

## CAPITULO 11

### THE BIRD BONES IN THE CAVE OF AMALDA

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The occupation levels at Amalda extend over a very long period of time, from the middle Palaeolithic until the time of Romano-Basque settlement.

Yet there does not appear to be a great deal of continuity between one occupation level and the next. And, although there are consistent features in the avifauna associated with each level, each represents a separate unit in the minutely changing ecological and climatic pattern of its period.

The one factor which remains consistent throughout its history is the situation of the cave itself and the environment of the surrounding area.

From high in the cliff above the West bank, the cave overlooks the little river Azolaras at a point about 3.5 Kilometres upstream of its confluence with the Urola River in the existing village of Aizarnazabal. Its position is just at the point where the valley begins to broaden out below the gorge, at the head of which is the cave of Erralla. A considerable variety of avian habitat exists therefore within two or three kilometres of the site. Above the cave on the higher ground there is open pasture, garrigue, rock and mountain forest and below it, the rocky scree and the cliffs of the gorge lead down to a wooded river valley and to cultivated meadow land as the valley bottom opens out. There conditions are always damp and at the present time temperate, well sheltered from the weather and with lush vegetation.

The climatic data for the cave over the timespan of its occupation varies from warm and temperate to moderately cold, but in all phases there appears to have been a fairly high level of humidity, at least in the base of the valley. The map (fig 1) indicates the range of habitat within 1 and 2 kilometres of the cave.

The number of bones in any level is quite small.

There are only 274 identifiable bird bones in the whole sequence. There are, however, 31 different species, whose differing habitat requirement give some indication as to what the local resources were and how they were exploited.

#### DESCRIPTION.

#### LEVEL VII. MOUSTERIAN

In the earliest level of occupation, resting on sterile layers, for which the sedimentary analysis indicated warm damp

#### DISTRIBUTION OF SPECIES

Level	VII	VI	V	IV	III	II	I
<i>Anas platyrrhynchos</i>	1	2	1	2			
<i>Accipiter gentilis</i>		1					
<i>Aquila chrysaetos</i>	3						
<i>Falco peregrinus</i>		1	2				
<i>Falco tinnunculus</i>		3	8				
<i>Perdix perdix</i>		3					
<i>Columba palumbus</i>							2
<i>Columba livia</i>			3	16	2		
<i>Bubo bubo</i>		5					
<i>Strix aluco</i>				1			
<i>Asio otus</i>		4					
<i>Asio flammeus</i>		1					
<i>Galerida cristata</i>	1			1			
<i>Lullula arborea</i>						1	
<i>Phylloscopus colybita</i>					1		
<i>Oenanthe oenanthe</i>				1	1		
<i>Monticola solitarius</i>					3	1	3
<i>Turdus merula</i>		1		2	1	13	
<i>Turdus philomelos</i>	2					2	4
<i>Turdus viviscivorus</i>	2	2					
<i>Emberiza calandra</i>	2	3	1	2			
<i>Emberiza citrinella</i>	1						
<i>Fringilla coelebs</i>					1		1
<i>Pyrrhula pyrrhula</i>						1	
<i>Coccothraustes coccothraustes</i>							1
<i>Garrulus glandarius</i>		1			1		
<i>Pica pica</i>			8	9			
<i>Corvus corax</i>		1		1			
<i>Corvus corone</i>	1						
<i>Pyrrhocorax pyrrhocorax</i>	12	29	8	56	11	9	1
Totals	28	53	28	102	20	29	12

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conditions, with some signs that the climate was becoming cooler, suggesting that it represents the early stages of the onset of a cold phase. In terms of bird remains, only 28 identifiable bones were recovered from this level. Ten different species were present.

- |                              |               |
|------------------------------|---------------|
| <i>Anas platyrhynchos</i>    | Mallard.      |
| <i>Aquila chrysaetos</i> ,   | Golden eagle  |
| <i>Turdus philomelos</i>     | Song thrush   |
| <i>Turdus viscivorus</i> ,   | Mistle thrush |
| <i>Galerida cristata</i> ,   | Crested lark  |
| <i>Emberiza citrinella</i> , | Yellowhammer  |

- |                              |                   |
|------------------------------|-------------------|
| <i>Emberiza calandra</i> ,   | Corn bunting      |
| <i>Corvus corone</i> ,       | Carion crow       |
| <i>Pyrhcorax pyrhcorax</i> , | Red billed chough |

The number of bones for any species are small. Of the Mallard there is only a single radius. The characteristic first phalange and a dorsal vertebra are all that remains of the Golden eagle. It may have been brought to the cave from some distance but the other species which would have been present all around it are not any more numerous; two bones of each of the thrushes and only single bones of lark, Yellowhammer.

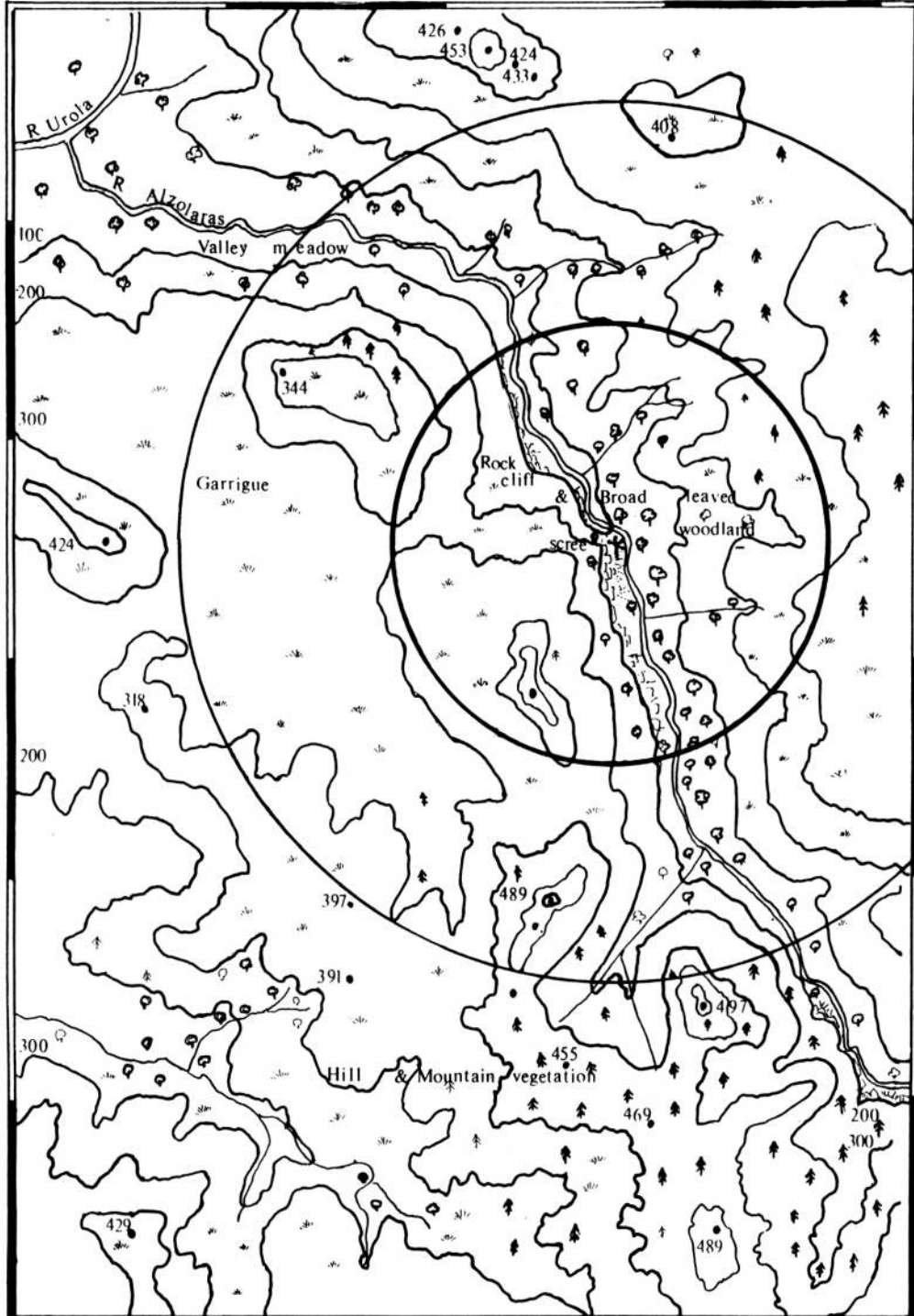


Fig. 1 AMALDA Habitat zones within 1 and 2 kilometres of the cave

Corn bunting and Crow. More than a third of all the bones from this level belonged to Chough.

If one considers the relationship between each of these species and the habitat zones in the immediate locality, the Buntings, Lark and Thrushes could have been found feeding anywhere along the valley bottom or on the open garrigue above the cliff. The Mallard would clearly have spent most of its time close to the river and by contrast the eagle belongs to the higher ground and rocky outcrops over an extensive hunting range.

This relationship may be expressed diagrammatically (see table 1).

The distribution of bones within the cave is limited in level VII, partly by the fact that this level was only uncovered in certain areas, but even so all the material comes from areas C,E,E,11 and 12, well within the zones of light penetration. There is no concentration of small bones in any one square metre such as to suggest that they were the work of raptors (see fig. 2.).

**LEVEL VI. PERIGORDIEN V.**

Despite the evidence in the climatic studies for colder conditions in this level, the avifauna does not show any marked increase in "cold" species. In fact, the ecological requirements of the birds in this level are very similar to those in level VII. Of the 52 identifiable bones recovered from this phase 29 belonged to Chough. The remainder included:

- |                            |                  |
|----------------------------|------------------|
| <i>Anas platyrhynchos,</i> | Mallard.         |
| <i>Accipiter gentilis,</i> | Goshawk.         |
| <i>Perdix perdix,</i>      | Partridge.       |
| <i>Bubo bubo</i>           | Eagle owl.       |
| <i>Asio otus,</i>          | Long eared owl.  |
| <i>Asio flammeus</i>       | Short eared owl. |
| <i>Turdus merula,</i>      | Blackbird.       |
| <i>Turdus viscivorus,</i>  | Mistle thrush.   |
| <i>Emberiza calandra,</i>  | Corn bunting.    |

Amalda Level VII Avian habitat zones local to the cave Table I

Mountain & Hill cover	Garrigue	Rock, Scree & Gorge	Valley meadow	Woodland	River
					<i>Anas platyrhynchos</i>
<i>Aquila chrysaetos</i>	—————→	—————→			
	—————		<i>Turdus philomelos</i>	—————	
	<i>Galerida cristata</i>		<i>Turdus viscivorus</i>	—————	
	<i>Emberiza calandra</i>				
	<i>Emberiza citrinella</i>				
	←————	←————	<i>Corvus corone.</i>	—————	
	—————	<i>Pyrhocorax</i>			
		<i>pyrhocorax</i>			

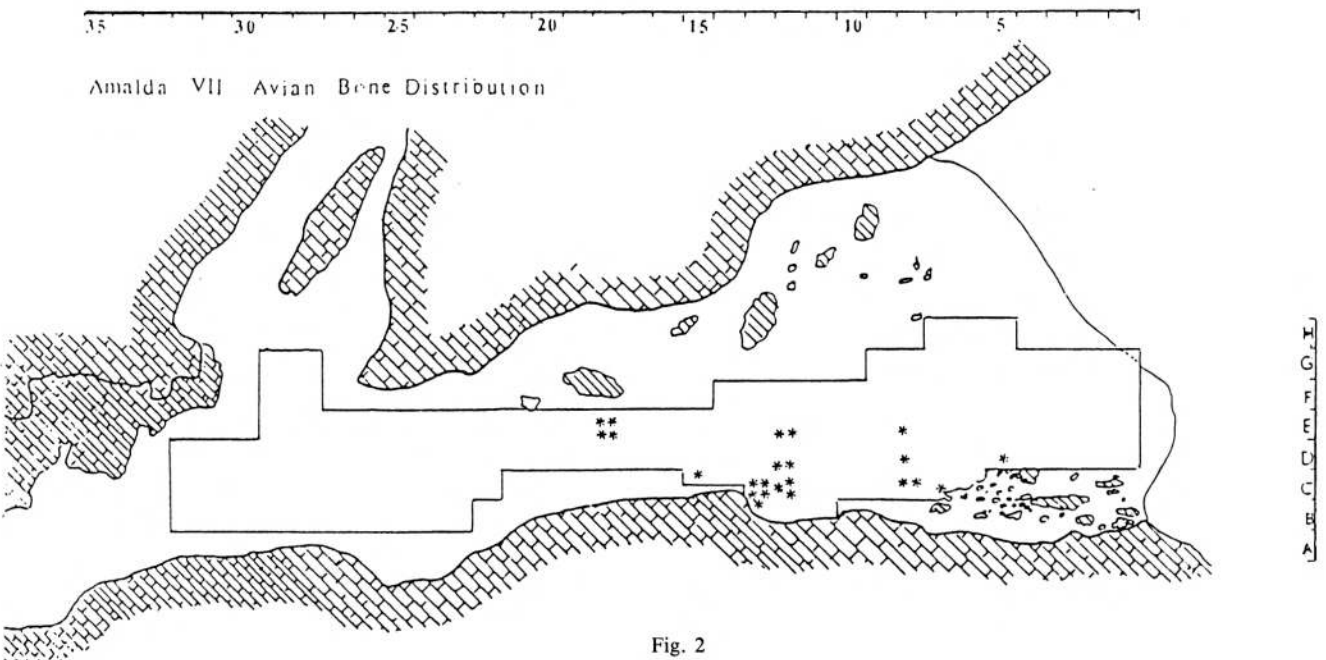


Fig. 2

- Emberiza citrinella*, Yellowhammer.
- Sturnus vulgaris*, Starling.
- Garrulus glandarius*, Jay.
- Pyrhcorax pyrhcorax*, Red billed chough.

The Goshawk, *Accipiter gentilis*, is typically a woodland species. It prefers a spruce, pine and larch environment, though in the absence of these, oak, beech and other broadleaved tree species may be substituted. It particularly likes to roost in treetops to which there is clear access such as the passage of a stream bed. Its food includes birds, often gamebirds and mammals up to the size of a hare, *Lepus europaeus*.

In this level also were found a number of bones of *Bubo bubo*, the European Eagle owl: a coracoid and scapula, two thoracic vertebrae and a claw. *Bubo* frequently roosts and even nests in rock crevices, cave entrances and ledges, which must be sheltered but yet command a good view of the surrounding countryside. In the present context it should be noted that the aspect of the ledge or roosting place is considered to be of importance; it normally faces S.W. or S.S.W. (Cramp 1985) (Mikkola 1983). At Amalda, however, the aspect of the cave is towards the North and East, which suggests that this was not a normal roosting place for this bird and that perhaps it was imported to the cave and did not arrive on its own volition. The evidence from recent populations shows that *Bubo* shuns contact with humans and areas of human settlement. (Cramp 1985)

In behavioral terms Eagle owls pair for life and pairs are sedentary and strongly territorial. Their food is very varied in size and in kind, including mammals as large as *Vulpes vulpes*, Red fox, *Sciuridae*, squirrels, *Erinaceus*, hedgehogs as well as a variety of smaller mammals. They will take birds, particularly water birds as big as *Ardea cinerea*, Heron and *Anatidae*. An Eagle owl resident in the locality of Amalda would have been capable of killing all or any of the bird species which were found in the cave during this period, yet there are the contra indications in its normal avoidance of human habitation and the absence of any marked concentration in the disposition of avian finds in

this level. It is the first time that *Bubo* has been recorded in a Perigordien level in Guipuzcoa although it has been recovered from deposits belonging to an early phase of Wurm and to Wurm III in Ariege at Soulabé and Camayot and from Wurm IV at Isturitz.

The two other raptors in level are both owls, *Asio otus* and *A. flammeus*, the Long eared and the Short eared owls. Four bones of *Asio otus* were recovered from areas 10 and 13B and the single femur of *A. flammeus* from square 11E, close to the entrance of the cave. Both are species of the open country. They prefer to roost in the open, on the ground or in trees and to nest arboreally too, avoiding enclosed surroundings like holes or the mouth of a cave. *Asio otus* frequently uses old nests of other woodland species like *Garrulus glandarius*, the Jay, *Corvus corone*, Carrion crow, *Pica pica*, the Magpie, or in the abandoned dreys of squirrels. *Asio flammeus* favours an even more open situation, roosting and nesting in rough grass, clumps of heather or of reeds and marshland sedges. It is able to make use of any low growing vegetation, only perching on taller bushes or trees while hunting. Neither species is recorded as ever using caves (see Cramp 1985 Vol IV pp. 572-601, Heimo Mikkola 1983 pp. 213-250 and Witherby 1943 Vol II pp 327-333) It therefore seems unlikely that any of the microfauna either avian or mammalian from these levels originated in pellets ejected by these individuals, despite the fact that their diet includes a high proportion of *Microtus*, *Apodemus* and *Sorex* and a much smaller percentage of small birds, usually taken outside the breeding season when species like Sparrows and Starlings roost in communities and are easy to hunt.

Two species, which are unmistakably food birds, *Anas platyrhynchos*, the Mallard and *Perdix perdix*, the Partridge, are interesting because all the bones recovered come from the meatier parts of the bird. The Mallard bones include a scapula, a section of sternum and a radius. All three bones were found close together in areas 11, 12 and 13 B and C and all could belong to a single specimen. The same is not true of the Partridge bones, a single ulna was found in area 12B but the others, humerus, femur and sternum were

Amalda Level VI Avian habitat zones local to the cave

Table 2

Mountain & Hill cover	Garrigue	Rock, Scree & Gorge	Valley meadow	Woodland	River
			←		<i>Anas platyrhynchos</i>
←	<i>Perdix perdix</i> ←	<i>Bubo bubo</i>	→	→	→
	<i>Asio otus</i>		→	→	
	<i>Asio flammeus</i>		→		
	←		<i>Turdus merula</i>		
	<i>Emberiza calandra</i>		<i>Turdus viscivorus</i>	→	
	<i>Emberiza citrinella</i>		→		
←	←	<i>Pyrhcorax</i> <i>pyrhcorax</i>	→	<i>Garrulus glandarius</i>	

recovered from inside the cave in areas 15 and 16E. The sternum provides useful confirmation of the species as *Perdix* rather than *Alectoris*, since there is an overlap in their natural occurrence in Northern Spain. In this case the conformation and structure of the foramen in the ventral face of the sternum is characteristic of *Perdix*, which is in any case the more likely species, if one takes into account the relatively cold climate prevailing at the time. Comparisons with *Lagopus mutus*, Ptarmigan and *Tetrastes bonasia*, Hazel hen showed considerable morphological differences and, in regard to the former, of size.

The other species in this level were the *Turdidae*, *T. merula*, and *T. viscivorus* both of which include a wide variety of fruits and berries in their diet during the Autumn; the Buntings, *Emberiza calandra* and *E. citrinella* are even more dependent on fruits and seeds, which account for upwards of 50% of their total food intake and the same is also true of the Partridge. Indications which suggest a ready availability of seed bearing and berried plants, shrubs and trees at the time. Indeed, *Garrulus glandarius*, the Jay, who has a particular preference during the Autumn for acorns, beechmast and hazelnuts can also tell us something about the deciduous woodlands of the valley and locality around the cave, suggesting a pattern of afforestation little different to that which exists today.

A comparison of the habitat diagram for this level (table 2) with that for level VII shows little change in the exploitation of resources, all the birds imported into the cave at this period were available in one or other of the habitat zones close to it.

Again the distribution of remains within the excavated portion of the cave, apart from the partridge already mentioned, is virtually unchanged from the previous level, concentrating in areas 8-13 C,D,E (Fig. 3.).

#### LEVEL V. THE FINAL PERIGORDIEN OR PROTO-MAGDALENIEN.

This phase, which was found in almost all excavated areas of the cave was not rich in bird remains, with a total of

only 28 bones. It appears to be characteristic of Amalda that despite evidence of a further change in climate from the damp cold conditions of Level VI to a much warmer and drier period, there is no corresponding change in the avian ecology.

The species in this level were:

<i>Anas platyrhynchos</i> ,	Mallard.
<i>Falco tinnunculus</i> ,	Kestrel.
<i>Falco peregrinus</i> ,	Peregrine.
<i>Columba livia</i> ,	Rock dove.
<i>Emberiza calandra</i> ,	Corn bunting.
<i>Corvus corax</i> ,	Raven.
<i>Pica pica</i> ,	Magpie.
<i>Pyrhcorax pyrrhcorax</i> ,	Red-billed chough.

The numbers of each species are very small. There is one furcular only of Mallard, a single ulna of Corn bunting and the Raven is identified as present from two highly characteristic claws.

For the first time on this site *Columba livia*, Rock dove appears. The cliff and ledges at the cave entrance are typical roost and nesting sites for these birds and colonies of them would naturally attract the attention of raptors like the two Falcons found here. And yet, that notwithstanding, of the three dove bones recovered, two, a humerus and a femur, came from the rear of the cave, areas 29C and 27B.

Peregrine falcons are particular predators of the Rock dove and during the breeding season Kestrels, who normally hunt small rodents, will take squabs from the nest. Another species, highly destructive of the eggs and young of many smaller birds and yet will also take both squabs and eggs of doves, is the Magpie, of which 8 bones came from this level. All the Magpie bones came from the interior of the cave and because there were two right hand humeri there were at least two individuals.

There were also 8 chough bones, indicating the persistent continuity of their colonisation of the cliffs in association with the human occupation. Proportionately this is fewer bones of chough than in other levels, though it is doubtful whether this is significant. It may be of more importance that there is no particular indication in terms of bird

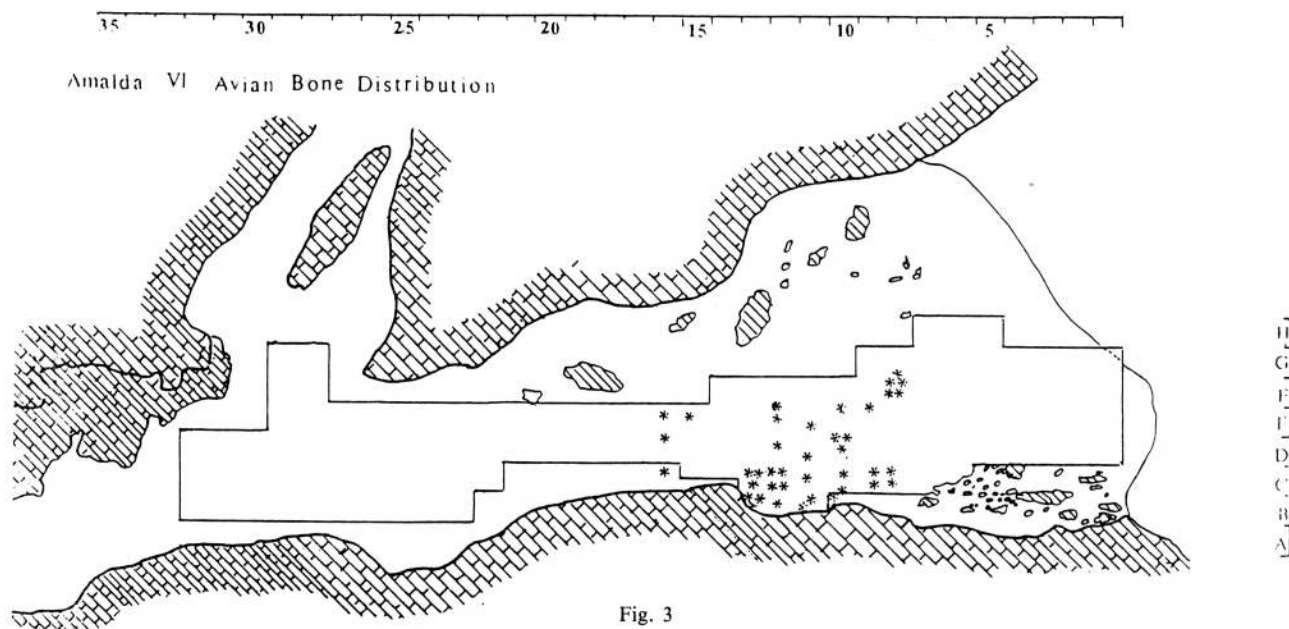


Fig. 3

ecology of the warmer climate which is believed to have existed at this epoch of the cave's occupation, any more than than the avifaunas of other, colder phases reflect the climatological evidence.

In terms of preferred habitat all the species come from the close environs of the cave (see table 3). The distribution of individual bones within the cave deposit, however, does show a degree of change because many of the birds were carried into the interior sector of the occupied area. Half of all the bones in this level came from areas 25-31, the remainder from areas 11-15, none were recovered from the entrance of the cave (Fig. 4).

**LEVEL IV. SOLUTREAN.**

The Solutrien was by far the richest of all the phases of the cave's habitation as regards bird bones. Yet amongst the 99 bones recovered, none are inconsistent with the

faunal pattern established in either preceding or subsequent levels, and this despite further evidence of a change in the climate.

The check list for this level is very little changed from that of previous periods:

- |                                |                    |
|--------------------------------|--------------------|
| <i>Anas platyrrhyncos,</i>     | Mallard.           |
| <i>Falco tinnunculus,</i>      | Kestrel.           |
| <i>Falco peregrinus,</i>       | Peregrine falcon.  |
| <i>Columba livia,</i>          | Rock dove.         |
| <i>Strix aluco,</i>            | Tawny owl.         |
| <i>Galerida cristata,</i>      | Crested lark.      |
| <i>Oenanthe oenanthe,</i>      | Wheatear.          |
| <i>Turdus merula,</i>          | Blackbird.         |
| <i>Emberiza calandra,</i>      | Corn bunting.      |
| <i>Pica pica,</i>              | Magpie.            |
| <i>Corvus corax,</i>           | Raven.             |
| <i>Pyrhacorax pyrrhacorax,</i> | Red billed chough. |

In this, the most recent of the palaeolithic deposits, there were no large raptors, only Kestrel and Peregrine falcons and a single bone belonging to a Tawny owl from the

Amalda Level V Avian habitat zones local to the cave Table 3

Mountain & Hill cover	Garrigue	Rock, Scree & Gorge	Valley meadow	Woodland	River
			←		<i>Anas platyrrhyncos</i>
←	←	<i>Falco tinnunculus</i>	→	→	
	←	<i>Falco peregrinus</i>	→	→	
	←	<i>Columba livia</i>	→		
	<i>Emberiza calandra</i>				
←	←	<i>Corvus corax</i>		→	
	←		<i>Pica pica</i>	→	
←	←	<i>Pyrhacorax</i>			
		<i>pyrrhacorax</i>			

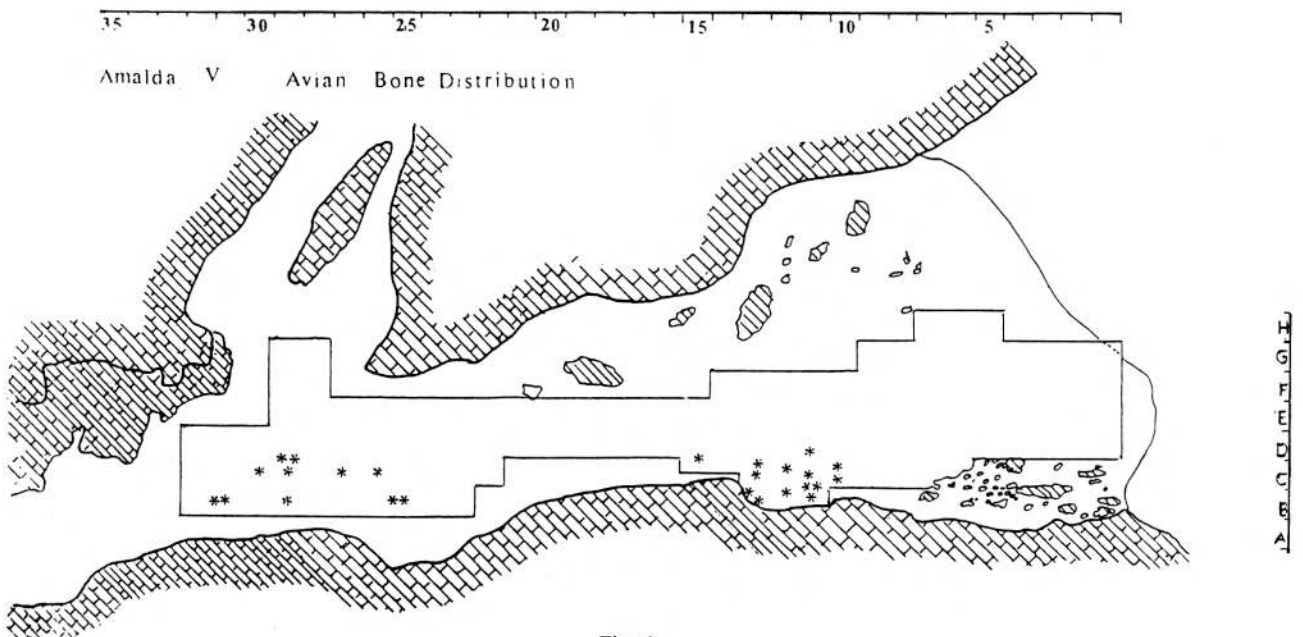


Fig. 4

A. E. 1954

interior of the cave. The two bones of Peregrine, *Falco peregrinus* were quite widely separated, the femur in square 15C and the tarsometatarsus in 29F, which may suggest more than one individual. The Kestrel, *Falco tinnunculus*, is even more widely distributed on the site: some bones were recovered near the entrance, in squares 15-10, and also a skull in square 23 plus some dorsal vertebrae at the rear of the cave in 32C.

Once more there is an increase in the numbers of the Rock dove, *Columba livia*. There were four right side humeri, all in areas 28 and 29, which suggests at least four individuals and an increasing population compared with level V. There is also an increase in the numbers of Red billed chough, 56 bones in all in this level, a feature which could indicate an increase of population, and therefore a

greater nuisance value to the human residents or, since 40 of the bones were distributed in areas 26-31, deliberate killing, possibly for food may have taken place.

Most of the smaller birds at this time tended to feed on the garrigue grassland areas above the gorge, or the open areas of the valley (fig 5).

In fact those bird species which were not specifically associated with the cave environment or the river and its valley tended to belong to garrigue country immediately above the gorge (see table 4). Amongst them is *Oenanthe oenanthe*, the Wheatear, of which there is only one specimen, represented by a single tarsometatarsus. Even so it is a significant find because it is the only bone belonging to a regular seasonal migrant throughout the Palaeolithic sequence of the cave.

Amaldà Level IV Avian habitat zones local to the cave

Table 4

Mountain & Hill cover	Garrigue	Rock, Scree & Gorge	Valley meadow	Woodland	River
←	←	<i>Falco tinnunculus</i>	←	→	<i>Anas platyrhynchos</i>
←	←	<i>Falco peregrinus</i>	←	→	
←	←	<i>Columba livia</i>	←		
←	←		←	<i>Strix aluco</i>	
←	<i>Galerida cristata</i>				
←	<i>Oenanthe oenanthe</i>		<i>Turdus merula</i>	→	
←	<i>Emberiza calandra</i>				
←	←	<i>Corvus corax</i>		→	
	←	<i>Pyrrhocorax</i>	<i>Pica pica</i>	→	
	←	<i>pyrrhocorax</i>			



Amaldà IV Avian Bone Distribution

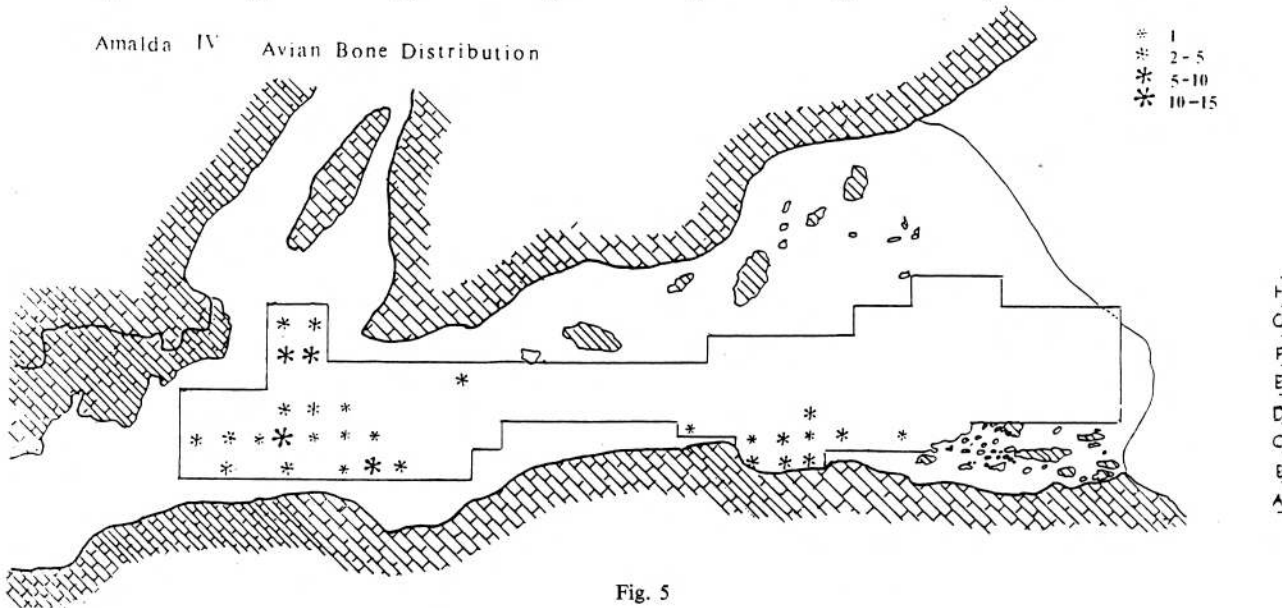


Fig. 5

**LEVEL III. THE CALCOLITHIC**

The long gap in time and in the occupation sequence between the Solutrean and the Calcolithic deposits found in level III, despite an amelioration in the climate to much more temperate, though rather wet, conditions, still seems to have resulted in only limited changes in the bird population.

Only 20 bones were in fact recovered from this level but the species included:

- Columba livia*, Rock dove.
- Phylloscopus colybita*, Chiffchaff.
- Monticola solitarius*, Blue rock thrush.
- Turdus merula*, Blackbird.
- Fringilla coelebs*, Chaffinch.
- Garrulus glandarius*, Jay.
- Pyrhcorax pyrhorcorax*, Red billed chough.

These bones were concentrated towards the rear of the cave. (See Fig. 6) It is noteworthy that in this level there are none of the larger "food" birds nor are there any predators or carrion eaters apart from the single humerus of a Jay.

The two species in this level which do suggest that warmer conditions prevailed are first, *Monticola solitarius*, the Blue rock thrush, a species whose preferred habitat is in rocky

slopes with ample fringing vegetation. The present day distribution is limited in Western Europe and it is less widespread than at the beginning of the twentieth century. It is a very shy bird and shuns humans so that this may be a cause of the reduction in distribution. In Spain it is still widespread outside the heavily populated areas. In the Palaeolithic record of the Iberian Peninsular it occurs in the Mousterien levels of Cova Negra in Valencia during phases associated with Wurm I and Wurm II. An interesting feature which may account for the presence of the Rock thrush at Amalda is that during the Summer months the scree below the cave is home today to a large colony of vipers, small ones by comparison with the vipers of Britain, and snakes and lizards form a large percentage of the diet of the Blue rock thrush, over 62% in some instances, especially during the breeding season (Cramp 1988. p907.)

Given that conditions were warm enough to favour the Blue rock thrush, one may perhaps distinguish which of the two possible species of *Phylloscopus*, are present here. In terms of bone structure *Phylloscopus colybita*, the Chiffchaff, and *Phylloscopus trochilus*, the Willow warbler are indistinguishable. However in this instance other evidence would suggest that the chiffchaff, which today is common throughout Spain and colonises areas up to a July Isotherm limit of 25.5°C is more likely than the Willow warbler, which, although it does occur today in parts of

Amalda Level III Avian habitat zones local to the cave Table 5

Mountain & Hill cover	Garrigue	Rock, Scree & Gorge	Valley meadow	Woodland	River
		<i>Columba livia</i>			
←	←	<i>Monticola solitarius</i>	←	←	←
			<i>Turdus merula</i>	←	
			←	←	
		<i>Pyrhcorax pyrhorcorax</i>		←	
←	←			←	

35      30      25      20      15      10      5

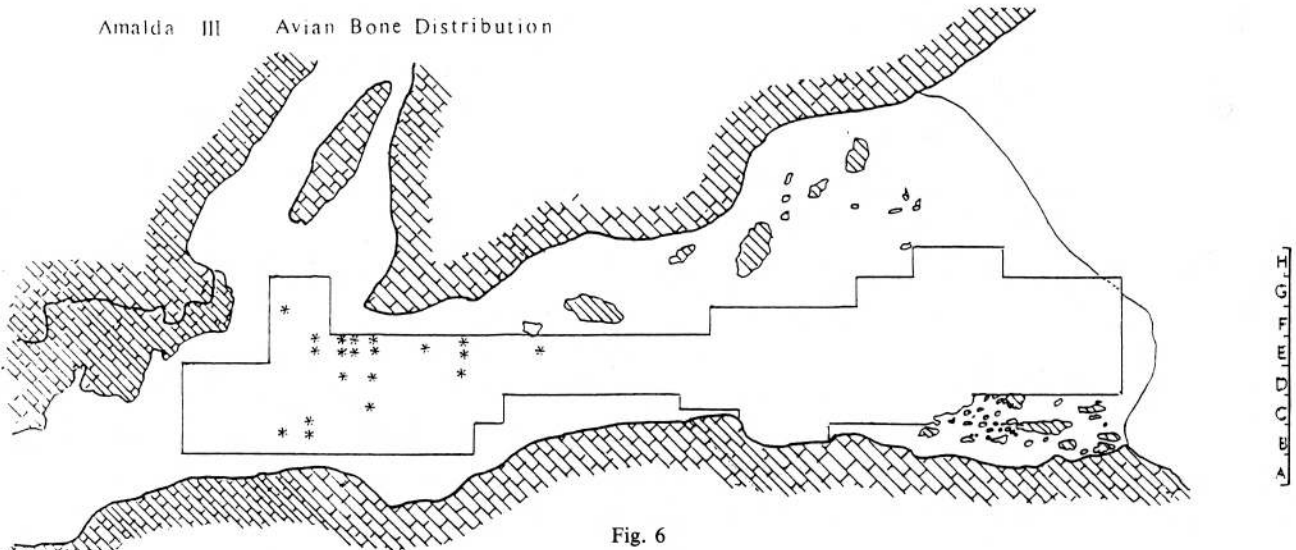


Fig. 6



Cantabria, is essentially a Northern European species, whose July Isotherm limits lie between 10.5°C and 21.6°C (Voous 1960 p 227). An insect eating bird, the Chiffchaff would have prospered in this wooded valley, along with the Jay, Chaffinch and Blackbird.

If once more the birds in this level are considered in terms of habitat preferences the range is a greatly limited in comparison with earlier occupations (Table 5). There appears to be a marginally stronger focus on the valley floor and fewer birds whose most favoured habitat lies in the areas outside.

## LEVEL II ROMAN FOURTH CENTURY

Culturally there is a long gap between the Calcolithic occupation at Amalda and the earliest Roman levels of the 4th century A.D. And yet the climate seems to have been very much the same: damp and temperate. All the bird bones belonging to this phase were recovered from living areas towards the interior of the cave; along the left hand side in squares B.C.D. and E 21-32 (see Fig. 7). The total number of 29 avian bones included:

- Lullula arborea*, Woodlark.
- Oenanthe oenanthe*, Wheatear.
- Turdus philomelos*, Songthrush.
- Monticola solitarius*, Blue rock thrush.
- Pyrhula pyrrhula*, Bullfinch.
- Corvus corone*, Carrion crow.
- Pyrhacorax pyrrhacorax*, Red billed chough.

There is a faint possibility here that some change in the vegetation or cultivation of the valley had place at this time. *Pyrhula pyrrhula*, the Bullfinch is a lover of fruit trees, their buds, blossom and the fruit itself, especially of apples and pears. Obviously it feeds on uncultivated varieties as well as being a menace to well tended orchards, so its presence here may be fortuitous, but it would be interesting to discover if any plant or palynological studies support this possibility.

## LEVEL I ROMAN LATE FOURTH CENTURY A.D.

The inference that birds were foraging amongst cultivated crops persists in late Roman times. There were only eight bones amongst the material recovered from this first level and all were found near the entrance to the cave, in areas 4, 5 and 6H 4D and 2 and 3E.

The species included:

- Columba palumbus*, Wood pigeon.
- Turdus philomelos*, Song thrush.
- Monticola solitarius*, Blue rock thrush.
- Fringilla coelebs*, Chaffinch.
- Coccothraustes coccothraustes*, Hawfinch.
- Pyrhacorax pyrrhacorax*, Red billed chough.

Of these birds three, the Wood pigeon, the Song thrush and the Hawfinch take fruits and seeds of different kinds. The Wood pigeon, which is only found in this level, is a regular feeder on cultivated land, where cereals and even more especially where leguminous crops are raised. The Song thrush, though in general a mixed hedgerow feeder, particularly enjoys frutis like the cherry and flocks of these birds can wreak havoc amongst cherry orchards. Hawfinches too are fond of cherries, along with plums, sloes, rose hips and hawthorn berries. They will also take the hard seeds of forest trees like Sycamore and Beech mast. However, the Hawfinch can also be of some use on cultivated land, since during the early Summer months, May and June, they are thought to raise their young largely on insects (Witherby 1943 Vol. I p 53). Clearly the bird remains alone are not conclusive evidence for suggesting that the valley was under cultivation at this time but they would certainly reinforce any positive evidence gained from pollen and plant studies.

The preferred habitats for all the species of birds found in the two levels of Roman occupation are very similar, with most of them exploiting the resources of the valley bottom, while the Rock thrush occupies its rocky slopes and the corvids extend their feeding range into the grasslands of the hill above. (see Table 6). The question remains as to

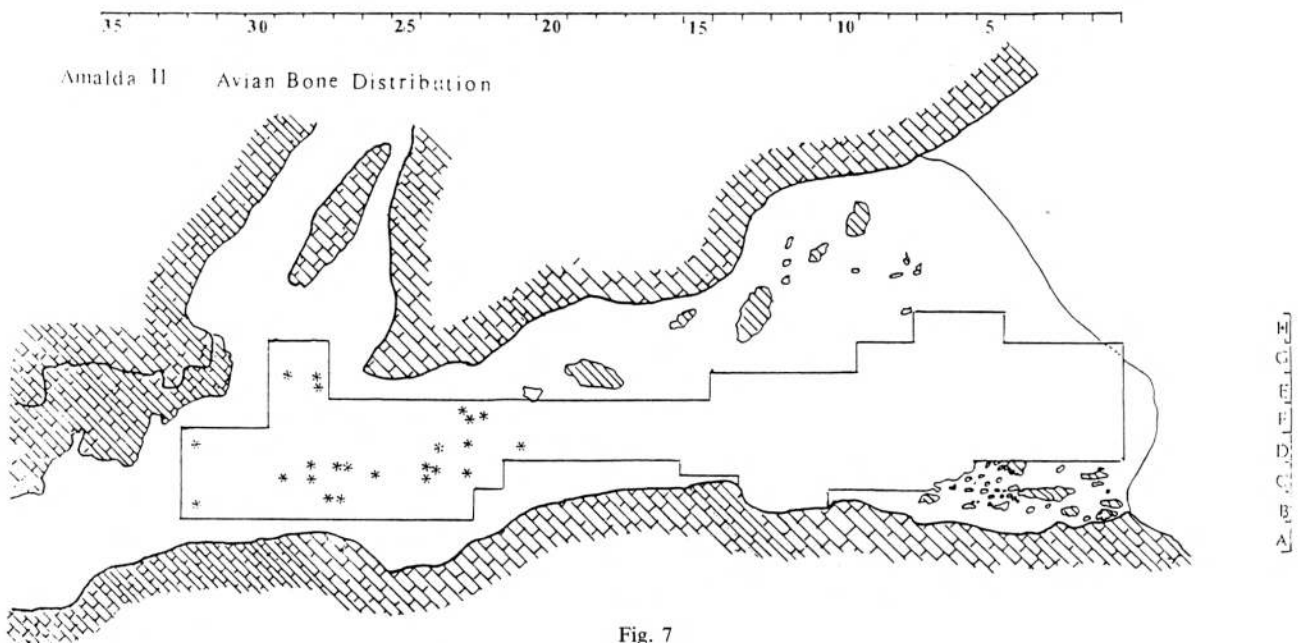


Fig. 7

Amalda Level I & II Avian habitat zones local to the cave

Table 6

Mountain & Hill cover	Garrigue	Rock, Scree & Gorge	Valley meadow	Woodland	River
			←	<i>Columba palumbus</i>	
			←	<i>Lullula arborea</i>	
←	<i>Oenanthe oenanthe</i>				
←	←	<i>Monticola solitarius</i>	<i>Turdus philomelos</i>	→	
	←		←	<i>Fringilla coelebs</i>	
			<i>Pyrrhula pyrrhula</i>	→	
←			<i>Coccothraustes</i>	→	
			<i>coccothraustes</i>		
	←		<i>Corvus corone</i>		
←	←	<i>Pyrrhocorax</i>			
		<i>pyrrhocorax</i>			

Amalda I Avian Bone Distribution

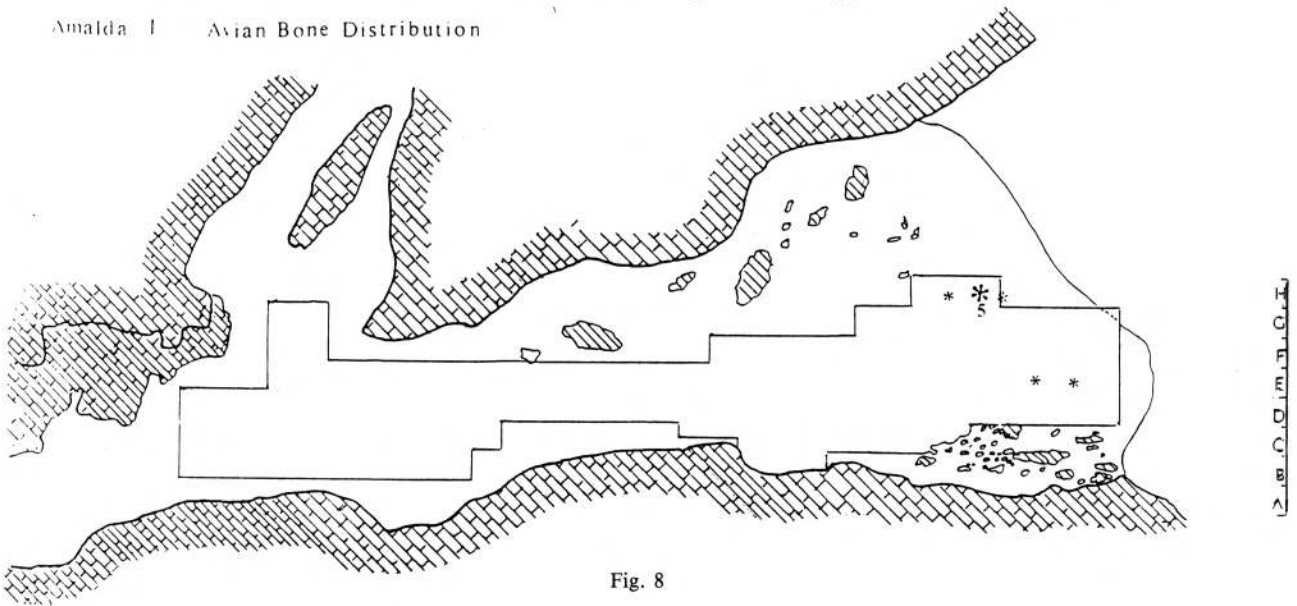


Fig. 8

whether during Roman times the small birds were killed and eaten, or whether they were brought to the cave for some other reason. The largest group is the thrush family, the *Turdidae*, all of which remain popular delicacies in the modern cuisine of parts of Europe. The same would apply to larks and to the finches in these two fourth century occupation levels (Larousse Gastronomique ed. 1961 p581 and p957-8).

**CONCLUSIONS**

An important feature of the bird remains at Amalda is that in all levels they are closely related to the ecology of the environment immediate to the cave. There are no species which could not have been encountered within a limited radius of its entrance as indicated on the map (Fig. 1) and

none which would certainly have needed to be imported from any distance. For instance, despite the fact that there were a few marine mollusca in all Palaeolithic levels, there is no sign that any species of sea or shore bird was ever brought back to the cave.

Another feature of the site is that the avian material gives little evidence with regard to seasonality in the Palaeolithic occupation levels. With the exception of *Oenanthe oenanthe*, in level IV, which was a summer visitor, and *Turdus viscivorus*, the Mistle thrush, which is a partial migrant in Winter, all the species are normally sedentary so that seasonal indications are somewhat negative. The total absence of Summer migrants in levels VII, VI and V may suggest the possibility of an Autumn or winter occupation, but equally it does not entirely exclude other times of year. The rocky crevices and cliff face at Amalda, with the river below would appear to offer the potential of an ideal habitat for a number of migratory species, in

particular for the *Hirundidae*, Swallows, and *Apodidae*, swifts and their absence must be noted.

It is possible that the *O. oenanthe* of level IV could indicate some difference in occupation or an overlap between their arrival and the human inhabitants. Wheatears begin to arrive in the more southerly areas of Western Europe between mid-March and mid-April and to move South again from August to October or November. But because it is only one bone any comments are necessarily tentative.

Even though the problem is not irreconcilable, there does appear to be a degree of discrepancy between the bird fauna in the Palaeolithic sequence, which remains broadly similar throughout, and the palynological and sedimentary evidence of climatic conditions, which shows quite considerable fluctuations. There is a marked non-conformity in Level VI, where 'cold' climate indicators include both *Rangifer tarandus*, Reindeer, and *Alopex lagopus*, Arctic fox, in the mammalian fauna, while the avian species are not entirely comparable. There are a number of owls, particularly those species with a preference for open conditions. But, where an association of *Nyctea scandiaca*, Snowy owl with the Reindeer and Arctic fox might be anticipated, the species actually recovered were *Bubo bubo*, Eagle owl, *Asio otus* and *Asio flammeus*, the Long and Short-eared owls; and in a situation where *Lagopus* or *Tetrastes bonasia* might be looked for, the Galliform present at the time was *Perdix*. There would appear to have been at this period sufficient plant growth to support the populations of land mollusca, anelidae, insects and adequate supplies of young buds and seeds for the food requirements of the resident *Turdidae* and *Emberizidae*. It must be concluded that, while all the birds in this level are tolerant of a wide range of climatic and ecological conditions, they are not typically those normally associated with a fully 'cold' fauna.

## COMPARISONS

If an examination of the Amalda birds is made in relation to comparable sites in the regions of Cantabria, the Pyrenees, Languedoc and Northern Catalonia, parallels may be found but also significant differences.

A systematic comparison is tabulated in Appendix I. It is set out as a check list of the birds at Amalda and comparisons made in three separate areas.

Initially, comparisons may be made with material from the immediate locality. The cave of Erralla, situated 3½ kilometres upstream in the same valley of the Azolaras contained a level of lower Magdalenien industry, which belongs to a stage of Dryas I and carries C14 dates of 16,270 - 15,740 B.P., which roughly approximates to the dating of the later stages of level IV at Amalda: 16,200 +/- 380 and 16,909 +/- 240 B.P.

The two sites have some sedentary species in common: there were Mallard, Falcons, Doves, Wheatear, Blackbird, Buntings and Chough. Further species appeared in the other levels at either site. However, unlike Amalda, there were at Erralla species imported from the river estuary and the sea coast, along with a variety of Summer migrants like Swallows, Shrikes, Reed warblers and Wryneck. There is divergence also in the raptors; amongst the three species

of owl at Erralla, bones of *Nyctea scandiaca*, the Snowy owl occurred in two phases of the Dryas I deposit.

On the other side of the massif, in the main valley of the Urola river, there were at the cave of Ekain lower Magdalenien levels of comparable date. Here the bird fauna was mainly made up of sedentary species which could have lived quite close to the cave but it too included a number of Summer visitors and partial migrants like Swallows and Wheatear, giving positive seasonal indications about the occupation of the cave.

The wider systematic comparison is based on the studies of C. Mourer Chauvire (1975, 1986) and P. Vilette (1983). Examination of this data shown in appendix I makes it clear that many species, which were relatively numerous at Amalda, were not surprisingly equally common elsewhere. The reasons may be that like *Columba livia* or *Pyrhacorax* rocky cliffs and gorges in the neighbourhood of limestone caves is their naturally preferred habitat; or that like the Anatidae and other waterbirds they were favoured food items and frequently available from rivers and other wetlands near to the caves; or that, like the *Turdidae* the species was always very widespread over S.W. France and N.W. Spain where humidity levels remained high, promoting an abundance of their favoured animal and plant foods.

Regional differences in distribution appear to have existed. It would appear for instance that some raptors were more common towards the Centre and Western end of the Pyrenees than in the East, Languedoc and Catalonia. There appears to have been a larger population of *Accipiter gentilis*, *Aquila chrysaetos* and *Falco peregrinus*, in that they were found in larger numbers in more Palaeolithic deposits on the Western side while their place was taken on the Eastern side by other kinds of predator.

Conversely, the family of the *Tetraornidae*, in particular the different species of *Lagopus*, common throughout the Pyrenees and many parts of S.E. France during glacial periods are only occasionally found on sites in N.W. Spain. There were a few individuals at Urtiaga and Aitzbitarte IV in Guipuzcoa and a single bone at La Riera in Asturias. It is *Perdix* which was the most usual species of Galliform along the Cantabrian coast.

The Owls at Amalda have already been discussed. It is interesting that the Eagle owl was less common in the Pyrenees than the Snowy owl which was at some periods very common. The local comparison with Erralla is relevant in this context.

A further feature is revealed by a comparison of regional distribution concerning the *Emberizidae* and *Fringillidae*, the family of the Buntings and the Finches. At Amalda as at other sites in N.W. Spain *Emberiza calandra* and *E. citrinella* were found in the context of Wurm III and Wurm IV deposits. Yet these species have been recovered much less frequently in France before the Holocene. Likewise *Carduelis carduelis*, the Goldfinch, was found in the context of Dryas I at Erralla but not until the Neolithic at Abeurador in Languedoc. The Calcolithic and Roman levels at Amalda contained other Finch species: *Fringilla coelebs*, Chaffinch, *P. pyrrhula*, Bullfinch, and *C. coccothraustes*, Hawfinch, which is consistent with their recovery in Holocene deposits elsewhere. How far the spread of these and the Bullfinch in particular may be linked to plant and fruit cultivation is a matter for further research.

The distribution of two Corvids, *Pica pica*, the Magpie, and *Garrulus glandarius*, the Jay shows another difference between Eastern and Western regions. Neither was as common in Languedoc and the East of the Pyrenees as in the West. Since the Jay is very much a woodland bird, the ecological inferences of its distribution during the late Pleistocene and early Holocene may be significant if the palynological data is consistent.

To summarise these conclusions: they attempt to demonstrate how intensive studies of the avifaunas of individual sites within the ecology of their immediate environs when brought into the wider context of the regional patterns of bird distribution, may extend the ecological record over increasingly precisely defined periods of time. In this sense the data from Amalda makes a contribution to the detailed reconstruction of environments from the past.

## APPENDIX I

Amalda	Cantabria	Western & Central Pyrenees	Languedoc & Catalonia
<u>Anas platyrhynchos</u>			
Wurm I/II Level VII		Aurensan 34200 Soulabe	Toucnal 29000
Wurm III Level VI	Isturitz	Saltpetriere	22350 + 100 20500 + 300 19100 + 500 18700 + 500
	Ekain VII 16510 + 270	Junqua Isturitz	Bois des Brousses
Wurm IV Level IV	Erralla Dryas I 14550 + 300	Espelugues Aurensan inf. Isturitz Espeche Gourdan Gourdis Trois Freres 13400 + 1000 Mas d'Azil La Vache Belvis (Aude) Crouzade	
Bronze			Fontjuvenale
<u>Accipiter gentilis</u>			
Wurm VIII Level VI	Erralla V	Isturitz Crouzade	
<u>Aquila chrysaetos</u>			
Wurm I/II Level VII		Isturitz VIII Espelugues Brassempouy Tarte Camayot Embulla Sol. Crouzade Duruthy Magd IV Isturitz Espelugues Aurensan inf. Espeche Crouzade	Toucnal 12860 + 320
	Urtiaga 15000 + 140		
<u>Falco peregrinus</u>			
Wurm III Level V	Isturitz	Salpetriere	
Wurm IV Level IV	Urtiaga 15000 + 140	Trois Freres	

Amalda	Cantabria	Western & Central Pyrenees	Languedoc & Catalonia
<u>Falco tinunculus</u>			
Wurm III Level V	Aitzbitarte 17950 + 100	Isturitz Harpons	Ab. des Pechours VIII B. des Brousses Arbreda.
Level IV.	Erralla 16270 + 240 16200 + 240 15740 + 240 Ekain. L. Magd. 15400 + 240 16510 + 240 La Riera. Azil. 14760 + 400 10630 + 120	Isturitz Mas d'Azil. 13400 + 1000 13200 + 110 Espelugues. Aurensan inf. 14280 + 300 13910 + 230 Espeche Gourdan Trois Freres	Cingle Vermell 11620 + 140 Font Juvenal. 4160 + 90.
<u>Perdix perdix.</u>			
Level VI. Wurm III	Aitzbitarte IV.	Gatzarrin Tarte Crouzade Isturitz.	Salpetriere 28180 + 1000 20630 + 770
Wurm IV.	Urtiaga. 17050 + 140		Arbreda Roca de la Melca 20900 Ab. des Pechours Gazelle 15070 + 190 Grotte Toucnal 14530 + 510 12860 + 320 Belvis Magd. 12270 + 280 Cingle Vermell 11620 + 140 Roca Gran 11700
	Erralla Dryas I 14570 + 140	Embulla	
	La Riera Azil, 14760 + 400		
<u>Columba palumbus</u>			
Level I Roman.			
<u>Columba livia</u>			
Wurm III	Aitzbitarte IV	Crouzade Rideaux Harpons Aurignac Embulla Aurensan Espeche Rhodes Belvis	Salpetriere 28180 + 1000
Wurm IV Levels V, IV & III	Urtiaga, all levels Erralla Magd. 14570 + 300		Cingle Vermell 11620 + 140
<u>Bubo bubo</u>			
Wurm III Level VI 27400 + 1000 Wurm IV		Soulabe Early Wurm Camayot  Isturitz Gourdan Trois Freres Mas d'Azil	
<u>Strix aluco</u>			
Wurm IV Level IV 17580 + 440 -16200 + 380	La Riera 12620 + 300		Fontbregoua 9570
<u>Asio otus.</u>			
Wurm III Level VI 27400 + 1000 Wurm IV		Olha Wurm I/II Aurensan  Espelugues Rhodes II	Salpetriere 28180 + 1000
<u>Asio flammeus</u>			
Wurm III Level VI Wurm IV		Aurensan Wurm I/II  Rideaux Espelugues Espeche Trois Freres Belvis	
<u>Galerida cristata</u>			
Wurm I/II Level VII Wurm III Level VI 27400 + 1000 Wurm IV		Gerda Riss/Wurm  Rideaux  Espelugues Espeche Trois Freres Belvis	Arbreda



**AMALDA AVIFAUNA: APPENDIX II**

Below are listed all the measurements for the bird bones. this is arranged on a systematic basis level by level. The columns are set out as follows:

1. Level.
2. Bone.
3. Laterality.
4. Greatest length.
5. Proximal breadth.
6. Smallest dimension of the corpus.
7. Distal Breadth.

These dimensions are standard. (A.Von Den Driesch 1976)  
All measurements are in mm.

**Anas platyrhynchos**

VII	radius				
VI	sternum				
	scapula	LII	11.15		
V	furcula fragment				
IV	furcula 2 fragments				

**Accipiter gentilis.**

VI	humerus	LII		14.00	
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**Aquila chrysaetos**

VII	vertebra				
	phalanges 2		35.55	16.85	9.80

**Falco peregrinus**

V	femur	RII		10.30	
IV	femur	LII		10.25	
	tarsometatarsus	LII			9.85

**Falco tinnunculus**

V	tarsometatarsus	LII			6.40
	phalanges 2				
IV	coracoid 2	LII	22.00	10.50	11.80
		RH		29.50	
	tibiotarsus	LII			6.35
	synsacrum, vert.		19.25		
	cranium fragments				

**Perdix perdix**

VI	humerus				
	ulna	RII		3.45	6.20
	femur	RII.		9.30	

**Columba palumbus**

I	ulna	RII.			
	carpometacarpus	RII	37.6	10.8	7.90

**Columba livia**

V	humerus	LII.			
	ulna	RII.		7.75	
	femur	LII.			
IV	humerus 4	RII.			10.35
					10.75
	ulna 3.	LII.	6.85	4.05	
		RII.		6.70	
	femur	RII.			7.55
	tibiotarsus 3	RII			6.70
III	humerus	LII.			10.50
	carpometacarpus	LII.			

**Bubo bubo**

VI	scapula	LII.			
	coracoid	RII.			
	phalange		25.30	7.30	7.10
	claws 2			15.50	

**Strix aluco**

IV	phalange		15.60		
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**Asio otus**

VI	tibiotarsus 2	RII			
		RII.			8.25
	tarsometatarsus	LII.		7.95	
	claw		16.80		

**Asio flammeus**

VI	femur	LII.			12.55
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**Galerida cristata**

VII	ulna	RII.			3.25
IV	carpometacarpus	RII.	16.80	4.15	4.00

**Lullula arborea**

II	humerus	LII.	24.10	7.25	2.25 5.00
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**Phylloscopus colybita**

III	carpometacarpus	LII.	10.25	2.25	2.50
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**Oenanthe oenanthe**

IV	tarsometatarsus	RII.			2.50
III	tarsometatarsus				

**Monticola solitarius**

III	ulna	LII.		4.75	2.50
		LII.	31.35	4.50	2.35 4.00
		LII.		4.50	
II	humerus	RII.	27.20	8.30	2.75 6.20
I	humerus	RII.	26.45	7.55	2.65 5.25
		RII.	26.05	8.20	2.70 6.20
	ulna	RII.		4.45	2.50

**Turdus merula**

VI	humerus	RII.	31.85	10.50	8.45
IV	humerus 2	LII.	31.65	10.30	3.3 3.30
		LII.		9.45	
III	tarsometatarsus	LII			3.85
II	Humerus	LII		9.30	

**Turdus philomelos**

VII	humerus	LII.		8.45	
	ulna	LII.			
II	humerus	RII.		8.85	
I	ulna	RII.	32.70	4.30	2.65 3.75
		LII.		4.85	
	carpometacarpus	RII.	21.00	5.20	4.35

**Turdus viscivorus**

VII	ulna	LII.	39.00	5.50	2.80 4.45
	tibiotarsus	LII			2.15 4.40
VI	ulna	LII.	39.00	5.50	4.75
		RII.			5.15

**Emberiza calandra**

VII	ulna	LII.		4.10	2.05 3.65
		RII.			2.20 3.75
VI	humerus	LII.		7.45	
	ulna	LII.		3.40	
	carpometacarpus	LII.	27.25	4.45	4.00
V	ulna	LII		4.15	
IV	ulna	LII.		4.20	2.45
		RII.			3.85 2.05

**Emberiza citrinella**

VII	ulna	RII.		3.90	2.00
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**Fringilla coelebs**

III	humerus	RII.	18.25	6.20	1.85 4.80
II	humerus	LII.		6.00	

**Pyrrhula pyrrhula**

II	humerus	LII.		6.05	1.75
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**Coccothraustes coccothraustes**

I	mandible. Length to nares			16.50	prox. Bd 14.80.
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**Garrulus glandarius**

VI	femur	RII.		8.00	
III	humerus	RII		12.35	

**Pica pica**

V	coracoid 2	RII.	28.65		
	humerus	RII.		14.85	
		RII.		14.50	
	ulna				
	femur				7.65
IV	tarsometatarsus 2.				
	coracoid 2	RII.	30.25		
	humerus 2			13.70	
	ulna 2	LII.			7.15
		RII.			7.10
	femur	LII.			7.75
	tarsometatarsus 2				

**Corvus corax**

VI	claw				
IV	claw				19.80

**Corvus corone**

VII	ulna2	LII.			
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**Pyrhocorax pyrrhocorax**

VII	ulna	LII.		8.00	
		RII.		7.70	
	carpometacarpus	LII		8.70	
				9.50	
				8.80	
	tibiotarsus	LII.			6.65
		RII.			7.75
		RII.			11.55
VI	humerus	LII.	24.90	3.85	1.95 3.20
	ulna				7.75
	carpometacarpus.	RII.		8.95	
				9.70	
				9.05	
				9.10	
				9.00	
V	tibiotarsus	RII			7.35
	ulna	RII			8.90
				8.25	
	carpometacarpus	LII.	37.80	9.20	7.05 9.30
		RII	36.25	10.10	5.50 6.45

IV	humerus	LH.	44.05	14.05	4.85	11.85
		RH.	44.30	5.55	8.45	8.40
				13.80		
	ulna	LH.			7.00	
					8.00	
				3.95	7.35	8.00
			8.85			
		RH.		7.80		
				7.50	8.00	
		8.35		7.95		
		8.00		8.10		
	carpometacarpus	LH.	34.40	8.50	8.20	
		RH.	33.40	8.00	8.50	8.80
	femur	RH.		9.40	8.80	
				9.40	8.50	9.20
			36.75	10.25	8.45	
				9.35		
	tibiotalarsus	RH.	39.65	7.95	3.60	8.60
		LH.			3.50	7.05
	tarsometatarsus	RH.			6.80	
		RH.		7.15	7.40	
				8.50		
					5.35	
III	femur	RH.	39.45	7.80	3.45	8.00
II	tarsometatarsus	RH.		8.85		
		LH.	32.35	7.85		7.85
	coracoid	LH.				
	carpometacarpus	RH.		10.05		
	tibiotalarsus	LH.				7.00

NOTE on measurements of *Pyrhocorax*: only bones for which measurements were obtainable are recorded.

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