ringing sessions from October through March of 1999-2000 and 2000-2001. Birds were trapped at Ghadira Nature Reserve, a permanent saline wetland fringed by seasonal salt marshes and rows of Tamarisks *Tamarix africana*; at Buskett, an agricultural locality with extensive groves of citrus fruits bordered with woods dominated by *Pinus halepensis* and at an olive-grove *Olea europea* growing along part of the banks of the intermittent stream of Wied il-Marg valley.

Table 1

Sample Sizes	
Sample category	**n**
Total sample	108
Effective sample	107
Ringed	87
Retraps	20
Adults	11
Unaged	96

The following morphometrics were taken: wing length, according to method 3 of Svensson (1992), to the nearest 0.5mms; wingspan to the nearest mm, using a metal rule according to the method of Pennycuick (1989); culmen length, from the tip to the proximal edge of the nares, bill-width and bill-depth at the distal edge of the nares, to 0.1mms. Tail-length was taken to the nearest mm following Svensson (1992) and tarsus was measured to 0.1 mms from the upper surface of the toes bent at right angles to the tarsometatarsus to the notch at the back of the intertarsal joint (see fig 18B and corresponding text of Svensson 1992).

Lengths of primaries 2-9, counting ascendentally and abbreviated as p1-p8, were taken to the nearest 0.5mms using dial-callipers, according to the method of Lockwood *et al.* (1998). Care was taken to keep each primary and its corresponding greater covert on the same side of the callipers to avoid damage to the feathers and reduce measurement error. Birds with damaged, missing or visibly abraded primaries were excluded. Not all measurements were taken for each bird and one bird measured twice at an interval of one year was omitted from the analysis, reducing the effective sample to 107.Tarsus, and bill length, width and depth were taken using dial-callipers. Wing-length was taken for most of the sample by the second author, the rest by three other ringers. The first author took all the other measurements.

We quantified wing-tip shape using the indices of Lockwood *et al.* (1998). C_2 is an index of wing-roundness, decreasing as wing-pointedness increases and C_3 is an index of wing-convexity, increasing as convexity increases – see Lockwood *et al.* (1998) for further details.

Age and sex in the Common Chiffchaff cannot be determined in the field (Baker 1997, Snow and Perrins 1998, Svensson 1992); however a sub-sample of retrapped birds (Table 1) was determined as adults as the interval between initial ringing and retrap was sufficiently long that the bird had undergone at least one full post-nuptial moult. The sub-sample of retrapped birds was biased towards these birds but the rest of the sample i. e. that composed of unaged birds, was random.

Statistical procedures

We tested the distance of each value from the rest of the values of a particular metric using Grubb's test for outliers (Graphpad online); Welch's approximate *t* was used to test for equality of slopes. We used P.C.A. to determine which index accounts for most of the variation and which can thus be used to further identify any discrete groups. Where indicated, prior to analysis all measurements were $\log_e$ transformed to normalise. Statistical analysis was carried out with Past statistical package (Hammer *et al.* 2001).

Results

The ranges of the values obtained for the morphometrics measured are listed in Table 3. A P.C.A. of the two indices showed the first axis to be very highly correlated to C_2 (table 2) so we feel justified in using this index to search for any discrete populations. A plot of the array (sorted ascendantally) for C_2 (Fig. 1) shows an apparent outlier at C_2 = 3.69 and an obvious break of slope at 7.40; the last four points clearly have a different slope than the rest. The central part of the curve, apart from these last four values and the first point (i.e. 2H049) shows a smooth increase in C_2, a third order polynomial explaining most of the variance (R^2=0.99).

Grubb's test indicated a significant outlier at C_2 = 9.98 (Grubb's test, critical value of Z =3.784, Z=4.3608, p<0.01) but not at C_2 = 3.69, though it is at the next furthest distance from the rest. This last bird, henceforth 2H049, thus had the most pointed wing and also the longest wing

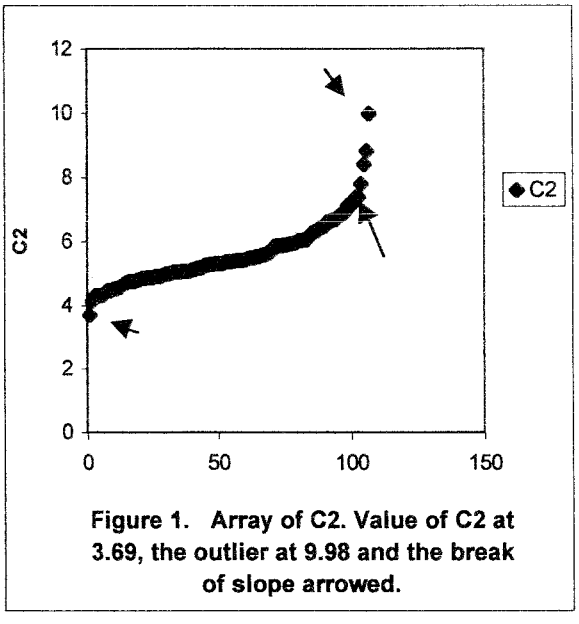


Figure 1. Array of C2. Value of C2 at 3.69, the outlier at 9.98 and the break of slope arrowed.

Table 2

P.C.A. analysis of C_2 and C_3	
First axis	
Variance explained	**98.49**
Correlation with C_2	**0.999**

Table 3

Metric[1]	Range	n[2]	2H049
wing span	152-190	104	190
wing length	52-67	107	67
bill length	7.3-11.3	62	9
bill width	1.5-2.3	62	2
bill depth	1.6-2.4	62	2
tail length	40-59	95	55
tarsus	17.2-21.3	98	19
C^2	3.69-9.98	107	3.69
C^3	0.287-0.975	107	0.697

1 = all measurements in mms; 2 = number of birds in the sample

span and wing length, but the tarsus, tail length, bill length, width, depth and C_3 fell within the range of the sample (Table 3). However, Grubb's test also showed that though wingspan, wing length and C_2 were not a significant outlier, they were all further than the rest (apart from C_2 =9.98) (Table 2).

There is a significant difference between the slopes of the plot of the last four values of C_2 versus that of the immediately preceding 22 values (between the third quartile at 6.03 to 7.40) (Welch's approximate t=42.094, $p < 0.01$, C_2 $\log_e$ transformed).

Discussion

So far only the nominate and *tristis* subspecies of the Common Chiffchaff have been definitely recorded for the Maltese Islands (see for example, DeLucca 1969, Sultana 1992-1994). Bannerman and Vella-Gaffiero (1976) and Sultana and Gauci (1982), state that *P.c. abietinus* occurs but as they do not state the basis for this statement further evidence is required as *abietinus* and *collybita* cannot be reliably separated on plumage (Williamson 1976, Svensson 1992, Svensson *et al.* 1999; see also descriptions in Baker 1997 and in Snow and Perrins 1998). Indeed we could not detect any significant differences in the plumage of any of the birds in our sample. We assign all the birds, except 2H049 (see below) in our sample to *P.c. collybita.*

P. c. abietinus can be separated from *P.c. collybita* on the differences in their morphometrics: *abietinus* is larger, and has longer, more pointed wings and a larger tail than *P. c. collybita* but its bill-length, width and depth and tarsus fall within the range of the nominate subspecies (Hanson *et al.* 2000; see also Snow and Perrins 1998). This pattern is repeated for 2H049, except that the tail length does not achieve the maximum value of its range; even though the wing variates are not a significant outlier (Table 4), nevertheless we consider the result of Grubb's test as biologically significant. We have no hesitation in assigning 2H049 to *P. c. abietinus;* we exclude *P.c. tristis* as it can be identified in the field on plumage characters (Williamson 1976, Svensson *et al.* 1999, Sultana 1992-1994; see also descriptions in Baker 1997).

Table 4

(2H049)		
	Critical	
Metric	Z	Z
Wing span	3.4	2.75**
Wing length	3.41	2.728**
C_2	3.69	1.867**
**$p < 0.05$		

There is also evidence of a sub-population of *collybita* within our sample. The only significant outlier, at C_2 = 9.98 is the maximum value of the entire sample and also that of the tail of the plot of the array. Considered together with the difference in the slopes, this points to the presence of a very small but quite separate population with blunter wings than the rest of the sample. Non-migratory populations have more rounded wings than migrants (Lo Valvo *et al.* 1988, Norberg 1995, Perez -Tris *et al.* 2001); we consider these four birds to be also *collybita* ssp. but derived from a nearby sedentary population, most likely that in Sicily/Italy. It is unlikely that they come from North Africa as the birds were observed in November/December i.e. during the southbound migration (see the distribution maps of the Common Chiffchaff in Baker 1997 and Snow and Perrins 1998). However, one of these birds was retrapped at the same site in a succeeding winter i.e. it returned to the same wintering locality for at least two years, thus possibly exhibiting obligate migration; this is not consistent with our interpretation. We do not expect that our conclusion be confounded by any differences in wing shape between age/sex classes due to the presence of an adult in this sub-sample and also because there is no reason to suspect that the probabilities of an unaged bird belonging to a particular age/sex class are not equal in these two sub-samples.

Unfortunately, as already pointed out by Tiainen and Hanski (1985) and Pilastro *et al.* (1995) lack of knowledge of the wing shape of the breeding populations of the Common Chiffchaff hinders any meaningful interpretation and given the small size of this sub-sample, renders any further discussion of these four birds futile, at least until a larger sample has been obtained.

We thus confirm the occurrence of *P. c. abietinus* for the Maltese Islands; as in the case of *P. c. tristis* it is not at all common, probably not more than a few individuals occurring each year (in our sample only this individual i.e. <1%, can be considered as belonging to *abietinus*). A more precise evaluation of the true status of this subspecies in the Maltese Islands is difficult given that in this situation it cannot be reliably separated from the nominate subspecies on plumage or on geographical grounds but only from a combination of morphometrics. To elucidate its status it is recommended that any Common Chiffchaffs trapped for ringing that have a wing-length of ~ 67 mms be also measured for wing-span, tail, bill and tarsus lengths and the pattern of distribution of the variates observed.

In summary, there are three subspecies of the Common Chiffchaff occurring in the Maltese Islands: the

nominate, which includes the vast majority of the birds and a very few *tristis* and *abietinus*; in addition there is also a sub-population, so far very poorly known, of *collybita*.

Acknowledgements
We thank M. Gauci, M. Mallia and J. Mangion of the Valletta Bird Ringing Scheme of Birdlife (Malta) for their co-operation during the acquisition of the data and S. Lanfranco and J. Sultana for supplying some of literature cited.

References

Baker, K. 1997. *Warblers of Europe, Asia and North Africa*. Christopher Helm – A. & C. Black, London.
Bannerman, D.A. and Vella-Gaffiero, J.A. 1976. *Birds of the Maltese Archipelago*. Museum Dept., Valletta.
Copete, J.L., Marine, R., Bigas, D. and Martinez Vilalta, A. 1999. Differences in wing shape between sedentary and migratory Reed Buntings *Emberiza schoeniclus*. *Bird Study* 46: 100-103.
De Lucca, C. 1969. *A Revised Check-list of the Birds Of the Maltese Islands*. Classey, Middlesex.
Gaston, A.J. 1974. Adaptation in the Genus *Phylloscopus*. *Ibis* 116: 432-439.
Graphpad. 2001. Available at http://www.graphpad.com/calculators/grubbs1.cfm
Hammer, O., Harper, D.T., and Ryan, P. D. 2001. Past: Palaeontological Statistics-Software Package for Education and Data Analysis. *Palaeontologia Electronica*, Vol. 4, Issue 1,art. 4: 9 pp., 178 KB at http://palaeo-electronica.org/2001_1/past/Issue1_01.htm
Hanson, M.C., Bensch, S., and Brannstrom, O. 2000. Range expansion and the possibility of an emerging contact zone between two subspecies of Chiffchaff *Phlloscopus collybita* ssp. *Journal of Avian Biology* 31: 548-558.
Lockwood, R., Swaddle, J. P. and Rayner, J. M. V. 1998. Avian wingtip shape reconsidered: wingtip indices and mor phological adaptations to migration. *Journal of Avian Biology* 29: 273-292.
Lo Valvo, F., Lo Verde, G., and Lo Valvo, M. 1988. Relationships among wing length, wing shape and migration in Blackcap *Sylvia atricapilla* populations. *Ringing and Migration* 9: 51-54.
Lovei, G.L. 1983. Wing Shape variations of Chiffchaffs on Autumn Migration in Hungary. *Ringing and Migration* 4: 231-236.
Norberg, U.M. 1995. Wing design and migratory flight. *Israel Journal of Zoology* 41 (3): 297-306.
Pennycuick, C. 1989. *Bird Flight Performance Calculations*. Oxford University Press, Oxford.
Pilastro, A., Farronato, I. and Fracasso, G. 1995. The use of feather length as a method for measuring the wing shape of passerines. *Avocetta*: 213-218.
Perez-Tris, J. and Telleria, J.L. 2001. Age-related variation in wing shape of migratory and sedentary Blackcaps *Sylvia atricapilla*. *Journal of Avian Biology* 32: 207-213.
Roberts, E.L. 1954. *The Birds of Malta*. Progress Press, Malta
Snow, D. M. and Perrins, C. W. 1998. *Birds of the Western Palaearctic*-Concise Edition. Oxford University Press, Oxford and New York.
Sultana, J. 1992-1994. The callnote of the Chiffchaff *Phylloscopus collybita* in Malta. *Il-Merill* 28: 35.
Sultana, J, and Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Malta.
Svensson.L. 1992. *Identification for Ringers*. British Trust for Ornithology, Tring.
Svensson, L., Mullarney, K., Zetterstrom, D. and Grant, P. J. 1999. *Collins Bird Guide*. Harper Collins, London.
Tiainen, J. & Hanski, I. K. 1985. Wing shape variation of Finnish and Central European Willow Warblers *Phylloscopus trochilus* and Chiffchaff *P. collybita*. *Ibis* 127: 365-371.
Williamson, K. 1976. *Identification for Ringers* 1-3 (revised edition). British Trust for Ornithology, Tring.

Charles Galea Bonavia - "Russett", Zebbug Road, Attard BZN 03, Malta. cgb@maltanet.net
Charles Gauci - "Skylark", Triq il-Kissier, Mosta MST 03, Malta. cgauci@waldonet.net.mt

Pre-breeding movements and early nest visits by the Levantine Shearwater *Puffinus yelkouan* in Malta

John J. Borg , Joe Sultana & Charles Coleiro

Abstract

Pre-breeding movements and early nest visits by the Levantine Shearwater *Puffinus yelkouan* in the Maltese islands during the pre-breeding months (August-October) are reported. Observations at nesting sites were carried out mainly from a colony located on the northeastern side of Malta, estimated as holding about 500 pairs by Sultana & Gauci (1982). Land based observations were carried out from headlands while boat trips contributed to a considerable increase in the number of birds observed off-shore between August and October. Ringing recoveries have shown that post-fledging birds as well as an unknown number of adults disperse into the Black and Aegean seas, but some adult birds have been found to remain in the vicinity of the nesting colonies throughout the whole year. Single birds handled during the month of September were found to be in heavy wing and body moult. At the end of the moult cycle birds start to make occasional visits to the nests.

Introduction

The Levantine Shearwater *Puffinus yelkouan* is an endemic breeding species to the central and eastern part of the Mediterranean. The main breeding colonies in the *Siculo-Melitense* basin are well known, but information from the Aegean and eastern parts of the Mediterranean is still scant (Zotier *et al.* 1992, Handrinos & Akriotis 1997). Although only one site is known to hold over 500 pairs (Sultana & Gauci 1982), several small to medium sized colonies have been located in the Maltese Islands (Fig 1).

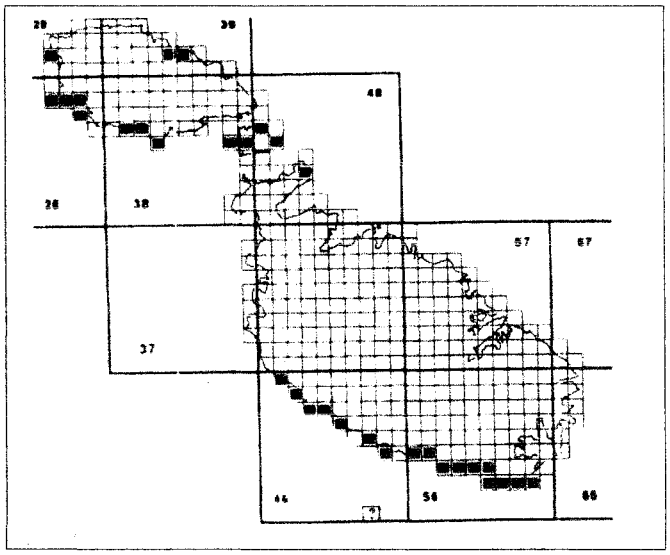


Fig. 1. Colonies of *P. yelkouan* in Malta (Sultana & Borg 2000).

Like most members of the shearwater family, *P. yelkouan* has a synchronised breeding period. Birds have been recorded visiting colonies in the first days of December (Borg & Cachia Zammit 1986-87), and egg laying has been reported as taking place in the first half of March (Galea 1990-91). However some early birds were recorded as laying in late February (pers.obs.). Chicks start to fledge from the end of June through the first week of July and colonies are deserted by the end of July (Sultana & Gauci 1982). An exceptionally late chick, aged about two and a half

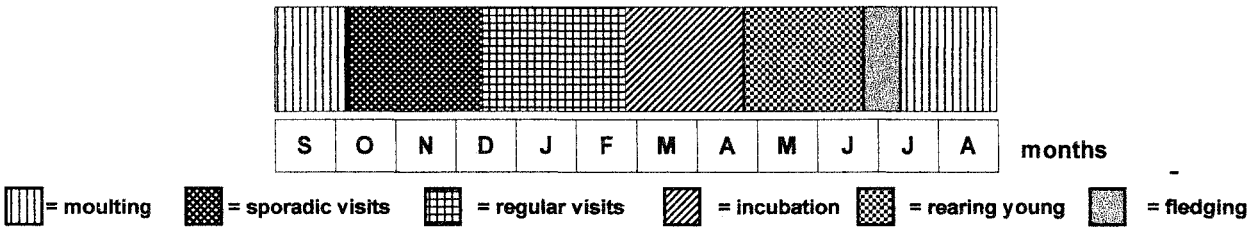


Fig. 2. Annual cycle of Levantine Shearwater.

weeks was found in a shallow burrow on 17 June 1988 at Gharb, Gozo. Unfortunately, the nest was disturbed and the bird was found dead (pers. obs.). Had it been successful, the young would have fledged in the last days of July.

Material & Methods

Land based observations were usually carried out in the early mornings as well as during the late afternoon mainly from headlands on Malta and Gozo and a series of boat trips increased considerably sightings of offshore birds. Binoculars and telescopes were used to facilitate the counting of rafting birds. Breeding colonies were visited from the first week of October to record first landfall throughout the whole breeding season till the end of July when colonies are deserted. Between July and October some of the colonies were also regularly visited while monitoring the breeding of Cory's Shearwaters *Calonectris diomedea*.

Ringing Recoveries

From 1969 to 1999, a total of 605 birds, adults as well as pulli, have been ringed from Maltese colonies. Three of these have been recovered away from territorial waters (Table 1). These recoveries show the post breeding movements undertaken by Maltese birds. The two young birds have been recovered in the northern edge of the Black Sea while an adult bird was found dead in Greek waters.

Ring No.	Age	Ringing date Recovery date	Ringing Place Recovery Place
EB68.806	4	21.05.76 18.07.76	L-Ahrax, Pt., Malta. Lagonisi ca. 37°50'N;23°45'E (Attiki), Greece.
ED96.747	1	24.06.72 00.08.75	L-Ahrax Pt., Malta. nr. Sochi, Black Sea: 43°34'N;39°44'E, (Krasnodar), ex USSR.
ED46.085	1	07.07.77 30.06.78	L-Ahrax Pt., Malta. nr. Alushta : 44°42'N;34°24'E, Black Sea, (Crimea) Ukraine.

Table 1. Foreign recoveries of Levantine Shearwaters ringed in Malta (Age: 4 = adult, 1 = pullus).

Movements

The proportion of dispersion and movements varies according to age and availability of food as well as to meteorological conditions. Daily observations during the post-breeding season (August-September) of Levantine Shearwaters have shown that there is an almost total absence of birds near the Maltese Islands. Brichetti (1992) reports a similar pattern of observations in and around Italian waters.

The increased number of birds from the eastern part of the Mediterranean in the post-fledging period coincides with the absence of birds from the central Mediterranean. Handrinos and Akriotis (1997) report it as present all year round in Greek waters, while Goodman & Meininger (1989) report that in Egyptian waters the Levantine Shearwater is a scarce but regular passage migrant and winter visitor between mid-August and early May. The 'thousands' reported off Lazium in September 1981 by Fraticelli (1983) must surely refer to the Cory's Shearwater.

Observations from Maltese waters in September and October also show that adult birds undertake moult in territorial waters, but mostly do so well offshore for land-based observers to see. One adult bird in moult was found on 13 September 1994, 7km offshore, while another shearwater in partial moult was observed, this time, only 70m away from shore, on the afternoon of the 11 September 1998. (See Fig. 3 and Table 2).

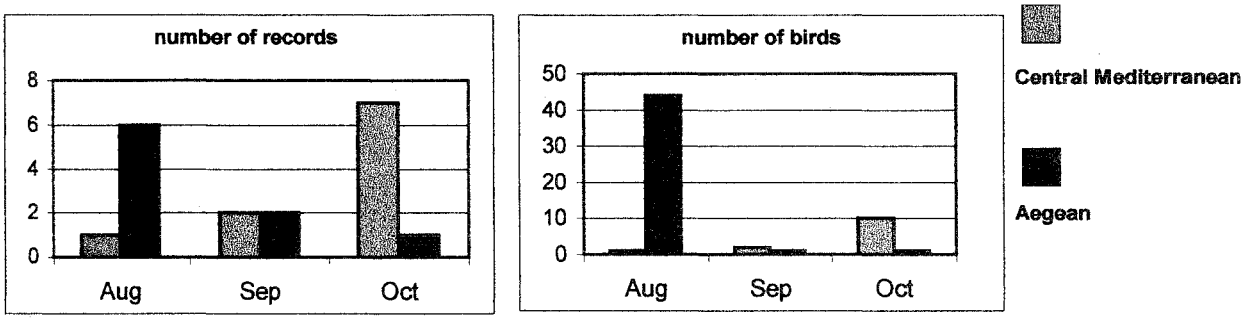


Fig. 3: Number of records and of birds observed at sea.

No. of birds	Date	Locality	Source
singles	30.08.1961	off Cyprus	Bourne & Radford 1962
singles	31.08.1961	off Banyas (Syria)	Bourne & Radford 1962
singles	01.09.1961	off Crete	Bourne & Radford 1962
12	28.08.1963	off Syria	Bourne 1964
1	08.10.1963	off Egypt (Med.)	Bourne 1964
1 (male – shot)	20.08.1973	Medit. Egypt	Goodman & Meininger 1978
1	19.08.1975	Malta	BirdLife Malta Data Bank
249	15.08-05.10. 1978	Medit. Egypt	Goodman & Meininger 1978
13	30.08.1981	Medit. Egypt	Goodman & Meininger 1978
13	26.06.1980	Medit. Egypt	Goodman & Meininger 1978
2	15.10.1987	Malta	BirdLife Malta Data Bank
2	20.10.1990	Malta	BirdLife Malta Data Bank
1	27.10.1991	Malta	BirdLife Malta Data Bank
2	28.08.1994	off E. Crete	Pers. obs.
1 (ad. Moulting)	13.09.1994	Malta	BirdLife Malta Data Bank
1	11.09.1998	Malta	Pers. obs.
2	24.10.1998	Malta	Pers. obs.
1	27.10.1998	Malta	Pers. obs.
1	30.10.1998	Malta	Pers. obs.
1	29.10.1999	Malta	Pers. obs.

Table 2. Sightings of *P. yelkouan* in the Central-Eastern Mediterranean in the non-breeding months.

Early visits to colonies

Some species of petrels and shearwaters are known to visit colonies in the non-breeding months (Warham 1990). Of the species recorded as visiting their nests outside the breeding season one finds the Little Shearwater *Puffinus assimilis*, which has been recorded on land over 10 months of the year (J. Warham pers. comm.). The Manx Shearwater *Puffinus puffinus* visits land from February to September (Harris 1966) with an exceptionally early bird reported by Alexander (*in* Brooke 1990) when a bird was heard calling in November on Skomer Island, off Wales. Lockley (1931) records an early bird on 26 January, but noted that regular visits to colonies start from late February or early March. On Iles Hyeres, in the south of France, Vidal (1985) found some individuals of *P. yelkouan* already visiting land in the beginning of November. One bird was reported as taken from a burrow by a dog in 'early autumn' from a small colony in Xaghra, Gozo (J. Attard Tabone pers.comm.).

Visits carried out in the years 1983-1999 to the largest breeding colony of *P.yelkouan* in the Maltese Islands have resulted in sporadic fresh footprints in front of nesting crevices from the third week of October. The earliest evidence of birds visiting the nest was on the night of the 27th/28th October 1998 when fresh footprints of a single bird were found in the soft earth. An increase was then noted from the third week of November when birds visited the nests on a regular basis. The local nesting habits of this shearwater, in deep shallow crevices, do not allow any accessible nests that might facilitate observations. Therefore, the length of time spent in the nest during these early visits is not known.

Conclusions

Direct observations have shown that in the post-breeding months, an unknown number of adult birds remain in territorial waters. Bird ringing on the other hand shows that some adult birds disperse eastwards into the Aegean and the immature birds fly through the Bosphorus and 'winter' in the Black Sea.

In the years 1983 to 1999, the Levantine Shearwater was never recorded on land between August and September. This absence of birds may be explained by the fact that in these two months, when in moult, birds remain offshore. Birds start to venture closer to land with sporadic landfall in October. Then they increase by the third week of November. Most summer sightings of birds in flight at sea have been recorded during calm weather. An increased number of both sightings and birds during or immediately after strong north-westerly winds suggest that offshore birds are blown in closer to land.

In the Maltese Islands then, the Levantine Shearwater has been recorded on land for almost ten months of the year.

References

Borg, J. & Cachia Zammit, R. 1986-87. Arrival dates of the Manx Shearwater in Malta. *Il-Merill* 24:15.

Borg, J.J., Sultana, J., Heidrich, P. & Wink, M. 1999. First record of the Manx Shearwater *Puffinus puffinus* in Malta - evidence from morphometric data and DNA analysis. *Il-Merill* 29 :18-20.

Bourne, W.R.P. & Radford, M.C. 1962. Observations of seabirds. *Sea Swallow* 15: 7-27.

Brichetti, P.A. 1992. Berta Minore *Puffinus puffinus* (Brunnich, 1764). In Brichetti, P., De Franceschi, P. & Baccetti, N. (Eds.) *Fauna d'Italia, Uccelli I.* Edizioni Calderini, Bologna.

Brooke, M. 1990. *The Manx Shearwater.* Poyser Books, London.

Cramp, S. & Simmons, K.E.L. (Eds.) 1977. *The Birds of the Western Palearctic*, Vol. 1. Oxford University Press, Oxford.

Fraticelli, F. 1983. Osservazioni di uccelli marini dalla costa dell'Oasi Naturale W.W.F. 'Bosco di Palo' (Roma). *Riv. Ital. Orn.* 53: 45-55.

Galea, R. 1990-91. Egg laying in the Mediterranean Shearwater *P. yelkouan* in Malta. *Il-Merill* 27: 23-24.

Goodman, S.M. & Meininger, P.L. 1989. *The Birds of Egypt.* Oxford University Press, Oxford.

Gutierrez, R. & Figeurola, J. 1995. Wintering Distribution of the Balearic Shearwater (*Puffinus yelkouan mauretanicus*, Lowe 1921) off the Northeastern coast of Spain. *Ardea* 42(2): 161-166.

Handrinos, G. & T. Akriotis. 1997. *The Birds of Greece.* Christopher Helm, A & C Black, London.

Harris, M.P. 1966. Age of return to colony, age of breeding and adult survival of Manx Shearwaters. *Bird Study* 13: 84-95.

Lockley, R.M. 1931. Further notes on the breeding habits of the Manx Shearwater. *British Birds* 24: 202-207.

Sultana, J & Borg, J.J. 2000. *Coastal Zone Subject Plan – Ornithology.* BirdLife Malta: report submitted to Planning Authority.

Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta.* The Ornithological Society, Malta.

Vidal, P. 1985. Premières observations sur le biologie de la reproduction du Puffin des Anglais *Puffinus puffinus yelkouan* sur le Iles d'Hyères (France) In Oiseaux marins nicheurs du midi et de la Corse. *Annales du C.R.O.P., Aix-en-Provence*, 2: 58-62.

Warham, J. 1990. *The Petrels Their Ecology and Breeding Systems.* Academic Press, London.

Zotier, R., Thibault, J-C. & Guyot, I. 1992. Known population and distribution of Cormorants, Shearwaters and Storm Petrels in the Mediterranean. *Avocetta* 2: 118-126.

John J. Borg - 13, The Catacombs, Rabat RBT 07, Malta. diomedea@onvol.net
Joe Sultana - 3, Dar Gajdoru, Gajdoru Street, Xaghra, Gozo XRA 104, Malta. jsultana@global.net.mt
Charles Coleiro - 74, St.Michael Flats / 2, Paris Str, Zebbug ZBG 05, Malta. ccol@global.net.mt

The Diet of three Black Redstarts *Phoenicurus ochruros* wintering at Mdina

Martin A. Thake

The droppings of three Black Redstarts *Phoenicurus ochruros* wintering at Mdina, Malta, were investigated in order to determine the components of the birds' diet. Visual observations of the birds' behaviour were also made.

The droppings of an adult male were collected from beneath one of its habitual perches, while the droppings of two different females were collected from beneath their common roost. The male's droppings represent food taken at various times of day during daylight, whereas the females' droppings represent food taken in the early morning and late afternoon.

The droppings were placed in alcohol and dissected under a binocular microscope (x 15). The contents of each (numbered) dropping were noted separately.

Droppings were collected during the birds' wintering period between late October and early March of the 1996-97 winter. 21 male and 106 female droppings were examined. The two females roosted in close proximity to one another and, as their droppings could not be distinguished, they were analysed together.

Results

Fruit was the predominant item in the females' droppings. This feature was evident in every month of analysis. As these droppings represent early morning and late afternoon feeding, it seems likely that fruit was eaten preferentially at such times. *Washingtonia filifera* drupes were the most important items in the dawn/dusk diet. This remained the case long after all the drupes had disappeared from the palm tree in early December, as the two females continued to visit the ground below the palm tree to take fallen drupes well into March. The palm tree was in the male Black redstart's territory (see Fig. 1 and Table 1). Ants and beetles were the commonest invertebrates taken by the females (se Table 2). Up to 4 slug shells were

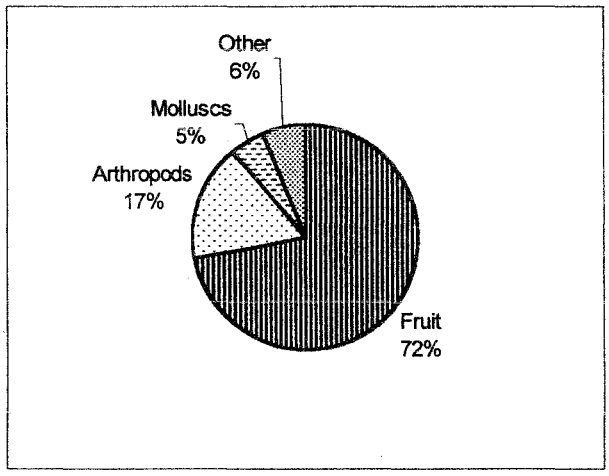


Fig. 1. Average composition of 106 droppings produced by two females Black Redstarts.

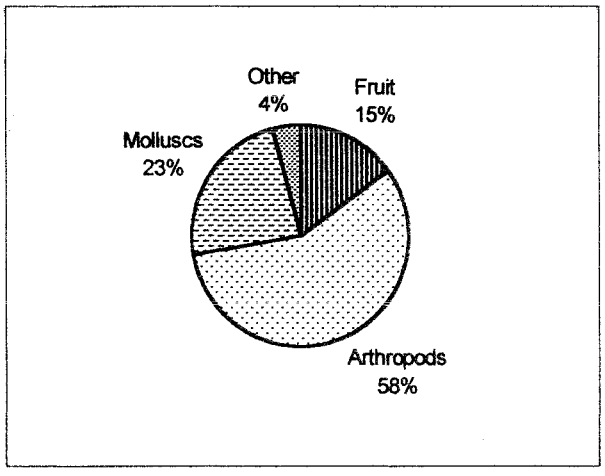


Fig. 2. Average composition of 21 droppings produced by a male Black Redstart. The composition of these droppings differs significantly from that of the females' droppings (G – test; $p < .001$).

found in a single dropping. Droppings which contained nothing but slug remains were uncharacteristic – a greyish shapeless smudge within a droplet of liquid. Droppings consisting of the remains of *Lonicera* fruits were also shapeless and uncharacteristic.

The male bird's droppings refer to various times of the day. Fruit was much less abundant in these droppings, figuring prominently only while the *Washingtonia filifera* bore fruit (see Fig. 2 and Table 3). Invertebrates predominated in

Month	Fruit %	Arthropods %	Molluscs %
early November	77.8	18.5	3.7
late November	56.2	37.5	6.2
early December	63.3	26.7	6.7
late December	64.7	17.6	11.8
early January	66.7	33.3	0
late January	72.2	16.7	5.6
early February	62.5	37.5	0
late February	95.8	4.2	0
early March	76.5	8.8	2.9

Table 1. Estimates of the proportion of various food types in the diet by month of year, estimated by volume of 'item' in faeces.

Item	Identified in n droppings
Washingtonia filifera fruits	66
Solanum luteum fruits	15
Lonicera japponica fruits	10
Hedera helix fruits	1
Unidentified fruit	12
grass leaves	4
moss leaves	3
springtail (*Collembola*)	1
termites (*Isoptera*)	2
Curculionid beetles	1
Straphylinid beetles	5
other beetles (*Coleoptera*)	13
adult *Lepidoptera*	1
ants (*Hymenoptera*)	19
large *Diptera*	7
small *Diptera*	1
Arachnida	1
Isopoda	6
unidentified arthropod remains (incl. some centipedes & spiders?)	27
snails (*Mollusca*)	9
slugs (*Mollusca*)	7
ovarian discharge	1

Table 2. Items identified in the droppings of two female Black Redstarts (total: 106 droppings).

the male's droppings. One dropping contained part of the maxilla of a frog *Discoglossus pictus*, hitherto unrecorded in the diet of this species (Cramp *et al.* 1988).

This study corroborates earlier work on the diet of the Black Redstart (see review in Cramp *et al.* 1988) in that ants and other ground dwelling invertebrates were an important part of the diet for much of the day. The large *Diptera* were taken in aerial pursuit, which has also been recorded previously. Predominance of fruit among food items has not been reported previously.

Acknowledgements
I am grateful to J. A. Vella-Gaffiero, o.i.c. at the National Museum of Natural History, Mdina for permission to conduct research at the Museum.

References
Cramp, S. (ed.) 1988. *The Birds of the Western Palearctic.* Vol. V. Oxford University Press, Oxford.

Item	Identified in n droppings
Washingtonia filifera fruits	6
Solanum luteum fruits	2
Lonicera japponica fruits	1
grass leaf	1
springtail (*Collembola*)	1
cockroach (*Blattodea*)	1
Curculionid beetles	2
Straphylinid beetles	1
other beetles (*Coleoptera*)	13
Lepidoptera larva	1
ants (Hymenoptera)	9
large *Diptera*	5
Arachnida	1
Isopoda	2
unidentified arthropod remains (incl. some centipedes & spiders?)	11
Frog (probably a small *Discoglossus pictus*)	1
snails (*Mollusca*)	6
slugs (*Mollusca*)	3

Table 3. Items identified in the droppings of a male Black Redstart (total: 21 droppings).

Martin A. Thake – 169, Fleur-de-Lys Road, B'Kara BKR 02, Malta.

A note on aging and sexing Common Chiffchaffs *Phylloscopus collybita* using wing morphometrics

Charles Galea Bonavia & Charles Gauci

Abstract
We use multivariate and univariate techniques to investigate sexing and aging of Common Chiffchaffs using wing morphometrics. We show that the wing length is an adequate metric to sex but not to age Common Chiffchaffs *Phylloscopus collybita*.

Introduction

The Common Chiffchaff *Phylloscopus collybita* cannot be assigned in the field to a particular age/sex class on plumage characters (Svennson 1992) but as it is sexually partly dimorphic in wing-length (see Snow and Perrins 1998,Ticehurst 1938, Williamson 1976) and juveniles have shorter wings than adults (see e.g. Norman 1997, Tiainen and Hanski 1985), we investigated whether wing morphometrics can be used in sexing and aging birds. In this paper we show that wing length, an easily taken and commonly used size index, is adequate for the first but not for the second purpose, at least for the Common Chiffchaffs that occur as autumn /spring passage migrants and as winter visitors in the Maltese Islands (for more details on status see Sultana and Gauci 1982).

Materials and Methods

A sample of 138 Common Chiffchaffs caught during ringing sessions at Buskett, Ghadira, and Wied il-Marg, was measured for wing length to the nearest 0.5 mm, for lengths of primaries 2-9 (abbreviated as p1-p8) to the nearest 0.5 mm and wingspan to the nearest mm. Not all measurements were taken for each bird. Further details of the sampling protocol can be found in Galea Bonavia and Gauci (Galea Bonavia and Gauci this volume pp 16-19).

We analysed only birds referable to *P. c. collybita* but we included also five birds assigned to a subpopulation with highly rounded wings (see Galea Bonavia and Gauci this volume). Birds were assigned to two age classes: age class 2, unaged birds and age class 4, adults, according to the criteria adopted by Galea Bonavia and Gauci (Galea Bonavia and Gauci this volume). One bird, ring number 3H091, was measured both as unaged (age class 2) and two years later as an adult (age class 4). Both sets of measurements have been included in our analysis.

An index of the linear dimensions (medial-distal) of the proximal skeletal elements (radius/ulna x2, humerus x2) of the wings was calculated by subtracting the wing length multiplied by two from the wingspan (this would also include sternal width).

Statistical Procedures

P.C.A. was used to analyse primary lengths while the distributions of wing length and wingspan and their relationship were determined graphically. Wingspan and wing length were tested for normality and where appropriate parametric/non-parametric tests were used in correlations and comparisons. Variates were log transformed where necessary using natural logarithms. We used PAST statistical package (Hammer *et al.* 2001) and Microsoft Excel (Microsoft 2000).

Results

The frequency distributions of wingspan and wing length do not differ (Kolomogorov Smirnoff test, D=1, p (same) = 1), both having a bi-modal distribution though wing length is more clearly so (fig 1a and fig 1b). This is to be expected as wingspan and wing length are extremely highly correlated (Spearman's Rho 0.85272, p=0).

A scatter graph of these two variates, with wing length plotted on the x-axis and wingspan on the y-axis, shows two well defined clusters, better separated along the x-axis i.e. wing length, than along the y-axis i. e. wingspan, with only a single uncertain data point.

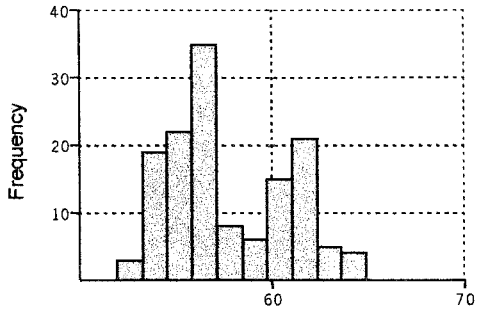


Fig. 1a. Frequency distribution of wing length.

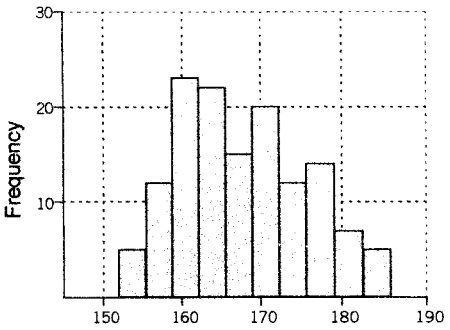


Fig. 1b. Frequency distribution of wing-span.

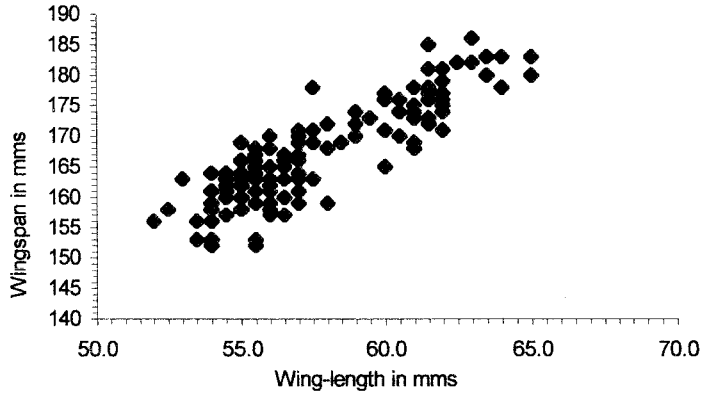


Fig. 2. Scattergraph of wingspan against wing length.

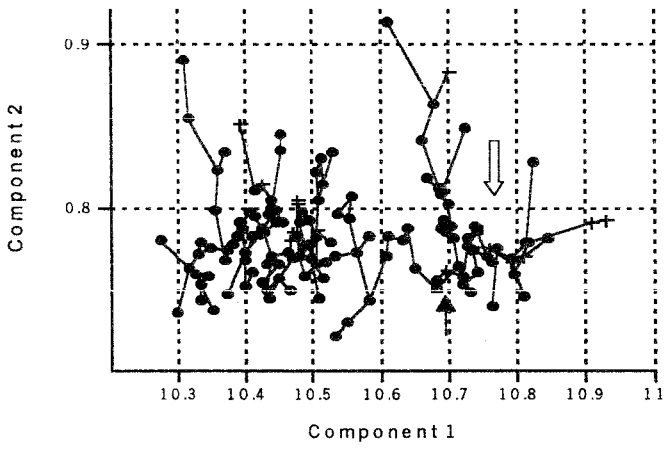


Fig. 3. PCA biplot: square = 3H091, crosses = adults (age class 4), black dots = unaged (age class 2).

A plot of P.C.2 against P.C.1 (see table 1) of the log-transformed primary lengths (Fig. 3), also clearly shows a two-cluster pattern, with the points separated along the first component axis, which summarises size but not along the second component, which summarises shape (but see Lockwood *et al.* 1998). In other words the ordination has separated the sample on size but not on shape. The net difference between these two clusters is further emphasised by the minimum spanning tree, which joins points within clusters but not across clusters. Significantly, the adult sample is split between the two clusters while interestingly both sets of measurements of 3H091 plot within the same cluster. Of course it is entirely possible that 3H091 was first measured when already an adult but the shorter wingspan and wing-length of the first set compared to the second set indicate that it was a juvenile rather than an adult when first measured.

The first, larger cluster identified by the P.C.A. is composed of individuals having wing lengths of 52-59 mm, with only two exceptions at 60mm and 61 mm. The second, smaller cluster is composed of birds having wing lengths between 59.5 mm and 64 mm, also with two exceptions, at 57.5 and 59 mm. Such a close correspondence between the results of the scatter graph and of the P.C.A. is only partly to be expected because though the wingspan and wing length obviously are not independent of primary length, the wingspan at least contains additionally skeletal elements, which only weakly though significantly correlate with primary lengths (Spearman's Rho = 0.21772-0.27623, p=0.010892-0.0011332). Thus the scatter graph provides further support for the evidence offered by the P.C.A. ordination. However it should be noted that in the scattergraph there is no evidence for any sub-clustering in contrast to the PC.A. which in the first, larger cluster shows slight evidence of two sub-clusters.

Discussion

Separation into the four possible age/sex classes-juvenile i.e. juvenile males, juvenile females, adult males, adult females, would require four clusters rather than the two, possibly 3, identified by the scattergraph, the histograms and the

	P.C.1	P.C 2
variance explained	93.72	2.8535
Factor loadings		
primary 1	0.3453	-0.864
primary 2	0.3547	- 0.2022
primary 3	0.3617	0.0544
primary 4	0.3903	0.1451
primary 5	0.3654	0.2391
primary 6	0.3464	0.218
primary 7	0.3221	0.2291
primary 8	0.3152	0.1774

Table 1. P.C.A. of the primary lengths.

P.C.A. biplot. This raises the question of which category the analysis has identified-sex or age?

We hypothesise that it is the sex-class rather than the age-class that has been identified. This is demonstrated in the P.C.A. biplot by the splitting of the adult sub-sample between the two clusters and the plotting of both sets of measurements of 3H091 within the same cluster (but see above). If it were the age-class that had been identified it would be expected that the adults would plot in the same cluster while one set of measurements of 3H091 would plot in one cluster, the second set in the other cluster.

The indication of the sub-division of the first cluster into two sub-clusters points towards a further separation of this cluster into the two age-classes but a larger sample is required to show and identify any age-specific differences clearly.

Thus both the P.C.A. and the scattergraph clusters are composed of the same wing lengths with just four exceptions; there is a highly significant difference (*t*-test, $t = -19.221$, $p < 0.05$) between the wing lengths identified by the two clusters. Our result is in agreement with that obtained by Tiainen and Hanski (1985). Thus wing length is a reliable metric to use to sex but not age an individual bird. More generally we infer that the wing shape of males and females does not differ and that the difference in wing length and wing-span between juveniles and adults is swamped by a greater sex-specific difference. It is interesting to note that the only trace of separation according to age occurs in the females, contrary to Hanski and Tiainen (1985) who found a greater difference in wing length between adult and juvenile males than between adult and juvenile females though presumably their study refers to *P. c. abietinus.*

In conclusion we suggest that birds with wing length values of up to 58mm can be safely sexed as females, from 59.5mm to 65mm as males. We also suggest that values of 58.5mm and of 59 mm cannot be used for sexing. It should be noted that these values apply solely to *P. c. collybita* and possibly to the birds that occur in the Islands but considering that recoveries of Common Chiffchaffs, both of birds ringed locally and recovered abroad and ringed abroad and recovered locally, have come from a wide area in Europe (see e. g. Sultana and Gauci 1989, 1990-1991), our results may apply on a wider scale. We need hardly add that of course care has to be taken that the primaries composing the wing tip are not abraded.

Acknowledgements
We would like to thank Sandro Lanfranco for advice about the statistical analysis and Joe Sultana for supplying some of the literature. We would also like to thank Mark Gauci, Joseph Mangion and Manuel Mallia for their co-operation and help in the acquisition of the data.

References

Galea Bonavia, C. and Gauci, C. 2002. Populations of the Common Chiffchaff *Phylloscopus collybita* occurring in the Maltese Islands. *Il-Merill*: this volume: 16-19.

Hammer, O., Harper, D.T., and Ryan, P. D. 2001. Past: Palaeontological Statistics-Software Package for Education and Data Analysis. *Palaeontologia Electronica,* Vol. 4, Issue 1,art. 4: 9 pp., 178 KB at http://palaeo-electronica. org/2001_1/past/Issue1_01.htm

Lockwood, R., Swaddle, J. P. and Rayner, J. M. V. (1998). Avian wingtip shape reconsidered: wingtip shape indices and morphological adaptations to migration. *Journal of Avian Biology* 29: 273-292.

Microsoft Excel. 2000. Microsoft Corporation. Redmond.

Norman, S. C. 1997. Juvenile wing shape, wing moult and weight in the family *Sylvidae. Ibis* 139: 617-630.

Snow, D. W., and Perrins, C. M. eds. *The Birds of the Western Palearctic* – Concise Edition, Vol. 2. Oxford University Press, Oxford and New York.

Svensson. L. 1992. *Identification for Ringers*. British Trust for Ornithology, Tring.

Sultana, J. and Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Valletta, Malta.

Sultana, J. and Gauci, C. 1979. Report on Bird-Ringing for 1977 and 1978. *Il-Merill* 20: 29-44.

Sultana, J. and Gauci, C. 1990-1991. Ringing Report for 1989. *Il-Merill* 27: 47-56.

Tiainen, J. and Hanski, I. K. 1985. Wing-shape variation of Finnish and Central European Willow Warblers *Phylloscopus trochilus* and Chiffchaffs *P. collybita. Ibis* 127: 365-371.

Ticehurst, C. B. 1938. *A systematic review of the genus* Phylloscopus. British Museum, London.

Williamson, K. 1976. *Identification for Ringers* 1-3 (revised edition). British Trust for Ornithology,Tring.

Charles Galea Bonavia – "Russett", Zebbug Road, Attard BZN 03, Malta. cgb@maltanet.net
Charles Gauci – "Skylark", Triq il-Kissier, Mosta MST 03, Malta. cgauci@waldonet.net.mt

Prey of a Peregrine *Falco Peregrinus* Pair off Crete

Harald Pieper & Dietrich Ristow

The diet of the Peregrine *Falco peregrinus* has been well studied in various parts of Europe (e.g. Becker 1998, Glutz *et al.* 1971, Langgemach *et al.* 1997, Oro & Tella 1995, Ratcliffe 1993, Rockenbauch 2000), but there are no previously published data from Greece. Peregrines in Greece live to a large extent on small islands of the Aegean (Handrinos & Akriotis 1997) where local bird populations are too low in numbers to provide the food base for this falcon.

What do Peregrines prey upon at such isolated sites? In the context of other studies, we had the opportunity to obtain some data on this question. The material presented here was collected on a 30 ha. island situated more than 20 km off Crete and with limestone cliffs reaching 120 m height. The abundance of breeding birds is given in Table 1. Although on this islet there is a substantial bird population, the three species present in appreciable numbers are atypical prey species because of their size. So the question remains valid for the study island.

Breeding species	Number of pairs
Puffinus yelkouan	3
Calonectris d. diomedea	700
Phalacrocorax aristotelis desmarestii	1
Falco peregrinus	1
Falco eleonorae	300
Larus cachinnans	100
Columba livia	10
Monticola solitarius	1

Table 1. Abundance of breeding birds on the study islet off Crete. (In addition to breeding birds, there may be visiting up to half a dozen Audouin's Gulls *Larus audouinii*, one or two Kestrels *Falco tinnunculus* from a neighbouring islet and a straggling Grey Heron *Ardea cinerea*, the latter two species feeding upon lizards *Podarcis erhardii*. All other birds seen were resting or passing migrants in spring and autumn).

Year	No. of fledglings
1989	1
1990	1
1991	1
1992	1
1993	-
1994	-
1995	3
1996	2
1997	2
1998	<1
1999	2
2000	-

Table 2. Peregrine success on the islet off Crete.

After the breeding season of the Peregrine, this islet was visited for 2-7 weeks in June-October each year to study Cory's Shearwater *Calonectris diomedea* and Eleonora's Falcon Falco *eleonorae*. During the course of this work, the Peregrine pair or their fledglings were seen on several days each time, although less than a fifth as often as in July-October. Direct pursuit of prey was never observed. Four alternative sites for the eyrie were located. Whilst the nests of Eleonora's Falcon typically lie on slopes in small corners with partial shade (Wink *et al.* 1982), the four Peregrine nests were in large and more than 1.5 m-deep caves in the vertical cliffs with complete shade all day. Each nest was used for several consecutive years.

When checked, the young had already fledged (Table 2) and the wind had blown the prey feathers away so that only bones were collected for analysis (Table 3 column A). As the gulls fledge in June, the Levantine Shearwaters in July/August, and the Eleonora's Falcons as well as Cory's Shearwaters in October, respectively, such bones must be from adults. Pluckings were collected from perches which were identified by means of Peregrine moult feathers so that confusion with prey of Eleonora's Falcon was avoided (Table 3 column B).

Due to the collection procedure, pluckings refer to the time after fledging. Prey items listed are values for each species. There is a preferential bias for finding and collecting large prey items (see also Langgemach *et al.* 1997). This way, especially in column A, the data is distorted in favour of the breeding species of the island. This is obvious when estimating the biomass. Depending on the values assumed, there is total of about 50 kg in

Prey Species	Number of prey items			Prey Species	Number of prey items			Prey Species	Number of prey items		
	A	B	C		A	B	C		A	B	C
Puffinus yelkouan (ad.)	19	1		*Larus ridibundus*		1		*Lanius minor*		3	
Calonectris diomedea (ad.)	19		7	*Larus minutus*		2		*Lanius senator*		4	
Phalacrocorax aristotelis (juv.)		1		*Sterna hirundo*	1	1		*Lanius collurio*		2	
Ixobrychus minutus	1	7		*Chlydonias leucopterus*	1	1		*Hippolais icterina*		2	
Botaurus stellaris	1			*Chlydonias hybridus*		2		*Phylloscopus trochilus*		6	
Anas querquedula	1			*Columba livia*	17	2		*Phyloscopus sibilatrix*		2	
Falco eleonorae (ad)	5		5	*Streptopelia decaocto*		1		*Muscicapa striata*		9	
Falco naumanni	1			*Streptopelia turtur*	12	19		*Ficedula hypoleuca*		2	
Coturnix coturnix	1	3		*Clamator glandarius*		1		*Ficedula albicollis*		1	
Porzana parva	2	1		*Cuculus canorus*		10		*Saxicola torquata*		1	
Gallinula chloropus	2			*Otus scops*		1		*Oenanthe oenanthe*		3	
Charadrius dubius		1		*Caprimulgus europaeus*	1	2		*Phoenicurus phoenicurus*		3	
Calidris minuta	1			*Apus apus*		2		*Turdus merula*		1	
Calidris ferruginea	2	1		*Merops apiaster*	1	2		*Turdus pilaris*		1	
Calidris alpina		1		*Coracias garrulus*		3		*Turdus philomelos*		3	
Philomachus pugnax	2	5		*Upupa epops*		23		*Fringilla coelebs*		4	
Gallinago media		1		*Calandrella brachydactyla*		2		*Emberiza melanocephala*		1	
Gallinago gallinago	1	1		*Galerida cristata*		1		*Passer domesticus/ hispaniolensis*		2	
Tringa stagnatilis	1	1		*Hirundo rustica*		4		*Sturnus roseus/vulgaris*		1	
Tringa nebularia	2			*Delichon urbica*		4		*Oriolus oriolus*		12	
Tringa ochropus	1	2		*Riparia riparia*		4		*Corvus monedula*	1		
Tringa glareola		1		*Anthus trivialis/cervinus*		7		*Passeriformes spp.*	ca. 40		
Larus cachinnans (ad.)	26			*Anthus campestris*		3					
Larus cachinnans (fledgling)			5	*Motacilla flava*		1					

Prey Species	Number of prey items		
	A	B	C
Total	ca. 168	180	17

Table 3. Peregrine prey from the study islet off Crete, collected June-September. A: Prey determined from old bones which were obtained at four eyries. B: relatively fresh pluckings collected at perch sites. C: Typical number of carcass specimen per year found in the rest of the whole island.

column A, i.e. about five times as much as in column B. If we take 100 g of biomass as daily food for a Peregrine, there would be 35 kg of biomass for a year; so the total of column A would be above and that of column B below this value. This distortion of data towards large prey would even be greater if corpses of prey from the local colonies which were found away from the favourite perches, were simply included in Column B. As the total in column A or B resembles roughly a year's diet for a Peregrine, the number of prey corpses from the local colonies is given as a typical value per year (Table 3 Column C), so that at least a coarse comparison between columns A, B, and C is allowed. Care was taken for specimen of Column C to avoid confusion with other causes of death and possible later decomposition by rats *Rattus r. alexandrinus*. It is worthwhile to draw attention to some specific points in Table 3.

(a) The extent of exploitation of the three colonial breeding species of the islet is quite low in comparison to the large number available so near the eyrie. This low percentage in case of Eleonora's Falcon and Yellow-legged Gull might be explained by a communal defense reaction of these species, but such an explanation cannot be put forward for Cory's Shearwater. After the Peregine young have left the eyrie, there is a tendency to prefer gull fledglings which become available in June. Fledglings of the other two species would become available in October,

and we do not have evidence to which extent they might be exploited. Amongst the Cory's Shearwaters there were one at least 9 year, and two at least 11 year old birds; and amongst the Eleonora's Falcons there were one fledgling, one 3 year, one 10 year and one 11 year old bird (as determined from the rings they wore).

(b) Although the Levantine Shearwater is the more nocturnal of the two shearwater species on the islet, it bears higher predatory by Peregrines. It is the smaller species. Neither come close to shore in the daytime. At sunset on windless days, Cory's Shearwaters regularly form a raft of 50 to 1200 birds about 1-2 km from the islet, but no attack on these flying or swimming birds was observed. In daylight, the Levantine Shearwaters are only seen as single birds, foraging more than 1 km from the islet, rarely in groups of 3-10 birds passing straight fast to the feeding grounds, or as 2-4 individuals rafting with the Cory's Shearwaters. The prey numbers found exceed numbers of local breeders plus prospectors and thus suggest that Levantine Shearwaters are chased at sea and not close to the cliffs.

(c) The variety of the prey species suggest that Peregrines prefer to prey upon solitary flying, migrating birds above the sea rather than attacking birds close to the cliffs or on the islet. Due to the season of sampling, there are more such migrants in column B than in A (compare for example *Ixobrychos minutus*, *Cuculus canorus*, *Upupa epops* or the ratio of *Streptopelia turtur* as compared to *Columba livia*).

(d) Of course, the average prey size is larger than that of the Eleonora's Falcon. For this medium-sized falcon more than 100 prey species have been identified from the same site (Ristow *et al.* 1986); prey size above 70 g such as a Hoopoe *Upupa epops* are exceptional and waders make up only 0.034 % of prey. For the Peregrine, the percentage of this group is 6.0 % (column A) or 7.3 % (column B).

(e) The Collared Dove's *Streptopelia decaocto* nearest breeding sites are 25 and 55 km away, those of the Jackdaw *Corvus monedula* 45 and 50 km (Scharlau 1999). It is virtually impossible that such prey was carried over such a distance. Are then, amongst the other prey, many more individuals dispersing as non-breeders to the islet?

(f) A total of 157 bird species are known for the archipelago (Ristow & Wink 1995). Six new species were recorded in this study (*Botaurus stellaris, Anas querquedula, Tringa nebularia, Streptopelia decaocto, Turdus pilaris, Corvus mondeula*).

(g) The total of 67 prey species in this study closely matches a report of 70 prey species with 341 items for three islands south of Marseille /France (Kayser & Bayle pers. comm.). The ratio of Non-Passeriform prey items is 76 % (column A) and 51 % (Column B) off Crete and only 31 % off Marseille, but the bias towards large prey in the Cretan data impairs the assertion. In any case no shearwaters, Yellow-legged Gulls, or raptors were found in that study, although they are present there, and both shearwater species and Yellow-legged Gulls were identified in the diet of the Eagle Owl *Bubo bubo* on these small islands (Vidal & Bayle 1997).

We conclude that for an isolated island Peregrine pair, they prey upon spring migrants in the first place and can supplement their diet by atypical large prey if it is available near the eyrie. The importance of dispersing birds as prey needs clarification. After disbanding of the family, a sole individual may remain who feeds on autumn migrants. The distance from which prey is carried to the eyrie needs further investigation, especially over which distance shearwaters are carried.

Acknowledgement

We are indebted to the Greek Ministry of Agriculture for permission to conduct field work in Crete.

References

Becker, M. 1998. Zur Nahrungswahl des Wanderfalken *Falco peregrinus* im Regierungsbezirk Trier. *Dendrocopos* 25:16-18.

Glutz von Blotzheim, U., Bauer, K. M. & Bezzel, E. 1971. *Handbuch der Vögel Mitteleuropas*, Bd. 4: 916-920.

Handrinos, G. & Akriotis, T. 1997. *The Birds of Greece*. A. & C. Black, London, U. K.

Langgemach, T., Sömmer, P., Kirmse, W., Saar, C. & Kleinstäuber, G. (1997). Erste Baumbrut des Wanderfalken *Falco p. peregrinus* in Brandenburg zwanzig Jahre nach dem Aussterben der Baumbrüterpopulation. *Vogelwelt* 118: 79-94.

Oro, D. & Tella, J. L. 1995. A comparison of two methods for studying the diet of the Peregrine Falcon. *J. Raptor Res.* 29(3): 207-210.

Ratcliffe, D. A. 1993: *The Peregrine Falcon*. T. & A. D. Poyser, London.

Ristow, D., Wink, C. & Wink, M. 1986. Assessment of Mediterranean autumn migration by prey analysis of Eleonora's Falcon. *Suppl. Ric. Biol. Selvaggina* 10: 285-295.

Ristow, D. & Wink, M. 1995. ENVIREC Report, Athens: 1-20.

Rockenbauch, D. 2000, *Der Wanderfalke in Deutschland*. Bd. 2. Koch, Reutlingen, Germany

Scharlau, W. 1999. Die Brutvögel Kretas. Berichte aus dem Arbeitsgebiet, *Entwicklungsforschung am Institut für Geographie Münster*, 31: 16-55.

Vidal, P. & Bayle, P. 1997. Le grand-duc d'Europe Bubo bubo : Une nouvelle espece d'oiseau nicheuse sur les iles de Marseille (Bouches-du-Rhone). *Faune de Provence (C. E. E. P.)* 18 : 55-57.

Wink, M., Wink., C. & Ristow, D. 1982. Biologie des Eleonorenfalken (Falco eleonorae): 10. Der Einfluß der Horstlage auf den Bruterfolg. *J. Orn.* 123: 401-408.

Dietrich Ristow – Pappelstr. 35, D-85579 Neubiberg, Germany. dietrich.ristow@t-online.de

The Eurasian Black Vulture *Aegypius Monachus* in Crete

C. Hinkelmann & D. Ristow

Abstract

A list of observations of the Eurasian Black Vulture Aegypius monachus *and a photograph of the species at carrion in Crete 1942 are presented, the latter being a rare and probably unique record. This vulture must have been a breeding bird in Crete and seems to be extinct since about 1980.*

In Europe the Eurasian Black Vulture *Aegypius monachus* is listed as extinct for about ten countries. Its present population is estimated to be 1500 pairs, of which 20 pairs live in northern Greece close to the border with Turkey. Worldwide, the only island population is known from Mallorca. The island of Crete has not been mentioned in this context in the up-to-date literature (Heredia 1996). The recent discovery of a photograph taken in Crete during World War II showing this species is reason to reconsider its historic distribution. It is worth following the traces which led to the discovery of this photo (Fig. 1.) and recall the observations of others on this species in Crete, irrespectively if these former sightings meet today's standards.

Fig.1. Five Griffon Vultures and one Black Vulture at carrion in the mountains above Samaria, Crete in November 1942.
(Photo: H. Siewert)

The earliest record from Crete of a Black vulture is from Frivaldszky (1902) whose collectors saw the species near the snow-covered mountains in 1843-45. Schiebel (1926) saw 35 Griffon Vultures *Gyps fulvus* at a donkey carcass on 30 May 1925, just east of Iraklion, and among them one large individual which looked different – presumably this was a Black Vulture.

During World War II Erwin Stresemann, the well-known curator of the Ornithological Department in the Museum of Natural History, Berlin, was in Crete on military duties when the island was occupied by the German Air Force. He successfully lobbied for a project to produce a film on the natural heritage of Crete with Dr. Horst Siewert as the project leader. Siewert was well known not only for his outstanding wildlife photographs and films and for his scientific publications on several raptor species, Great Bustard *Otis tarda* and Black Stork *Ciconia nigra*, but also as the founder and manager of a game park close to Joachimsthal in the Schorfheide game reserve near Berlin. Siewert was in Crete for three weeks in August-September 1942 and another twelve weeks in October-December 1942 when he began filming the wild Bezoar Goats *Capra aegagrus* in the Lefka Ori mountains. He continued his work in 1943 when he met his sudden death (Hinkelmann 1999a, 1999b). Stresemann received the collected specimens for the Natural History Museum Berlin and published the notes from Siewert's diaries (Stresemann 1943). Siewert in retrospect was credited with the first records of, for instance, the Long-eared owl *Asio otus* (2 November 1942, specimen no. 43.128) and the Fat Dormouse *Glis glis* (12 specimens, e.g. no. 92722 and 92725; Siewert 1953) as well as the second record of the Wild cat *Felis silvestris* (fur in the Natural History Museum Vienna; Zimmermann *et al.* 1953) in Crete.

Stresemann (1943) also wrote that Siewert filmed 6 Griffon Vultures and 2 Black Vultures at carrion on 11 November 1942. For Stresemann, the occurrence of the Black Vulture seemed to be so self-understood that he published another observation of 2 individuals together with several Griffon Vultures near Panagia on 4 April 1944 without any further comment (Keil in Stresemann 1956). After Siewert's death, Stresemann arranged for Heinz Sielmann to resume Siewert's work in Crete. In preparation for his mission, Sielmann was at Joachimsthal, where Siewert's material from Crete was housed at his parents'. Sielman (pers. comm.) saw Siewert's photographs from Crete, but not the films. He could not remember having seen any photos of the Black Vulture. Siewart's parents fled the approaching Soviet army at the end of the war and almost all of the invaluable material of photographs, films, and diaries from Crete got lost (Hinkelmann 1999a, 1999b). Due to the unusual circumstances of the times and lack of hard proof, there remained a slight uncertainty whether there was a communication error between Siewert and Stresemann.

There are no straightforward confirmed records for the post-war period. A single individual (?) was noted near Mount Ida (R. Koch, incompletely quoted by Bauer et al. (1969); no details found in Bauer's assets (H. Heckenroth pers. comm.)), and again in the Lassithi mountains on 30 April 1973 (R. Koch in litt. to Bauer). C. Vaglianos (pers. comm.) who lives in Crete, and who befriended the vulture enthusiasts J. F. & M. Terrasse in his student days in France, was familiar with the roosting and breeding sites of Griffon Vultures and Bearded Vultures *Gypaetus barbatus* in the '70s and '80s, but he never saw a Black Vulture. With the increasing activities of foreign bird watchers, J. Parrot reports three observations – one at Varchasi Gorge mid-may 1974 (K. Mikkola); a probable at Neapolis 23 August 1974 (Clarke); a probable near Potami 7 April 1976 (J. Parrot) - all of which are listed in Handrinos & Akriotis (1997) as not fully confirmed. Additionally, M. Wink saw one in flight near Piskokefalon on 5 October 1977 and another one near Mariona on 1 September 1979. He knew then that he had seen something special, but was not aware of the exceptional importance. That is why his colleagues remained sceptic about the proper identification. Accordingly, the species was not mentioned for Crete in the recent publications on the species' historical account by Heredia (1996) and amongst the breeding birds by Scharlau (1999).

In 1999, a small exhibition dedicated to the person and work of Horst Siewert with pre-war wildlife photos, drawings, publications, personal documents, and letters was presented at the Ostpreußisches Landesmuseum in Lüeburg. The material had been obtained from Ottomanowsky at Joachimsthal, who had salvaged part of Siewert's property after his parents fled in 1945, and from Gerlinde Siewert, his niece. She lives in Kassel and acts as trustee to her uncle's estate. Among photographs secured by her grandparents, a slightly out of focus picture with 5 Griffon Vultures and 1 Black Vulture (Fig.1) was discovered, this being the only unquestionable record of this species in Crete.

When counting the sightings of the Bearded Vulture in relation to those of the Black Vulture during 1895-1960 (Meinertzhagen 1921, Kelham 1922, Schiebel 1926, White 1939, Niethammer 1943, Wettstein 1943, Stresmann 1943 and 1956, Altner & Reger 1959), the former seems to have been about ten times commoner. Considering the short stay of Siewert in Crete, we conclude that Stresemann was right to include the Black Vulture in the list of breeding birds for Crete – although a nest was never found.

References

Altner, H. & Reger, K. 1959 Ornithologische Frühjahrsbeobachtungen auf Kreta. *Anz. Ornithol. Ges. Bayern* 5: 224-234.

Bauer,W., Helversen, v.O., Hodge, m. & Martens, J. 1969. Catalogus Faunae Graeciae. *Thessaloniki*, p. 49.

Frivaldsky, E. 1902 Excerpt from a report. *Aquila* 9: 206-208.

Handrinos, G & Akriotis, T. 1997. *The Birds of Greece*. A &C. Black, London.

Heredia, B. 1996. Action plan for the Cinereous Vulture (*Aegypius monachus*). In Heredia, B., Rose, L. and Painter, M., (eds.) *Globally threatened birds in Europe*. Council of Europe – BirdLife International.

Hinkelmann, C. 1999a. Horst Siewert. Meisterfotograf, Tierfilmer und Wildbiologe. *Märkischer Kunst– und Heimatverlag, Bismark.*

Hinkelmann, C. 1999b. Horst Siewert (1902-1943). Bl. *Naumann-Mus.* 18: 25-53.

Kelham, H. R. 1922. Some Cretan birds. *Ibis* 4: 675-687.

Meinertzhagen, R. 1921. A note on the breeding birds of Crete. *Ibis* 2-3: 126-139.

Niethammer, G. 1943. Über die Vogelwelt Kretas. *Ann. Nat. Hist. Mus. Wien* 53: 5-50.

Profft, J. 1950. Vogelkundliche Frühjahrsbeobachtungen auf Kreta. *Ann. Nat. Hist. Mus. Wien* 57: 296-304.

Scharlau, W. 1999. Die Brutvögel Kretas. *Berichte aus dem Arbeitsgebiet, Entwicklungsforschung am Institut für Geographie Münster* 31: 16-55.

Schiebel, G. 1926. Ornitologische Briefe aus Kreta V. *Ornithol. Monatsber.* 34: 142-144.

Siewert, H. 1953. Der Siebenschläfer Kretas. *Z. Säugetierkunde* 17: 52-57.

Stresemann, E. 1943 Überlick über die Vögel Kretas und den Vogelzug in der Ägäis. Unter Zugrundelegung der Tage bücher und Sammlungen Dr. Horst Siewerts. *J. Ornithol.* 91: 448-514.

Stresemann, E. 1956. Bausteine zu einer Ornithologie von Kreta. Den Tagebüchern von Heinz Sielmann (1944/45) und andaren Stellen entnommen. *J. Ornithol.* 97: 44-72.

Wettstein, O.v. 1943. Bietrag zur Ökologie der Vögel Kretas. *Ann. Nat. Hist. Mus. Wien* 53: 51-59.

White, C. M. N. 1939. A contribution to the ornithology of Crete. *Ibis* 14: 106-136.

Zimmermann, K., Wettstein, O. v., Siewert, H. & Pohle, H. 1953. Die Wildsäuger von Kreta. *Z. Säugetierkunde* 17: 1-72.

C. Hinkelmann – Ostpreußisches Landesmuseum, Ritterstr. 10, D-21355 Lüneburg, Germany.

D. Ristow – Pappelstr. 35, D-85579 Neubiberg, Germany. dietrich.ristow@t-online.de

SHORT NOTES

Irruption of Common Crossbill *Loxia curvirostra* during 1990

The Common Crossbill is a very rare visitor to the Maltese Islands but in some years irruptions and small influxes occur; on such occasions it is frequent, and its metallic call often heard. Unfortunately when such irruptions occur most of the birds are trapped or shot and it is difficult to make proper counts and observations of such birds. The last known irruption took place during summer of 1990 (Coleiro & Attard Montalto 1992-1994) and the following is a summary of sightings, mainly as observed by local birdwatchers.

Age and Sex of birds trapped for Ringing	Numbers
Adult Males	8
First Year Males	3
Second Year Males	1
Males (Not aged)	2
Adult Females	8
First year birds (Not sexed)	3
TOTAL	25

Table 1. From 1 to 8 July 1990 a total of 25 Crossbills where trapped and ringed at Wied il-Luq, Buskett, and their sex and age was recorded.

Date	Place	Nos.	Date	Place	Nos.
24/6	Buskett	11	3/8	Ghadira	1
30/6	Buskett	13	4/8	Buskett	1
1/7	Buskett	25	5/8	Bingemma	1
2/7	Ghadira	1	10/8	Valletta	2
2/7	Buskett	21+	15/8	Bingemma	7
3/7	Buskett	20+	18/8	Buskett	2+
4/7	Buskett	35+	19/8	Buskett	1
5/7	Buskett	52	25/8	Buskett	2+
6/7	Buskett	25	25/8	Chadwick Lakes	c6
7/7	Mtarfa	1	25/8	Bingemma	6
7/7	Buskett	40+	25/8	Dwejra, Malta	3
7/7	Bingemma	1	25/8	Ghadira	1
8/7	Buskett	30	26/8	Buskett	5+
8/7	Rabat	16	29/8	Sliema	1
9/7	Buskett	10+	30/8	Ghadira	1
9/7	Birzebbuga	1	31/8	Ghadira	6
11/7	Buskett	3	1/9	Buskett	1
14/7	Ghadira	1	1/9	Bingemma	1
14/7	Buskett	1	2/9	Buskett	1
19/7	Ghadira	2	2/9	Buskett	1
21/7	Buskett	2	2/9	Chadwick Lakes	1
22/7	Ghadira	1	4/9	Dwejra, Malta	2
22/7	Rabat	1	20/9	Mdina	1
24/7	Ghadira	1	17/10	Xemxija	1
26/7	Birzebbuga	2	18/10	Buskett	1
28/7	Sliema	1	18/10	Ghadira	1
1/8	Zejtun	1	26/10	Buskett	2
2/8	Ghadira	8	27/10	Buskett	2
2/8	Buskett	1	10/11	Buskett	2
2/8	Birkirkara	1	21/11	Buskett	1
2/8	Victoria	5+			

Table 2. Birds observed by birdwatchers in various areas of Malta and Gozo from 24 June to 21 November 1990. On some dates there were more than one record per place. In such cases only the highest count is recorded.

Crossbills feed on the seeds of Pine trees (*Pinus sp*) and they also need plenty of fresh water to drink, especially during the hot summer months. Buskett with its Aleppo Pine *Pinus halepensis* groves and the fresh water source at Wied il-Luq was the main area visited by this bird. Correspondingly most of the observations and counts took place there.

First recorded during 1990 were 11 birds at Buskett on 24 June. Peak dates were during the first week of July when the highest count of 52 was made on the 5th. For a complete list of sightings see Table 2. After the first week of July numbers started to decrease dramatically as most of the birds were either trapped or shot. In July over 100 birds were reported caught by bird trappers and shooters from the Buskett area alone. Other birds were reported taken from places like Mizieb, Addolorata Cemetery, Bahrija, Delimara and l-Ahrax. Records of up to 7 birds were logged on several dates with the last sighting of a single bird at Buskett on 21 November.

25 birds were trapped and ringed during five ringing sessions at Wied il-Luq, Buskett from 1 to 8 July. The highest catch was on the 7th when 15 birds were trapped from near the water source in just one hour. This was early in the morning when the birds came down to drink. Their weight varied from 38.0g to 48.5g with a mean of 42.25g. Sexing and aging was possible in most birds handled. 14 birds (56%) were males, 8 (32%) were females and 3 (12%) were unsexed first year birds (see Table 1).

There have been 6 other irruptions and/or small influxes of Common Crossbills recorded in Malta. The first occurred in July 1909 when over 200 birds were caught; and others seen in October (Caruana Gatto 1910). A small passage took place in the second week of July 1916 (Despott 1917). A rather heavy passage took place in mid-October 1929 (Despott 1930) and another large irruption was recorded from August to October 1930 when a total of 550 birds were caught in three localities

(Despott & Conti Meli 1931). Sporadic individuals were recorded until the next small irruption which occurred in September 1963, when over 50 birds were trapped near Rabat. A small influx took place from July to September 1972 when at least 14 birds were recorded (Sultana & Gauci 1982).

Acknowledgments
Thanks are due to all the birdwatchers and ringers who carried out the observations, and also to members of the research group of Birdlife Malta who made their notes available.

References
Caruana Gatto, A. 1910. Sulla straordinaria comparsa in Malta della "Loxia Curvirostra L." *Archivium Melitense* 1: 15-17.
Coleiro, C. & Attard Montalto, J. 1992-1994. Systematic List for 1990-1992. *Il-Merill* 28:38-64.
Despott, G. 1917. Notes on the Ornithology of Malta. *Ibis* (10) 5: 303.
Despott, G. 1929. Grande irruzione di Crocieri (*Loxia curvirostra curvirostra, Linn.*) a Malta durante la seconda meta' di Ottobre 1929. *Rivista di Scienze Naturali.* 20: 165-168
Despott, G. & Conti Meli, T. 1931. Continuazione dell' irruzione dei Crocieri (*Loxia curvirostra curvirostra Linn.*) a Malta, durante l'estate e l'autunno del 1930. *Rivista Italiana di Ornitologia* (2)1: 184-185.
Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society. Malta

Raymond Galea – 'Osprey' Ganu Street, Birkirkara BKR 06, Malta. raygalea@global.net.mt

---

A Linnet's *Carduelis cannabina* nest on Gozo

On 11 March 1990 at 1420 hrs while walking through an area of garigue largely dominated by Tree Spurge *Euphorbia dendroides* and Wolfbane *Periploca angustifolia* a female Linnet *Carduelis cannabina* was flushed ca. 4-5 meters away from me. This piece of garigue is very near a sea cliff in the NE part of the Island of Gozo. On a closer examination, a nest containing 5 eggs was found in a 75cm tall Tree Spurge. It was very well concealed by the leaves, 45cm above the ground. A bulky cup of dry grass, plant stems and small twigs, lined with hair, down and feathers. The eggs were bluish-white with some purplish spots and speckles, mostly at the wider end. On 17 March it still contained 5 eggs.

The site was last visited on 24 March at 1315 hrs, when five young of 6-7 days were present in the nest. Some grey down was still present, mainly on the head. Gape flanges were pale pink and the inside of mouth a pinkish-red. The pulli were ringed. On both three occasions the female came calling very near while I was examining the nest.

This is the first record of a Linnet breeding in a Tree Spurge. Nests are usually built in Carob *Ceratonia siliqua*, Olive *Olea europea*, Citrus *Citrus sp.* and Almond *Prunus dulcis* trees, but also in overhanging bushy plants on steep slopes or cliffs (Sultana & Gauci 1982). The Linnet is a very common autumn migrant in the Maltese Islands, repassing in smaller numbers in spring. It is common in winter. A few pairs try to breed occasionally, mostly in Gozo.

References
Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Malta.

Raymond Galea – 'Osprey' Ganu Street, Birkirkara BKR 06, Malta. raygalea@global.net.mt

---

Male Spectacled Warbler *Sylvia conspicillata* raising young by itself

During a survey of the population of Spectacled warbler *Sylvia conspicillata* in early June 1999, a nest containing four healthy young, nearly ready to fledge, was located in the morning of 5th June in a Golden Samphire *Inula crithmoides* plant at Il-Hotba tal-Qasam in the north-western part of Gozo. The nest was observed for more than an hour and only the male was seen, feeding the young frequently and regularly. The site was visited again in the afternoon to confirm that only one parent was feeding the young and again, for more than two hours, only the male could be seen. One assumes that a predator must have taken the female and the male was able to continue to raise the young by itself.

Joe Sultana – 3, Dar Gajdoru, Gajdoru Street, Xaghra, Gozo XRA 104, Malta. jsultana@global.net.mt

Breeding Records of Spotted Flycatcher *Muscicapa striata* for the period 1992 to 2001

Records of breeding Spotted Flycatcher *Muscicapa striata* from 1971 to 1991 have been documented (Sultana & Gauci 1973, 1975, 1976, 1979, 1982, & 1983, Galea 1987&1991). Cachia (1999) reported on the breeding of the Spotted Flycatcher at the Addolorata Cemetery, Paola in 1995 – the report included an editorial note about the San Anton records of 1996.

Following are some notes and breeding records for the ten year period 1992 - 2001, mainly from Buskett and Addolorata Cemetery, but also from San Anton Gardens in1996, Ta' Qali National Park in 1997 and 2001, and Howard Gardens, Rabat in 2001. Buskett was visited regularly on several dates during all 10 years under review from late May to early September, the breeding season for this species. Addolorata Cemetry was also visited regularly but less so from 1995. From 1992 to 1995 a lot of time was spent searching for nests, but from 1996 to 2001 observations were mainly based on the location of pairs and family parties after the young fledged from the nest.

Buskett

1992: 3 pairs located and 3 nests found. 2 of the nests were built in Cypress trees *Cupressus sempervirens* and one in an Aleppo Pine *Pinus halepensis.* All the nests were built on lateral branches, well away from the main trunk. Two of the pairs, both raised broods of three each one fledging in the third week of June and the other fledging on 1 July . The other nest had 4 eggs on 24 June, which did not hatch.

1993: 3 pairs present and 3 nests found. One of the nests was built on top of one of the previous year's (1992) nest, suggesting that this was the same pair. On 13 June a female was incubating 3 eggs which hatched on 24 June. On 9 July young fledged birds were calling in the vicinity of the nest indicating successful fledging. The second pair's nest was found on 13 June with four 7-day-old pulli. They fledged on 21 June. The third pair had three 10-day-old pulli on 21 June, which fledged a week later.

1994: Three pairs bred. One pair laid eggs twice but did not hatch, using two different nests. One of the nests was used the previous year (1993). The other two pairs nested successfully, both raising a brood of three each. On 17 June the first nest contained three 8-day-old pulli and 2 addled eggs. On 3 July a family party was present near the nest. The second nest contained three 3-day-old pulli on 5 July, which fledged successfully in the third week of July. Family party noted on 24 July.

1995: At least three pairs bred. On 15 July all had fledged young near their nesting areas. Two pairs raised broods of three young each, while the other pair had four fledged young.

1996: Three pairs located on 2 June. On 7 July three family parties were observed. Two pairs with 4 young each whilst the third pair had 5 young.

1997: A record year. At least 8 pairs bred. On 30 July not less than 8 different family parties noted, when at least 40 different birds (adults and fledged young) were observed. Some of the young were still being fed by their parents.

1998: Four pairs located. On 25 July 2 family parties noted 4 +4.

1999: Four pairs bred and raised young this year. On 27 June 3 pairs had fledged young.

2000: At least 5 pairs located in June and July. On 6 August 4 family parties were observed.

2001: At least 6 pairs with a couple of pairs raising two broods each. A nest with two eggs was found on 16 July. It was built on a lateral branch of a Pine tree ca 3.5 meters above the ground. These hatched on 26 July.

Addolorata Cemetery

1995: One pair with 3 fledged young in July .

1996: At least one pair. Family party of two adults and two juveniles on 5 July.

1997: Two pairs, one with 2-3 fledged young and one with at least one young on 20 June. In early June D. Cachia found a nest with one young (pers. comm.).

1998: Two pairs. On 17 June a pair had at least one fledged young, still with small tail. On 26 June at least 3 young birds were heard calling.

1999: Two pairs. On 11 June one pair had at least one fledged young and the other pair had at least 2 fledged young.

2000: At least two pairs. 2 family parties noted, on 30 June, each with at least 1 fledged young

2001: Two pairs present on 15 June. 3 fledged young being fed by adults on 6 July.

San Anton Gardens
1996: On 5 August two adult birds were observed feeding 3 fledged young. Young still had short tails. In 1995 this pair had 1 fledged young (Ed. Note (1999) *Il-Merill* 29 p.28).

Ta' Qali National Park
1997: On 14 August a family party consisting of two adults and 2-3 fledged young were observed near a few mature Aleppo Pines. The Spotted Flycatcher has never been reported breeding in this area.

2001: A pair bred. On 17 July two adults were noted feeding at least one fledged young.

Howard Gardens, Rabat
2001: Two pairs bred. A pair noted feeding two fledged young on 13 July, while another pair was feeding 2-3 fledged young on 25 July. This was the first breeding record for this area.

Acknowledgements
Thanks are due to Denis Cacha for some of the Addolorata Cemetry records, to Alex Casha who informed the author about the Ta' Qali 1997 breeding birds, and to Mark Gauci for the Ta' Qali and Howard Gardens records of 2001.

References
Cachia, D. 1999. New Breeding site for Spotted Flycatcher *Muscicapa striata*. *Il-Merill* 29: 28.
Galea, R. 1987. Some Notes on Spotted Flycatchers breeding at Buskett during 1983-1986. *Il-Merill* 27: 19.
Galea, R. 1991. Breeding of Spotted Flycatcher at Buskett in 1991. *Il-Merill* 27: 19.
Sultana, J. & Gauci, C. 1973. Another addition to the Breeding species of Malta. *Il-Merill* 10: 10.
Sultana, J. & Gauci, C. 1975. A Spotted Flycatcher's nest. *Il-Merill* 15: 4.
Sultana, J. & Gauci, C. 1976. Three interesting breeding species. *Il-Merill* 17: 29-30.
Sultana, J. & Gauci, C. 1979. Further breeding records of the Spotted Flycatcher. *Il-Merill* 20: 24.
Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Malta.
Sultana, J. & Gauci, C. 1983. Some notes on the breeding species for 1982. *Il-Merill* 22: 2.

Raymond Galea – 'Osprey' Ganu Street, Birkirkara BKR 06, Malta. raygalea@global.net.mt

---

Savi's Warbler *Locustella luscinioides* moulting while on migration

The Savi's Warbler *Locustella luscinioides* is a very scarce migrant to the Maltese Islands, appearing almost annually from late February to late April and from early August to late October (Sultana & Gauci 1982).

An early bird was trapped for ringing on 26 July 1997 at Is-Simar Nature Reserve. From its heavily abraded and bleached plumage (most especially the wings and tail feathers) it was aged as an adult bird. It was retrapped 44 days later, on 8 September, at the same place. On this occasion it was noted that it had an almost complete set of new fresh feathers, some of which still with a waxy sheath at the base. On 14 September, when it was trapped again, it had a complete fresh plumage, indicating a complete moult.

The moult of the Savi's Warbler is a complex one and not altogether clear. Individual variation appear to be extensive (Svensson 1992).

References
Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Malta.
Svensson, L. 1992. *Identification Guide to European Passerines*, 4th edn. Stockholm.

Raymond Galea – 'Osprey' Ganu Street, Birkirkara BKR 06, Malta. raygalea@global.net.mt

Note on the Moult of a Levantine Shearwater *Puffinus yelkouan* and a Cory's Shearwater *Calonectris diomedea.*

Whilst reference can be found in the literature to the sequence and timing of the moult of the Manx and Balearic Shearwaters *Puffinus puffinus* and *Pufinus mauretanicus*, those of the Levantine Shearwater *Puffinus yelkouan* do not seem to have been investigated (Cramp & Simmons 1977, Ginn & Melville 1983).

On 13 September 1994 a Levantine Shearwater was picked up at sea off Filfla by a fisherman and handed over to the present writers. It was found to be in active moult, the sequence of which was recorded before the bird was ringed and released the following day. The criteria as described by Snow (1967) were used. A score of 0 was given for an old feather, 1 for a missing feather or a feather totally in pin, and 2, 3 and 4 to feathers up to one-third, two thirds and nearly full-grown respectively. New fully-grown feathers were given a score of 5, but those still having a sheet of wax at the base were given a score of 4.

Both wings had the same moult score. The primaries were being moulted descendantly that is from the innermost primary (the first) outwards. The score of the primary moult was 31, with the inner five primaries (1^{st} to 5^{th}) all fully grown, the 6^{th} nearly fully grown, the 7^{th} one-third fully grown, and the remaining 4 outer primaries (8^{th} to 11^{th}) old and heavily bleached and abraded.

The secondaries (23 in all) were noted to be moulting ascendantly that is from the outermost secondary (the first) inwards, but it was doing it in groups. First secondary (the outermost) was two-thirds fully grown, with the next three secondaries (2^{nd} to 4^{th}) old. Then the 5^{th} was fully grown, the 6^{th} nearly full-grown and the next eight secondaries (7^{th} to 14^{th}) were old. Then all the rest (15^{th} to 23^{rd}) were fully grown.

The primary coverts were corresponding to the primaries, but the greater coverts were all new. So was the bastard wing. The median and lesser median coverts were a mixture of old and new feathers, with the median ones mainly old. The head and upper body had some new feathers while the underwing coverts were old except for the axillaries which were new. The tail was not moulting and all the rectrices were all old and abraded.

This sequence is similar to that of *P. mauretanicus* as described by Cramp & Simmons (1977).

The Cory's Shearwater *Calonectris diomedea* has a complete annual moult that overlaps with the breeding season (Mayaud 1949-50).

An adult female Cory's Shearwater *Calonectris diomedea* was found occupying a nesting hole during daytime on 23 September 2001 along with its almost full-grown chick. When examined it was found to be in moult. It was moulting the primaries descendantly and had a primary score of 21, with the inner three primaries (1^{st} to 3^{rd}) fully grown, the 4^{th} was two-thirds fully grown, the 5^{th} was one-third fully grown, the 6^{th} was in pin and the remaining 5 (7^{th} to 11^{th}) were old. The secondaries were mixed but mainly old. The greater coverts were almost all new, the median coverts were mostly old, while the lesser median were a mixture of old and new feathers. The back, rump and tail coverts were also in active moult with a mixture of old and new feathers. The tail was old except for one central rectrice, which were new.

References

Cramp, S. and Simmons, K. E. L. (eds.) 1977. *The Birds of the Western Palearctic*, Vol. 1. Oxford University Press, Oxford & New York.

Ginn, H. B. & Melville, D.S. 1983. *Moult in Birds*. BTO Guide 19. British Trust for Ornithology, Tring.

Mayaud, N. 1949-50. Nouvelles precisions sur le mue des procellariens. *Alauda* 17-18:144-155.

Snow, D. W. 1967. *A guide to moult in British birds*. B.T.O. Field Guide No. 11. British Trust for Ornithology, Tring.

Joe Sultana* & John J. Borg**

* 3, Dar Gajdoru, Gajdoru Street, Xaghra, Gozo XRA 104, Malta. jsultana@global.net.mt

** 13, The Catacombs, Rabat RBT 07, Malta. diomedea@onvol.net

Vertebrate inclusions in the diet of the Spanish Sparrow *Passer hispaniolensis*

The diet of the Spanish Sparrow *P. hispaniolensis* consists of plant material and invertebrates; that of the House Sparrow, which converges ecologically with the Spanish Sparrow in the Mediterranean region (the species is absent from the Maltese Islands though), is similar (Snow & Perrins 1998). In the Maltese Islands, Roberts (1954) reports that Spanish Sparrows regularly feed on crops and adds that insects are eaten during spring and summer. Sultana and Gauci (1982) also report the species feeding on crops.

At mid-day on 2 July 1999, in an urban area, a Spanish Sparrow was observed repeatedly attacking a Maltese Wall Lizard *Podarcis filfolensis.* For some reason the lizard did not attempt to escape. The bird was then disturbed and flew off. Upon close inspection the lizard, an adult female, was found to be in good condition if somewhat sluggish.

References

Roberts, E. L. 1954. *The Birds of Malta.* Progress Press, Malta.
Snow, D. W. & Perrins, C. M. 1998. *The Birds of the Western Palearctic* (Concise edition). Oxford University Press, Oxford and New York.
Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta.* The Ornithological Society, Malta.

Victor Falzon – "Cipress", A. Durer Str., Attard BZN 04, Malta. cyborg@waldonet.net.mt

Editorial Note: A Spanish Sparrow was reported eating a lizard on 14th May 1987 in the Funchal Botanic Gardens, Madeira (see Zonfrillo, B. 1992. Spanish Sparrow eating Lizard. *British Birds* 85: 499).

The Common Kestrel *Falco tinnunculus* nesting on Comino

The Common Kestrel *F. tinnunculus* is a common migrant in the Maltese Islands, both in spring and in autumn; a few birds overwinter in suitable localities. Occasional pairs breed and probably the species would be a regular breeding bird were it not for human persecution (Sultana & Gauci 1982). The species bred on Comino in 1994, when a pair with two fledged young was observed in the last week of June. The last nest on record was noted at Ta' Cenc cliffs in Gozo, on 2 June 1945; the nest contained young about a fortnight old (Gibb 1951).

On 8 April 1990 a pair of Common Kestrels were observed performing a flight display on the north-eastern side of the island of Comino. On April 14 they were observed copulating on a rubble wall (A. Casha, pers. comm.), suggesting breeding in the area. On April 27 a nest was located in a hole 3.6 metres below the edge of the nearby sea cliffs; although there was no sign of the adult birds, the nest site was characterised by droppings and dry grass. On April 27 and 31 the female was noted to be incubating. The site was last visited on June 7, when closer inspection with the help of a mirror lowered from the cliff edge revealed a nest with three eggs; the nesting hole was considerably deep but the nest itself was very close to the entrance. On this occasion there was no sign of the adults.

It should be noted that after April 14 only the female was observed - the male must have been shot soon after this date. The female must have deserted the nest after the eggs failed to hatch, possibly due to the female spending a lot of time away hunting. Village (1990) suggests that female Common Kestrels desert their clutches if they are not fed sufficiently by their mate and must hunt for themselves, and that the ability of males to supply food to their mates may be the main factor affecting the timing and success of breeding.

References

Gibb, J. 1951. The Birds of the Maltese Islands. *Ibis* 93: 109-27.
Sultana, J. & C. Gauci 1982. *A New Guide to the Birds of Malta.* The Ornithological Society, Malta.
Village, A. 1990. *The Kestrel.* T & AD Poyser, London.

Raymond Galea – 'Osprey' Ganu Street, Birkirkara BKR 06, Malta. raygalea@global.net.mt

Berries as a food source for various species of birds

The relation between birds and berries has often been noted; berries are a source of food for many species of birds, that in turn help in the dispersion of the plant through discarding the seeds, either in their faeces or by regurgitating, after eating the berry (see Snow & Snow 1988).

In the Maltese Islands several species of plants produce berries that have been noted to constitute a source of food for birds. One example is the Mediterranean Buckthorn *Rhamnus alaternus*, a cultivated and naturalised species which produces berries in summer. Sardinian Warblers *Sylvia melanocephala* have often been noted feeding on the berries of this shrub at Buskett; faeces found on the plant itself contained the seeds as well as parts of the skin of the berry, suggesting that Sardinian Warblers are dispersers of the Mediterranean Buckthorn. The berries of the Small Buckthorn *Rhamnus oleoides*, a closely related species that grows in rocky places, are very often eaten by Subalpine Warblers *Sylvia cantillans*, during their late summer - early autumn migration through the islands.

Another shrub that produces berries which are eaten by several bird species is the Lentisk *Pistacia lentiscus*. At Buskett young plants were found growing a considerable distance away from larger, mature shrubs; some of these young plants were growing directly below perches, suggesting that dispersal is occurring through bird faeces. At Simar, a Lentisk shrub was found growing at the base of Eucalyptus *Eucalyptus sp.* trees commonly used for roosting, as well as in a Tamarisk *Tamarix africana* grove. In this last locality Olive *Olea europea* saplings were also found, suggesting the dispersive role of Starlings *Sturnus vulgaris* which frequent the Tamarisk grove and were often observed feeding on the fruits of Olives growing in the area.

Another well-noted relation is that between the Blackcap *Sylvia atricapilla* and the Ivy *Hedera helix* (see for instance Sultana & Gauci 1982). At Buskett, where Ivy is plentiful, Blackcaps are frequently observed feasting on berries during the winter. Bird faeces around and under Ivy growths are often stained black and contain seeds. By late February berry-bearing stalks are not uncommonly stripped bare - this was noticed in February 1999 for instance. Another species which has been observed feeding on Ivy berries is the Starling. In addition, Song Thrushes *Turdus philomelos* (and occasionally Redwings *T. iliacus* and Fieldfares *T. pilaris*, both of which are uncommon winter visitors to the islands) are sometimes flushed from Ivy thickets at Buskett, suggesting feeding; *Turdus* sp. have been widely recorded as feeding on Ivy berries and acting as dispersers (Snow & Snow 1988).

A female Spanish Sparrow *Passer hispaniolensis* was observed feeding on berries of the Nightshade *Solanum sp.* at Mosta in June 1999. The bird crushed the soft flesh, ate the seeds and pulp, and discarded the skin.

References

Snow, B. & Snow, D. 1988. *Birds and Berries*. T & AD Poyser, London.
Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Malta.

Alex Casha – "Ave Maria". Il-Barjol Street, Mosta, Malta. pandionlex@mail.global.net.mt

Editorial note: Sultana & Gauci (op. cit.) report that the berries of the Bramble *Rubus ulmifolius* and the Toothed Myoporum *Myoporum tetrandrum* often serve as a food source for migrating Subalpine Warblers. They also record Blackcaps feeding on berries of the Deadly Nightshade *Solanum nigrum* at Lunzjata, Gozo. The editor has observed a Song Thrush feeding on the fruit of the Hawthorn *Crataegus monogyna* at Ghajn Zejtuna. Blackcaps as well as Spanish Sparrows have often been observed feeding on berries of the Deadly Nightshade in the same locality; when handled for ringing, the undertail coverts of the former species were often noted to be stained a dark purple, no doubt from the faeces. *Sylvia sp.* warblers of various species have often been observed feeding on Lentisk berries on Comino - indeed, the spread of this plant species across the garigue landscape of the island may be related to berry feeding by birds. In addition, various fruits are widely known in the Maltese Islands to provide food for birds - notable examples include the Golden Oriole *Oriolus oriolus* feeding on the fruits of the White Mulberry *Morus alba* and the Japanese Loquat *Eriobotrya japonica*, and various species (notably *Sylvia sp.* warblers) feeding on the fruit of the Fig *Ficus carica*. The relation between birds and berries / fruit in the Maltese Islands, particularly the value of fruit as a food source during migration, is a complex and interesting one and certainly deserves systematic research. See also M.A. Thake "the diet of three Black Redstarts Phoenicurus ochruros wintering at Mdina, Malta", this volume.

Zitting Cisticola *Cisticola juncidis* in an urban area

In spring 2000, a male Zitting Cisticola *C. juncidis* was observed apparently attempting to set up territory in Fleur de Lys, a highly urbanised area which is entirely built up. The bird spent long periods in private gardens and singing in flight above the rooftops. This behaviour increased steadily from one to twenty song flights during the period 9 to 22 May, after which there was an observation of three song flights on 23 May. Thereafter the bird was not heard singing in the area.

The species inhabits wet as well as dry habitats almost always dominated by grasses or other plants; although basically a bird of tropical grasslands, in Europe most habitats are coastal and low-lying, often modified by man (Snow & Perrins 1998). In the Maltese Islands, since breeding was first confirmed in 1973 it has rapidly colonised new areas, mainly marshy areas, cereal and clover fields, as well as other areas where grasses grow, cultivated and otherwise (Sultana & Gauci 1982).

References

Snow, D.W. & Perrins, C.M. 1998. *The Birds of the Western Palearctic* (Concise edition). Oxford University Press, Oxford and New York.

Sultana, J. & Gauci, C. 1982. *A New Guide to the Birds of Malta*. The Ornithological Society, Malta.

Martin A. Thake – 169, Fleur-de-Lys Road, B'Kara BKR 02, Malta.

Editorial note: A Zitting Cisticola was noted singing in an urban area (Gzira) on 21 June 2002 (D. Cachia pers. comm.). This species has also been noted nesting in close proximity to built up areas in at least one locality; in this case however, suitable habitat was available right adjacent to buildings.

First record for the Maltese Islands of the dark morph Marsh Harrier *Circus aeruginosus*

On the morning of 22 October 1998 whilst bird watching at Qawra, we observed a raptor coming in low over the sea. The first general impression was that of a dark brown raptor with two white patches at the base of the primaries not unlike the markings of a juvenile Golden Eagle *Aquila chrysaetos*. Upon closer inspection we noticed that it was a Marsh Harrier *Circus aeruginosus* with unusual plumage. From above it was uniform dark brown with a pale grey tail. The underwings were also all very dark brown with a wide dark trailing edge and with white bases to primaries and secondaries. The body was also completely dark brown, the same colour of the wings except for the pale grey tail. The head was also completely dark and without any markings.

The bird was a dark morph male Marsh Harrier. It was properly identified after consulting various raptor guides that were published after the sighting, as the bird was not illustrated in previous guides.

According to Forsman (1999), the Marsh Harrier also occurs in a rare dark form; this form occurs among eastern populations migrating through the Middle East and only exceptionally further west.

This was the first record for the Maltese Islands but a second dark morph bird was observed on 17 September 2001 at Tigne (D. Attard & E. Bonavia pers. comm.).

References

Clark, W. S. 1999. *A Field Guide to the Raptors of Europe, The Middle East and North Africa*. Oxford University Press

Forsman, D. 1999. *The Raptors of Europe and the Middle East.* T & D Poyser, London

Porter, R. F., Willis, I., Christensen, S. & Nielsen, B. P. 1981. *Flight Identification of European Raptors*. 3rd edition. T & D Poyser, London.

Michael Sammut*, Charles Coleiro & David Attard*****

* 8, Rigu Alley, B'Kara BKR 05, Malta. fulmar@global.net.mt

** 74, St. Michael Flats, Flat 2, Paris Street, Zebbug ZBG 05, Malta. ccol@global.net.mt

*** 16, "Blossoms" Triq San Gwann Bosco, Dingli RBT 11, Malta. dcbattard@yahoo.co.uk

Editorial note: It seems that although it is infrequent, the dark morph Marsh Harrier is not so rare in western Europe (see Fouquet, M. & Yesou, P. 1991. Dark-morph Marsh Harriers in western France. *British Birds* 84 (10): 438.).

Nest Site selection in the Spectacled Warbler *Sylvia conspicillata*

The Birds of the Western Palearctic quoting the present writer, cites only one observation of nest-site selection for the Spectacled Warbler *Sylvia conspicillata*. In this example/case the male chose the site and, after three days of building and singing, was apparently joined by female who three days later was seen helping male to build by adding lining (Cramp 1992).

The nest in question was located on 23rd March 1989 on the eastern slope of Dabrani hill, Gozo. The male was seen carrying nesting material to the nest site in a *Cynara cardunculus* plant in an uncultivated terraced field. On the 24th the site was again visited for half an hour during which time the male was seen carrying nesting material three times. Each time after building it flew to a perch about 20 metres away from the nest site calling and singing a few notes. Only the male was in sight.

On 25th the site was observed for two hours from 1300 to 1500hrs. During the first three-quarters of an hour only the male was present. It was seen visiting the site twice with nest material, and singing frequently from various perches around the nest site, once indulging in a display song flight. At about 1400 hrs a female was noticed for the first time in the presence of the male about 20 metres away from the nest site. For the next half-hour the male was singing frequently and indulging in display song flights, after which he visited the nest at least three times without nesting material.

On 29th the site was again visited from 1230 to 1430hrs. On arrival the male was seen perched some 12 metres away and started giving 'churring' calls alarmingly, followed by a short sub song. The female was also seen nearby carrying vegetable down and flitting about. After chasing the female, the male visited the nest without any nesting material but was noticed arranging it. After a while the female flew in with the white vegetable down. The male then left the nest site while the female lined the nest with the (white) vegetable down. Afterwards both birds were noticed feeding together in a nearby field and flitting about close to each other.

By 10th April the nest contained 5 eggs.

References

Cramp, S (ed). 1992. *The Birds of the Western Palearctic*. Vol. VI. Oxford University Press, Oxford.

Joe Sultana – 3, Dar Gajdoru, Gajdoru Street, Xaghra, Gozo XRA 104, Malta. jsultana@global.net.mt

---

Red-rumped Swallow *Hirundo daurica* moulting wing feathers while on migration

While bird-ringing at Is-Simar Nature Reserve on 23 October 1997 an adult and two first year Red-rumped Swallows *Hirundo daurica* were trapped together. In autumn these birds are rare and irregular in the Maltese Islands, passing from late September to early November. On closer examination the adult bird was noted to be partially moulting some of the primaries, as follows:

Right Wing. Innermost Primary (P 1) - Score 4 Adjacent Primary (P 2) - Score 1	Left Wing. Innermost Primary (P 1) - Score 3 Adjacent primary (P 2) - Score 2

(Moult scored as indicated by Ginn & Melville 1983.)

On both wings there was also a new primary covert. All other feathers were old and abraded. No sign of moult was noticed on the juvenile birds. All three birds had a considerable amount of fat.

After recording the data all three birds were released together as most probably they constituted a family party which were migrating south together.

References

Ginn, H. B. & Melville, D.S. 1983. *Moult in Birds*. BTO guide 19. British Trust for Ornithology.

Raymond Galea – 'Osprey' Ganu Street, Birkirkara BKR 06, Malta. raygalea@global.net.mt

'Cross-billed' Cory's Shearwaters *Calonectris diomedea*

Various degrees of deformities affecting mainly the eyes and feet have been described in the Procellariiformes, especially on the small-sized members of the order e.g. the Storm Petrels such as *Hydrobates pelagicus* (Murray 1984). Pomeroy (1962) reports a case of bill deformity in a Manx Shearwater *Puffinus puffinus* from the Irish Sea. Nogales *et al* (1990) reported bill malformation in the Cory's Shearwater Calonectris *diomedea* from the Great Selvage Islands in Atlantic. Three 'cross-billed' chicks were found in 1988 out of a total of 801 ringed, while another bird was found in 1989 out of 600 chicks ringed.

In the period 1983 to 1997 four chicks from the Maltese Islands were noted bearing some form of deformity. One had extremely swollen eyes covered with a thin membrane while another two had growths around the eyes and bill. Another bird was found with stunted wings and limp legs. From these four birds it was only the last bird that failed to fledge. It was found dead inside the nesting chamber.

In 1998 a new form of deformity was recorded, bill-malformation. A juvenile bird (see Fig. 1), which became stranded after leaving the nest, was collected for re-release. The shape of the bill was similar to that reported by Nogales *et al.* (1990) but added to this, on the head and especially around the eyes the bird was infested with parasites. In 1999 a chick, which had a normal-looking beak a few days after hatching in one of the study nests, was found to be 'cross-billed' when it was 39 days old. Apart from this deformity, the upper mandible was also severely damaged. Although deformed, the chick managed to fledge successfully, although it is doubtful whether such birds survive - as already suggested by Nogales *et al* (1990).

Fig. 1.

In the case of the Atlantic birds, it has been suggested that the cause for these bill deformities may be related to sea pollution (Nogales *et al.* 1990). However, in the course of discussion on the matter with some colleagues, a more simple explanation for this phenomenon was brought up. It was suggested that the parent birds might be the cause of these so-called deformities at an early stage during chick feeding (D. Ristow pers. comm.). Vaughan (1980) gives a detailed account of the feeding of chicks by the adults. During the actual feed, the chick points its bill towards the adult, later this develops into a violent almost frenzied motion of pecking and nibbling at the parent's head and bill. The pecks take the form of a rhythmical thrusting and the chick appears to become frantic. The adult responds in an similar behaviour followed by the opening of the bill, and the chick then thrusts its bill inside it.

It seems obvious that inexperienced or first-time breeders together with the overzealous thrusting of the chick's bill into its parent's mouth could be the cause of these rare bill deformities. This must have been the cause of the bill deformity of the 1999 chick. Its parents were both first-time breeders as they had been ringed as prospectors in 1998.

I would like to thank Dietrich Ristow, Jose Pedro Granadeiro, Jean-Claude Thibault, and Pierandrea Brichetti for the information thay gave me on 'cross-billed' shearwaters.

References

Murray, S. 1984. Abnormalities and diseases of the feet of the Storm Petrels. *Seabirds* 7: 74.

Nogales, M., Martin, A. & Zino, F. 1990. Bill Malformation of Juvenile Cory's Shearwaters (*Calonectris diomedea borealis*) on Selvagem Grande. *Bocagiana* 139:1-5.

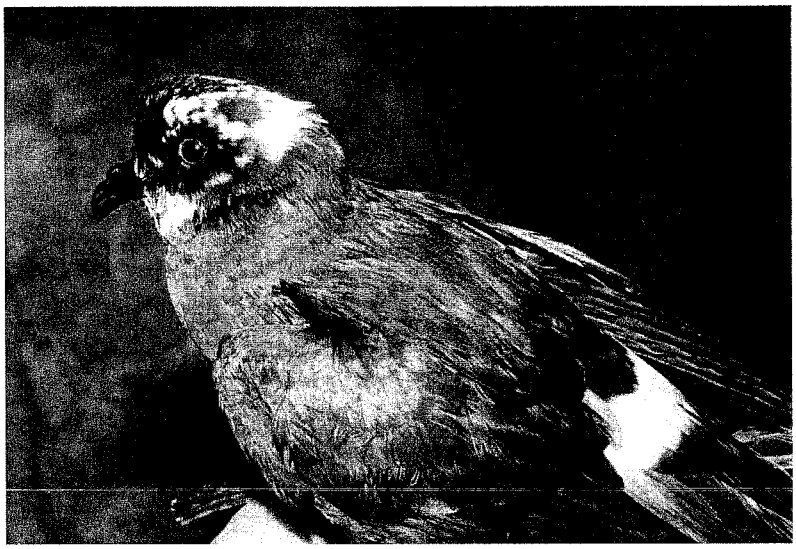
Pomeroy, D.E. 1962. Birds with abnormal bills. *Brit. Birds* 55 (2) 49-72.

Vaughan, R. 1980. Notes on the Cory's Shearwater *Calonectris diomedea* and some other birds on Linosa, Pelagic Isles. *Riv. Ital. Orn.* 50: 143-154.

John J. Borg – 13, The Catacombs, Rabat RBT 07, Malta. E-mail: diomedea@onvol.net

Partially albinistic European Storm-petrel *Hydrobates pelagicus melitensis* from Filfla

The European Storm-petrel *Hydrobates pelagicus melitensis* colony on the island of Filfla, located some 5km off the south coast of Malta, has been monitored regularly since 1968 with over 18,000 birds ringed by bird ringers of BirdLife Malta's ringing scheme. On very rare occasions birds with one or few white primaries or tail feathers have been handled for ringing. A partially albinistic European Storm-petrel, showing some white secondaries and greater coverts was recorded on Filfla on 1st July 1978 (Sultana 1991).



John J. Borg

While mist-netting Storm Petrels on the 31 May 2001, an adult bird was trapped having patches of white feathers on the crown, nape, lore, ear-coverts and throat. The eyes were of a paler shade than normal while parts of the legs and feet also showed very pale patches.

A similar bird has been reported from the Balearic Islands (Arbona *et al.* 1996)

References

Arbona, P., Gonzales J. M., McMinn, M. & Rebassa, M. 1996. Noneta (*Hydrobates pelagicus melitensis*) parcialment albina capturada a Na Pobra, Cabrera, Iles Balears. *A.O.B* 11:47-49.

Sultana, J. 1991. Partial albinism of Storm Petrel. *British Birds* 84 (10): 437-438.

Joe Sultana* & John J. Borg**

* 3, Dar Gajdoru, Gajdoru Street, Xaghra, Gozo XRA 104, Malta. jsultana@global.net.mt

** 13, The Catacombs, Rabat RBT 07, Malta. diomedea@onvol.net

Advice and instructions to contributors

Authors are required to submit TWO copies of their contribution, which should be typed or printed on one side only of paper. Articles / short notes should be double-spaced throughout, and wide margins should be left all around the text, including at least 4 cm on the left-hand margin. All pages, including Notes, References and tables, should be numbered. Tables and diagrams must be properly titled and numbered consecutively in the order in which they are to appear in the text; each table / diagram should be prepared on a separate page or separate pages at the end of the typed or printed article and its approximate position in the text should be indicated (e.g., 'Table 1 about here').

Information contained in the contribution should be original and based on personal research except where otherwise indicated. The main text should be concise. Authors of major articles are required to include an ABSTRACT of their article of up to 120 words maximum. A detachable sheet on one copy of the article / short note should carry the author's name, university and / or home address, telephone number, and email address. The Editorial board does not undertake to return rejected manuscripts.

Textual references must follow the format contained in the following examples:
As Dollard (1957) argues; Dollard's (1957) study; (Dollard 1985); (Dollard 1985, pp. 23-6).

Citation of references must follow the format contained in the following examples:

Bibby, C.J. 1981. Wintering bitterns in Britain. *British Birds* 74: 1-10.

Curry-Lindahl, K. 1981. *Bird migration in Africa*. Academic Press, London.

Stettenheim, P. 1972. The integument of birds. In *Avian Biology*, D.S. Farner & King, J.R. eds., pp 2-54, Academic Press, London.

Contents

BirdLife MALTA

Il-Merill

The ornithological journal of BirdLife Malta

57/28 Abate Rigord Street, Ta' Xbiex MSD 12, Malta

Tel: (+356) 21347646 Fax: (+356) 21343239

Email: info@birdlifemalta.org Website: www.birdlifemalta.org LM3