CHAPTER 1 - INTRODUCTION:

Captive birds, their biology and its relevance to their care

Birds have for long been a source of fascination and pleasure to the human race. This is largely on account of the ease with which many species can be seen, the attractive colours and songs of some and the willingness of substantial numbers of them to live in close proximity to *Homo sapiens*.

Birds have also played an important part in human culture and tradition. Archaeological evidence indicates that some species, such as eagles, were considered to be symbolic of war, storms and fertility over 5,000 years ago. Birds feature, in some guise or another, in most of the great religious and secular writings of the past. Their beauty is often lauded and in some cases our responsibility for them is emphasised. For example, in a story that is recounted in both the Bible and the Koran, the tending of young birds that have been stranded is extolled as a virtue. Many of the great religious and secular manuscripts, dating from 700 AD to the Renaissance, depicted birds, often in remarkable detail, and the reader who is interested in this aspect is encouraged to read the study by Brunsdon Yapp (1981) which is listed in the References and Further Reading at the end of this book.

While birds have generally been seen in a good light, a few species have been associated with danger or fear. In some cultures owls are still considered to be a bad omen. The reputation of members of the crow family (Corvidae) still seems to depend upon the species involved; ravens and crows bring bad luck while rooks are generally a good omen, especially in country areas. The albatross, immortalised in Coleridge's poem "The Ancient Mariner" has traditionally been viewed with suspicion, a portent of ill fortune, by sailors. However, these examples are few compared with the many instances when birds are portrayed as beneficial, as friends of the human race and worthy of consideration and protection.

The attraction of birds has not been confined to those that are free-living in the wild. For thousands of years humans have been interested in the keeping of birds in captivity – primarily as a source of eggs, meat and feathers but also, in some cultures, as companion animals (pets), for exhibition or for study. Thus, bird-keeping has been a feature of Chinese life for at least three millennia and it continues to play an important cultural role there and elsewhere.

The role of domesticated birds in the development and well-being of the human race cannot be over-estimated. A major contribution was (and remains) as a source of food. The domestic fowl *Gallus domesticus* (see Fig. 1.1.) provides nearly twenty five percent of the world's animal protein, and without this many communities would not survive. The domestic fowl has also contributed greatly to scientific knowledge; for example, our understanding of immune processes is based very much upon studies in the fowl and B lymphocytes, present in all mammals including humans, are still named after the bursa of Fabricius, that was first described in that familiar bird. Knowledge of avian diseases and pathology also owes much to work on chickens and other domesticated species of poultry. It is an interesting and disturbing thought that the red jungle

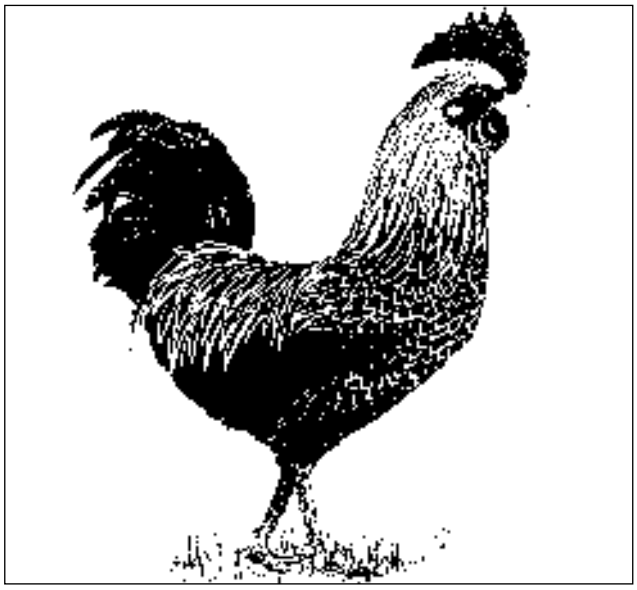

Figure 1.1. A domestic fowl.

fowl, *Gallus gallus,* the progenitor of the domestic chicken (which, as explained above, has contributed so much to the human race) may now be threatened in much of its range in South East Asia. This is a pertinent reminder that concern for birds in captivity must go hand-in-hand with concern for their conservation in the wild.

Birds have not only been kept for pleasure and as a direct source of eggs, meat and feathers. They have also been used widely for hunting – for example, birds of prey such as hawks which for centuries have been trained for falconry. Even cormorants have been employed to catch fish, by the Chinese and others. Examples of birds that have been domesticated are given in Table 1.1. The domestication and use of birds have helped in the accumulation of information on the natural history, biology, health and welfare of this fascinating group of animals.

Table 1.1. Some examples of birds that have been domesticated.

Species	Origin	Present distribution	History and uses
Domestic fowl *Gallus domesticus*	Red junglefowl, *Gallus gallus,* and possibly other species, S E Asia	Worldwide	Domesticated in Asia 4000 or more years ago; taken elsewhere by traders; used for meat, eggs, feathers and sport
Domestic turkey *Meleagris gallopavo*	Wild turkey, *Meleagris gallopavo*, America	Worldwide; wild turkeys introduced into New Zealand, Germany and Hawaii	Domesticated in Mexico and elsewhere at least 1000 years ago; taken to Europe in 16th century by Spaniards; used for meat
Domestic guineafowl *Numida meleagris*	Helmeted guineafowl, *Numida meleagris,* Africa	North America, Europe, Asia and Africa in captivity or free-ranging; introduced elsewhere eg Madagascar, Comores and Antilles	Kept and sometimes bred by Romans 2000 years ago; West African stock taken to Europe by Portuguese in 15th century; domesticated in Europe, re-exported elsewhere; used for meat, eggs, feathers and exhibition
Domestic duck *Anas platyrhynchos*	Mallard, *Anas platyrhynchos,* Eurasia	Worldwide in captivity; free-living population more restricted; introduced into many countries	Probably domesticated in Asia/China 3000 years ago, and subsequently in other parts of the world; many varieties; used for meat, eggs, feathers and exhibition
Muscovy duck *Cairina moschata*	Free-living Muscovy, *Cairina moschata,* South America	In captivity in many parts of the world	Kept and bred by local people in Columbia and elsewhere at least 1000 years ago; used for meat, eggs and feathers
Domestic pigeon *Columba livia*	Free-living rock dove, *Columba livia,* Middle East	Both the domestic pigeon and its feral or free-living relatives are now found throughout the world	Domesticated in Mesopotamia, Egypt and elsewhere at least 4000 years ago and probably subsequently elsewhere; many varieties; used for meat, eggs, sport and carrying messages
Ostrich *Struthio camelus*	Various subspecies of the free-living ostrich, *Struthio camelus* Africa	Reduced range in Africa (free-living) but in captivity in Europe and North America; feral ostriches in Australia	Kept and bred in captivity in Sudan at least 200 years ago; domesticated on a large scale in South Africa in 19th century, and more recently elsewhere; used for meat, hide, feathers, etc.
Cormorant *Phalacrocorax carbo sinensis*	Free-living cormorant, *Phalacrocorax carbo*	Captive birds restricted to Far East	Kept and bred in captivity in China 1000 years ago and in Japan 1500 years ago; still bred on small scale; used for fishing

Various birds of prey especially falcons Family Falconidae	Free-living species eg peregrine, *Falco peregrinus,* Europe, North America and elsewhere	Captive and free-living birds in many parts of the world	Many species trapped for falconry for hundreds of years; in past 30 years captive breeding has become widespread and a number of species can now be considered to be domesticated; hybrids also produced; used to catch mammals and birds and to deter pests, exhibition
Various passerine and psittacine birds Orders Passeriformes and Psittaciformes	Free-living species eg canary, *Serinus canaria,* and budgerigar, *Melopsittacus undulatus*	Some species now very restricted in wild e.g. canary, but widespread in captivity in many parts of the world; others eg budgerigar, still prevalent	Kept and bred in captivity by aviculturists for varying periods of time but now domesticated; many colour and morphological varieties; used for companionship and exhibition

(Adapted, with permission, from Cooper, 1995)

Approximately nine thousand species of bird exist in the world today. Of these no more than a handful, perhaps a dozen at the most, are currently domesticated and these include some species kept for pleasure as well as birds that are used for food. Examples of these are given in Table 1.1. above.

It is important at this point to stress that the term 'domesticated' is not synonymous with 'captive'. A domesticated animal, whether a bird or a mammal, has various specific characteristics which were listed by Mason in his book *Evolution of Domesticated Animals* (1984).

A domesticated animal:

- Breeds under human control.
- Provides a product or service useful to humans.
- Is tame.
- Has been selected away from the wild type.

Domesticated birds, in general, fare well in captivity because they have adapted to close proximity to humans and to the various other features of confinement that can prove stressful to animals that have only recently come in from the wild. It is for this reason that many people recommend that a budding bird-keeper should first learn how to keep a domesticated species before he/she embarks on something more exotic. For instance, experience gained with quail and pigeons can prove invaluable when one moves on to psittacine birds and exotic pheasants.

An understanding of the biology and natural history of birds is vital if one is to keep them in captivity. Biology relates to such scientific aspects as taxonomy, anatomy and physiology. Birds are vertebrate animals (ie similar in basic anatomical terms to mammals, reptiles, amphibians and fish) and are in the class Aves. The nine thousand species are further sub-divided into orders, which can be recognised by the suffix ' –formes'. Thus, the largest order of birds is the 'Passeriformes'; this means 'sparrow-like', and the order encompasses most of the familiar perching birds of the garden and countryside. Some examples of orders of birds are given in Table 1.2.

In recent years DNA studies have cast doubt on the classification of some birds – for example, it now seems likely that the Falconiformes (eagles, hawks, falcons etc) may be very closely related to the Ciconiiformes (storks) – but in this book traditional classification, based on anatomical criteria, will be followed.

The scientific names of birds are important as these are recognised internationally. A Russian or Indonesian ornithologist knows *'Passer domesticus'* even if he/she does not call it a 'house sparrow'. In this book the scientific names are sometimes (depending upon the circumstances) given in the text, are always provided in Tables and in most cases are also listed in Appendix I.

The Psittaciformes and Passeriformes have provided many of the birds that are kept in captivity for pleasure. Some information on birds in these two orders is given in Table 1.3., together with biological data on their origins, adult weight and particular features in captivity.

Table 1.2. Examples of orders of birds.

Order	Groups covered	Examples
Passeriformes	'Perching birds' such as thrushes, starlings, finches	Greater hill mynah *Gracula religiosa* Canary *Serinus canaria*
Psittaciformes	'Psittacines' – parrots and their allies	African grey parrot *Psittacus erithacus* Budgerigar *Melopsittacus undulatus* Cockatiel *Nymphicus hollandicus*
Falconiformes	'Diurnal' or 'falconiform' birds of prey such as hawks, eagles and falcons	Kestrel *Falco tinnunculus* Sparrow-hawk *Accipiter nisus* Golden eagle *Aquila chrysaetos*
Strigiformes	'Nocturnal' or 'strigiform' birds of prey - owls	Tawny owl *Strix aluco* Barn owl *Tyto alba*
Columbiformes	Pigeons and doves	Domestic pigeon *Columba livia* Wood pigeon *Columba palumbus*
Anseriformes	Ducks, geese and swans	Mallard *Anas platyrhynchos* Mute swan *Cygnus olor*
Galliformes	Gamebirds	Japanese quail *Coturnix coturnix* Peafowl *Pavo cristatus*

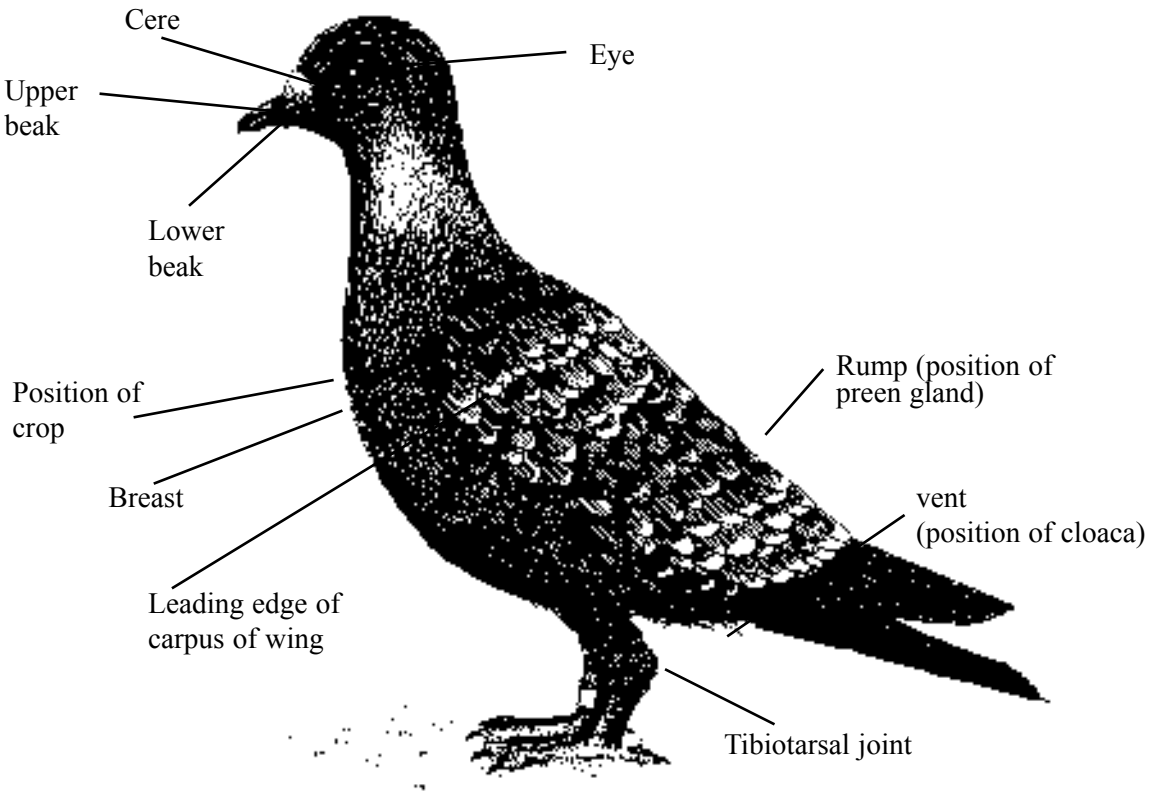

Figure 1.2. External features of a bird - a domestic pigeon.

Table 1.3. Some examples of psittacine and passerine birds that are often kept in captivity.

Species	Origins	Adult weight (grammes)	Comments
Order: Psittaciformes (parrot-like birds)			
Budgerigar *Melopsittacus undulatus*	Australia	30-70	The most popular pet bird in Europe and North America. Many colour forms and varieties.
African grey parrot *Psittacus erithacus*	Africa	240-450	One of the most popular parrots. A good talker and mimic. Breeds infrequently in captivity.
Cockatiel *Nymphicus hollandicus*	Australia	100-140	Breeds readily in captivity. Many colour forms available.
Greater sulphur crested cockatoo *Cacatua galerita galerita*	Australia	600-800	Popular in Europe and America. Breeds readily.
Ring-necked parakeet *Psittacula krameri*	India and Arabia and Africa	100-200	The most popular parakeet. Breeds readily.
Blue-fronted Amazon parrot *Amazona aestiva*	South America	250-500	One of the most popular of the Amazon parrots. A good mimic.
Blue and gold macaw *Ara ararauna*	South America	3000-4000	The most popular macaw.
Fischer's lovebird *Agapornis fischeri*	Africa	50-70	One of a number of species of lovebird. Breeds prolifically.
Swainson's lorikeet *Trichoglossus haematodus*	Australia	200-300	A 'brush-tongued' parrot which requires nectar and soft fruit. Not suitable for the beginner.
Order: Passeriformes ('perching birds')			
Canary *Serinus canaria*	Canary Islands, Madeira and Azores	10-40	Long bred in captivity. Many different breeds available e.g. Border, Norwich, Fife.
Zebra finch *Taeniopygia castanotis*	Australia	10-20	Breeds readily in captivity. Many colour forms.
Gouldian finch *Poephila gouldiae*	Northern Australia	16-20	Popular with aviculturists. One of the 'Australian finches', prone to respiratory mites and other conditions.
Greenfinch *Carduelis chloris*	Europe	15-25	One of a number of British finches that can be crossed with canaries to produce 'mules'.
Java sparrow *Padda oryzivora*	South East Asia	20-35	Popular aviary species. Several colour forms. Breeds readily.
Orange-cheeked waxbill *Estrilda melpoda*	Africa	10-20	A popular species. Inexpensive and hardy.
Greater hill mynah *Gracula religiosa*	Asia	180-250	A typical 'softbill' (see Chapter 3) which feeds on fruit and insects. A popular pet which is a good mimic.

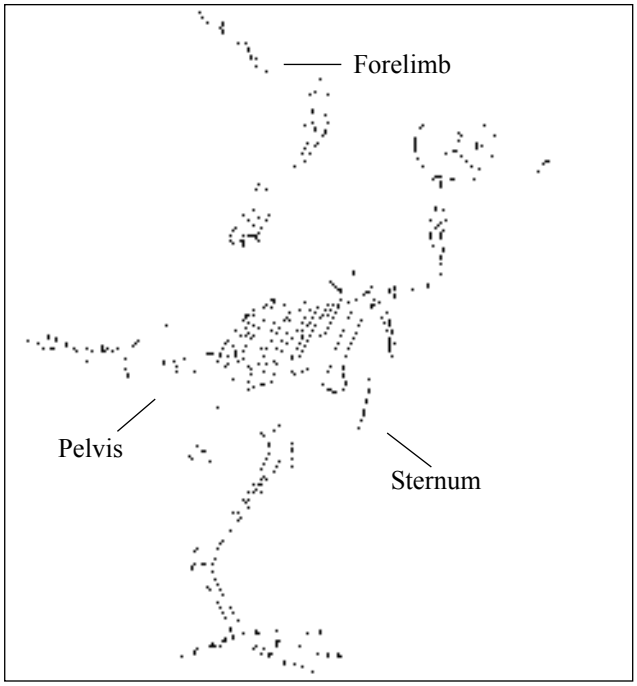

Figure 1.3. The basic features of the skeleton of a bird, showing the vertebrate structure, with the forelimbs modified as wings and modifications to the pelvis and sternum.

The class Aves as a whole is characterised by certain key anatomical features (see Fig. 1.1.). Most important of these is the presence of feathers which are not found on any other living animals. Feathers are an outgrowth of the outer layers of the skin and they show great diversity of structure, colour and function. They are a key part of a bird's survival. Feathers permit flight but also provide insulation and, by dint of coloration and appropriate modifications, play a part in courtship, display, mate selection and competition (see Chapter 7).

The main external features of a bird are shown in Figure 1.1. The basic features of the skeleton, which illustrates well that birds are vertebrate animals, with their forelimbs modified to form wings, are depicted in Figure 1.2. Some of the key biological features of the Aves, using five orders of birds as examples, are listed and described in Table 1.4.

While it is the external features of birds that usually assist in identification and in deciding how to house, feed and tend them, some understanding of the internal anatomy is also important to bird-keepers.

Features that distinguish birds from most other species of animal include:

- (In some species) a 'crop', which is a dilated part of the oesophagus, used for storage of food.
- (In many species) two 'caeca' (singular 'caecum'), paired structures in the lower intestine.
- (In most species (but not the kiwis, *Apteryx*!)), the presence of only one functional ovary, on the left hand side.
- A modified respiratory tract which comprises two lungs, numerous air sacs within the body cavity and sometimes in certain bones, and a 'voice box', the syrinx, which is situated at the base of the trachea, not at the top as is the larynx of mammals.

Birds, like reptiles, have a 'cloaca'. This organ takes its name from the Latin word for a latrine and is the common chamber into which products from the intestine (faeces), kidneys (urates) and reproductive organs (eggs or spermatozoa) empty. The cloaca is also a feature of reptiles and a very few species of mammal but is found in all birds and an understanding of its structure and function can be of great help in diagnosing and treating disease. Some of the important internal organs of birds are depicted in Chapters 8, 9, 10 and 11.

The physiology of birds (ie how their bodies function) is complex and will not be discussed in any detail in this book. The most important physiological features of the class Aves insofar as their care in captivity is concerned, are as follows:

- All birds are endothermic – that is, they can control and maintain their body temperature by internal means. Thus, the body temperature of a penguin (*Spheniscus* species) is likely to remain constant, whether the bird is living free in the Antarctic or inhabits a zoo in southern England. There are some exceptions but the principle is generally sound. Birds and mammals are the only living vertebrates that are truly endothermic.
- The body temperature, metabolic rate and associated body functions of birds tend to be higher in small birds than in large. Thus, a hummingbird will usually have a higher body temperature and a faster heart rate than does a crow or an ostrich. The smaller bird will also

Table 1.4. Some biological characteristics of five different orders of birds.

Feature	Passeriformes	Raptors: Falconiformes	Raptors: Strigiformes	Columbiformes	Anseriformes
Lifestyle	Generally diurnal Essentially 'perching' birds but found in many different habitats	Generally diurnal Spend much of time on land, perching or in flight	Generally nocturnal	Diurnal	Generally diurnal Spend much of time on water, sometimes on land, or in flight
Diet	Vary from entirely herbivorous to largely carnivorous	Carnivorous - whole animals, often including invertebrates		Herbivorous - seeds, leaves, fruit	Some species predominantly carnivorous, some herbivorous, some omnivorous
Moult	Usually annual, after breeding season. In sequence, gradual				Usually annual, after breeding season. Some species go into 'eclipse plumage' when flight may be impaired
Reproduction	Sexual dimorphism a feature of some species	Sexual dimorphism sometimes marked, often slight	Sexual dimorphism generally slight	Sexual dimorphism slight	Sexual dimorphism often marked
Anatomy					
Beak (see Figure 1.3.)	Shape of beak varies according to diet	Hooked beak for eating whole animals		Relatively slender beak for eating vegetable matter	Highly modified beak for seeking and processing different types of food
Crop	Crop usually present	Crop present	Crop absent	Crop present	Crop usually absent
Gizzard	Usually grit present in gizzard (thick-walled)	Generally no grit in gizzard (thin-walled 'ventriculus')		Grit in gizzard (thick-walled)	Grit in gizzard (thick-walled)

Caeca	Caeca vary	Caeca small	Caeca large	Caeca small	Caeca large
Male reproductive organs	←	No distinct penis (phallus) in most species	→		Distinct penis (phallus)
Female reproductive organs	Only one (left) ovary present	Often two ovaries but only left is functional	←	Only one (left) ovary present	→
Trachea and syrinx	←	Trachea and syrinx unremarkable	→		Trachea and syrinx often highly modified in males
Feet	Perch with three digits forward, one back, claws vary	Perch with three digits forward, one back, hooked talons	Perch with two digits forward, two back, hooked talons	Perch with three digits forward, one back, short claws	Perch with three digits (webbed) forward, one (often vestigial) back claw

For English and scientific names of some examples of the orders of birds listed above, see Appendix I.

Table 1.5. Some examples of incubation periods.

Species	Incubation periods		Age at which egg-laying begins	Duration of laying period (temperate areas)	Approximate number of eggs laid
	Average	Range			
Domestic fowl *Gallus domesticus*	21 days	20-22 days	6-8 months	24 weeks	150-250 (or more) *per annum*
Domestic duck *Anas platyrhynchos*	27 days	26-28 days (Muscovy duck 33-35 days)	6-8 months	Up to 48 weeks	Up to 80 or more in heavy breeds; 300 *per annum* in light breeds
Domestic turkey *Meleagris gallopavo*	27 days	25-28 days	10-12 months	12-15 weeks	25-70; selected individuals up to 200 *per annum*
Domestic goose *Anser anser*	30 days	28-38 days	10-12 months	4-6 weeks	20-40 (80) *per annum*
Guineafowl *Numida meleagris*	27 days	26-28 days	9 months	Feb-March	50 *per annum* or more
Peafowl *Pavo cristatus*	28 days	25-29 days	12 months	May-July	Up to 15 per clutch
Domestic pigeon *Columba livia*	18 days	16-18 days	6 months	March-August	Usually 2 in a clutch. 2-3 clutches annually
Mute swan *Cygnus olor*	35 days	34-38 days	2 years at earliest	Second half April, sometimes May	8-12. 1 clutch per annum

absorb, metabolise and excrete medicines more rapidly. As a general rule, the larger the bird, the lower its metabolic rate.

A knowledge and understanding of the points above is important if one has responsibility for the health and wellbeing of birds. Maintenance of body temperature requires expenditure of energy and can be a costly business for a bird. A canary (for example) that is kept at too low a temperature will expend considerable amounts of energy by using its stores of carbohydrate (and sometime also fat) in order to keep warm. As a result, it will lose weight and condition and may either die or become more susceptible to intercurrent diseases or problems. This has to be borne in mind when designing accommodation for captive birds and, in particular, when deciding the best temperature range to provide for them. Some birds are better adapted to cold than are others, while certain species fare well at high temperatures: such differences also have to be taken into account.

The question of metabolic rate is an important one. As was mentioned above, a small bird that has a high metabolic rate will generally absorb, metabolise and excrete compounds more rapidly than will a large bird. This means that medicines for small birds may need to be given at a different dose rate and more frequently than the same medicine for a large bird. This is termed ‘allometric scaling’ and is increasingly being used by veterinary surgeons who work with avian species (see Chapter 14).

All aspects of biology are affected by metabolic rate. For example, a small bird with a high metabolic rate will have a more rapid ‘gut transit time’ than will a large

bird. This means that food will pass through the intestine more rapidly in the former than in the latter. Again, this will have an effect on absorption of nutrients and of medicines (or, indeed, even poisons) if they are ingested.

All birds lay eggs and the incubation periods vary, depending upon the species. Some examples of egg-laying data are given in Table 1.5.

Newly hatched birds fall into two main groups:

- Altricial, which are poorly developed at hatching, usually with eyes closed and no feathers, and totally unable to fend for themselves, eg the young of thrushes, hawks, parrots.
- Precocial, which are well developed at hatching, with eyes open, a layer of plumage and able from the outset to walk, to run and to fend for themselves eg gamebirds, waders.

Not surprisingly, these two types of chick need to be treated differently in terms of management.

This very superficial discussion of anatomy and physiology is intended to introduce the bird-keeper to the particular features of the class Aves. If he/she is to keep birds under optimal conditions, to know how best to nurse them and to tend them successfully when they are unwell, greater knowledge may be required. This is best attained by reading relevant books, papers and information on the internet and by having access to advice from experienced persons.

Knowing where to go for information is sometimes a stumbling block for bird-keepers. The local veterinary surgeon will have some knowledge of avian biology and should know where to find answers to certain questions. The bird-keeper can benefit by working closely with the vet; this is part of the reason for developing a good working relationship between the two, as discussed in more detail in Chapter 6.

All those who keep birds should ensure that they own or have access to relevant textbooks. A subscription to appropriate organisations – both specialist (eg World Pheasant Association) and generalist (eg National Council for Aviculture) is strongly recommended – for legal (see Chapter 15) as well as for practical reasons. Magazines such as *Cage & Aviary Birds* or *Bird Keeper*, or their equivalent in North America or elsewhere, usually contain information that will ensure that the aviculturist keeps up-to-date, not only on avicultural matters but also on the law (see Chapter 15).

The care of birds in captivity is increasingly a specialised subject which cannot be covered in great

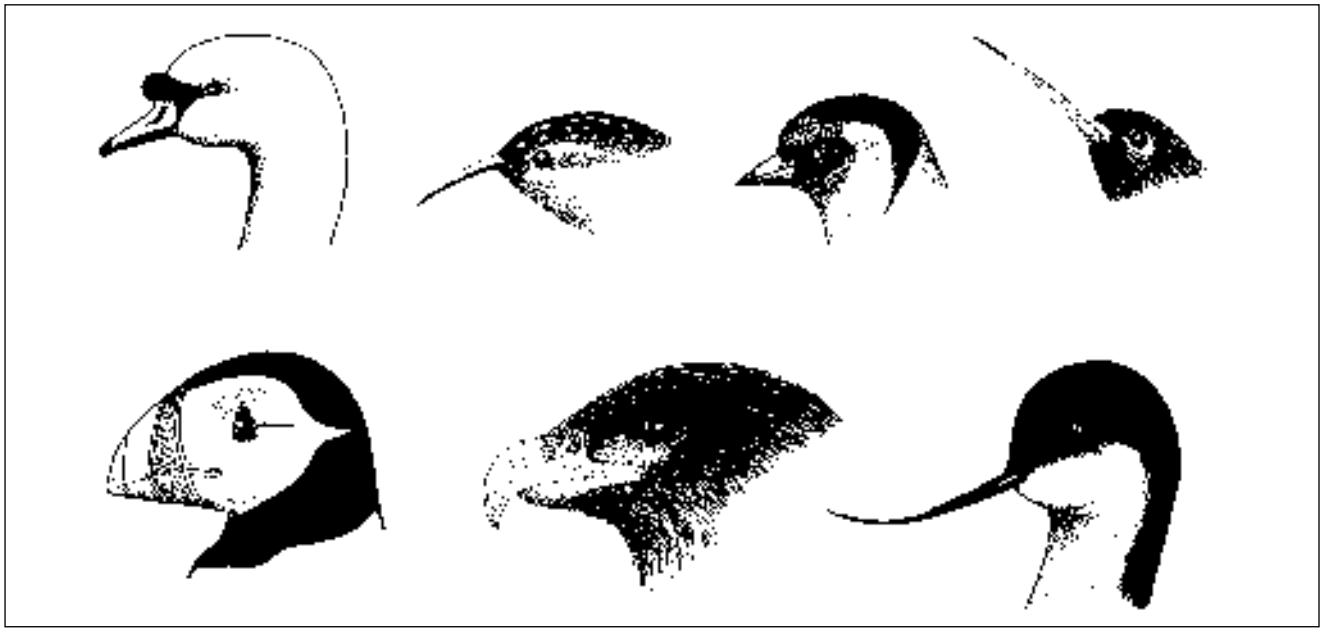

Figure 1.4. The shape of the beak (bill) of a bird reflects its use in feeding. The reader with a knowledge of natural history will recognise those above.

Table 1.6. Recommended methods of handling and restraint of birds.

Group	Main points	Additional points
Small passerines	Grasp in hand or net. Hold in one hand with 2nd and 3rd fingers around head and thumb and 4th and 5th finger around body; release fingers in order to examine wings or to take samples	May stab or bite with beak; thin gloves will help to minimise effect. Use elastic band or sticky tape to seal beak (remember to remove!)
Large passerines	Hold with two hands, around wings. Place on a towel on flat surface to examine wings or to take samples	As above, light (gardening) gloves may facilitate handling
Small psittacines	As for small passerines	As for small passerines but less inclined to stab. Usually not practicable to seal beak: best to restrain head with other hand or to cover it with a cloth or small bag
Large psittacines	As for large passerines. Examination and sampling may necessitate chemical restraint	As for small psittacines: head will need to be restrained or covered by a second person
Small and medium birds of prey (falconiform and strigiform)	As above (large passerines)	The claws (talons) usually present more of a hazard than the beak. Light gloves will minimise effect. Falconers' birds can be handled easily if hooded. Jesses and leashes can be used to advantage to facilitate examination and sampling. Avoid damaging plumage
Large birds of prey	As for small and medium birds of prey. Can use cloth to grasp round wings. Alternatively, catch while bird is perching by seizing legs and quickly turning it upside down: the wings will usually be extended but can be readily folded in to the body.	The feet can be hazardous and it may prove very difficult to loosen the bird's grip without levering out the talons one by one. Use heavy (reinforced) gloves and, where appropriate, falconers' equipment
Pigeons and doves	As for small/large passerines. Pigeon fanciers prefer to hold birds with one hand, around the base of the tail	Rarely bite or scratch. Inclined to defaecate during handling. Feathers readily lost - try to minimise this and other damage to plumage in racing birds
Waterfowl	As for large passerines	May bite: some geese have sharp claws and powerful legs and can inflict severe scratches. Swans and geese may flap wings and prove difficult to restrain
Gamebirds	As for large passerines	May bite, stab with spurs or scratch with claws. Some species eg quail, inclined to leap into the air and may concuss themselves
Waders Storks Herons Cranes	As above, depending on size. Grasp neck of herons, storks and cranes first in order to restrain.	May stab with beak: protect eyes and exposed skin. Handle with care as long legs prone to damage, including fractures. Storks and cranes have strong legs and will kick
Gulls, Terns Shearwaters Petrels	As above, depending on size.	Gulls very likely to stab with beak: always use an elastic band. All this group inclined to vomit during handling: fulmars may regurgitate oil
NB Some birds will remain stationary for a short time, if placed on their backs. However, such ‘tonic immobility’ may be unnecessarily stressful to the bird as well as providing an opportunity to escape.		

detail in any one book. Methods of accommodating, feeding, handling and breeding birds vary according to the species and the facilities available. Nevertheless, the principles are the same and it is those that form the basis of this book.

A knowledge of the natural history of birds is an enormous advantage and it is no surprise that many of the best aviculturists are also excellent birdwatchers. There are many good field-guides available for birds in different parts of the world.

The care of birds in captivity revolves around accommodation, daily care, nutrition, record-keeping and health checks and these are discussed in more detail in Chapter 3.

As is emphasised in Chapter 3, birds vary greatly in their feeding habits and this is often reflected in their beaks (bills) (see Table 1.4). An eagle with a large hooked beak, an avocet with a long curved beak, and a hummingbird with a long tongue clearly are adapted to feed in different ways. There are many variations, some of which are shown in Fig. 1.3.

An aspect of management that will be discussed in this chapter, because it requires some understanding of the biology and anatomy of birds, is handling and restraint.

Birds kept in captivity will need, from time to time, to be caught – perhaps in order to examine or treat them, to apply rings (bands) or to transfer them from one cage or enclosure to another.

Handling techniques cannot readily be taught from a book; practical tuition and 'hands-on' experience are essential. However, some basic principles apply and these are listed below.

- Avoid frightening birds too much during capture. The procedure should be carefully planned and take as short a time as possible.

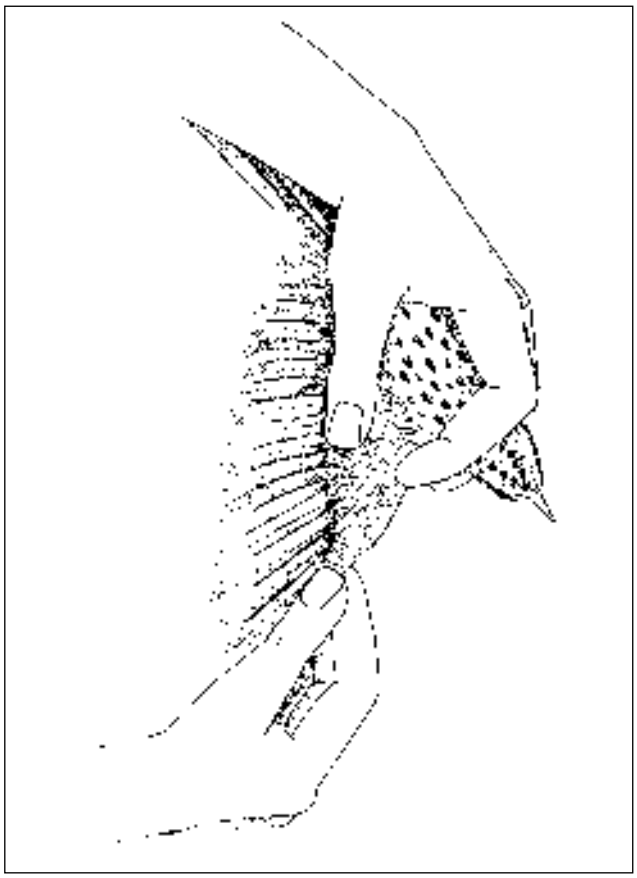

Figure 1.5. A thrush (a small passerine) is examined in the hand; careful restraint permits investigation of the wing and flight feathers.

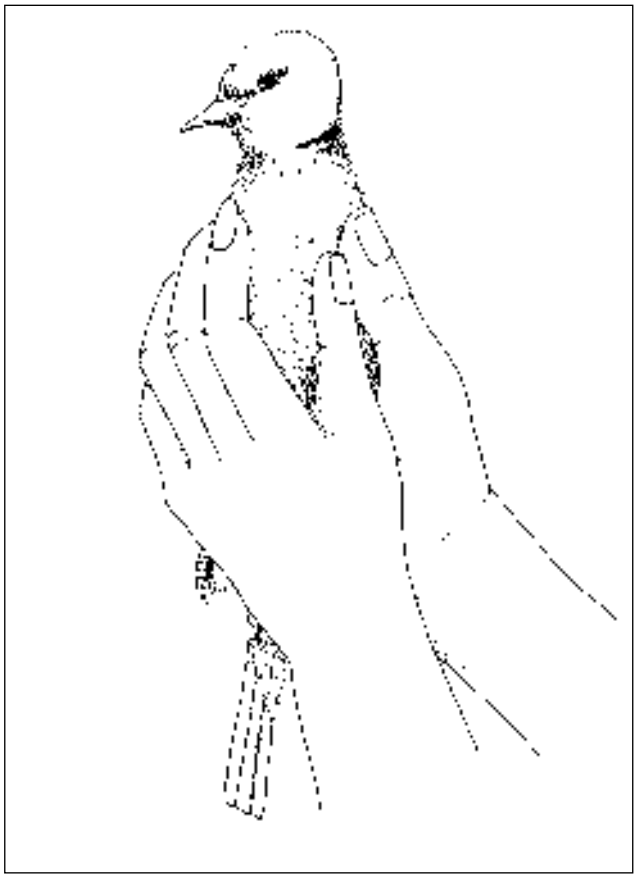

Figure 1.6. A dove is restrained with two hands, thus controlling its wings and preventing unnecessary distress.

Table 1.7. Equipment for handling and restraining birds.

Equipment	Purpose	Comments
Gloves	To reduce damage to handler	Avoid unless essential. Use thin gloves wherever possible: even surgical gloves will minimise wounds. Elbow-length gloves can be useful for large aggressive birds
Nets	To catch and transport birds	Use nets with a padded rim to minimise damage to the bird
Towel/cloth	To wrap around bird in order to facilitate handling and permit restraint for examination/sampling/treatment	An invaluable aid. Various thicknesses (one or more folds) can be used for different purposes
Cloth bag/sack/ stocking/pillow case	To place bird in, so as to minimise struggling and to facilitate weighing and other procedures	Care must be taken not to asphyxiate or damage the bird
Cardboard tubing	As above	Frequently used by field biologists in North America. The bird appears quieter and less easily stressed
Hood or cloth bag	To cover head of (diurnal) bird in order to reduce stress and trauma	A standard method of quietening and restraining falconers' birds: can be used to advantage in many other species. A well fitted hood is preferable to a loose cloth bag
Harnesses and other devices	To restrain bird so as to minimise struggling and facilitate procedures	Many designs available including the 'Guba' used for falconers' birds (see References)
Elastic bands and sticky tape	To seal beak and to protect the handler	Remember: 1) that the bird can still stab, and 2) to remove band or tape before release

- Make full use of appropriate equipment and ensure that this is of good quality. Some examples are given in Table 1.7. In the case of diurnal birds, consider catching them at night or when the illumination can be reduced, as this will usually help to quieten them and facilitate capture.
- A bird is best held and restrained by controlling its wings. There are recommended methods of holding and carrying certain species (see Table 1.6), but the principle is essentially the same. Covering the head with a cloth or towel – or even putting a soft bag over it – will help to quieten the bird during restraint. Birds of prey and certain other species can be hooded. Such equipment must be accessible as soon as the bird has been captured, to minimise stress.
- Any procedures that need to be performed while the bird is restrained should be done so promptly and efficiently. 'A bird in the hand' may be worth 'two in the bush' but in practical terms the bird in the hand can easily and rapidly become stressed. The shorter the time of restraint, the better. Again, all items needed - for example, equipment for ringing or for clipping of claws and beak, - should be available from the outset so that no time is lost. When veterinary treatment is

Figure 1.7. Large, long-legged birds, such as this heron, need particularly careful handling as they are easily damaged and some can stab.

to be carried out, a similar, systematic, approach is needed. Too often a sick bird is held in the hand, under bright lights, while the veterinary surgeon and the owner discuss what should be done.

Methods of handling and restraint are given in Table 1.6 while Table 1.7 lists equipment that may facilitate handling and restraint. Examples of methods of handling and restraint are shown in Figures 1.4, 1.5, 1.6 and 1.7.

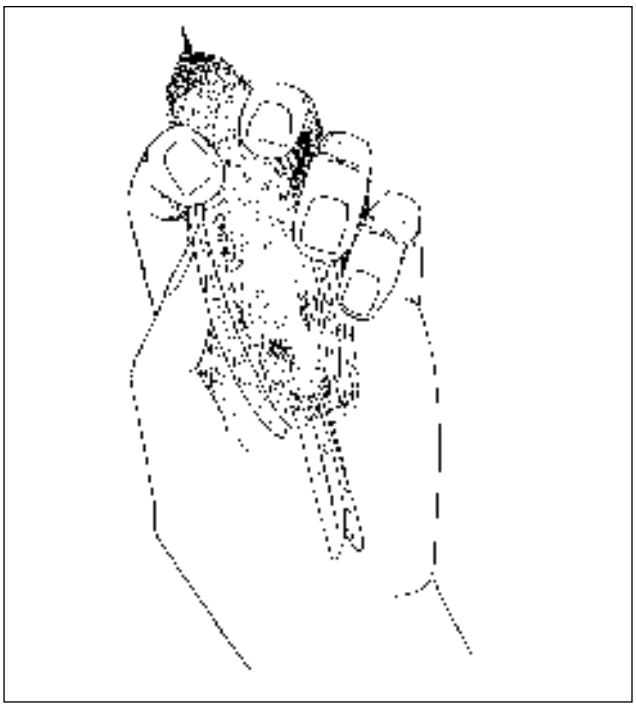

Figure 1.8. Small birds are often best held securely cupped in the hand, with fingers on each side of neck.

General management

The captive bird is most likely to thrive if it is kept under hygienic conditions, in well-designed accommodation and fed a diet that is adequate in terms of both quality and quantity. Good management is the key to both disease prevention and the early detection of ill health; it is the cornerstone of successful and profitable bird-keeping.

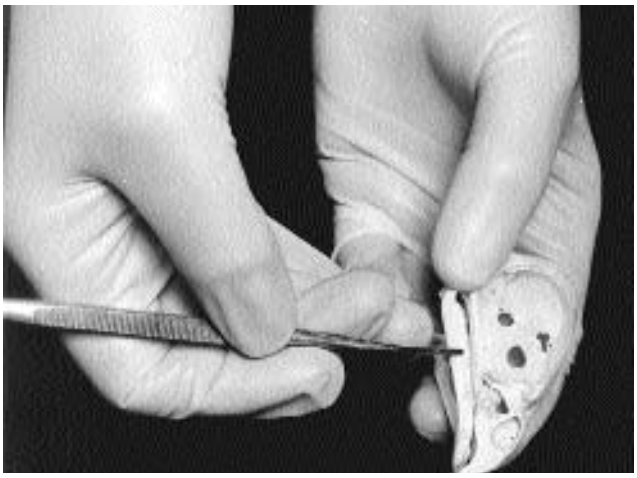

Plate 1.1. Examination of a bird's skull helps the aviculturist and the veterinarian to understand diseases affecting the beak.

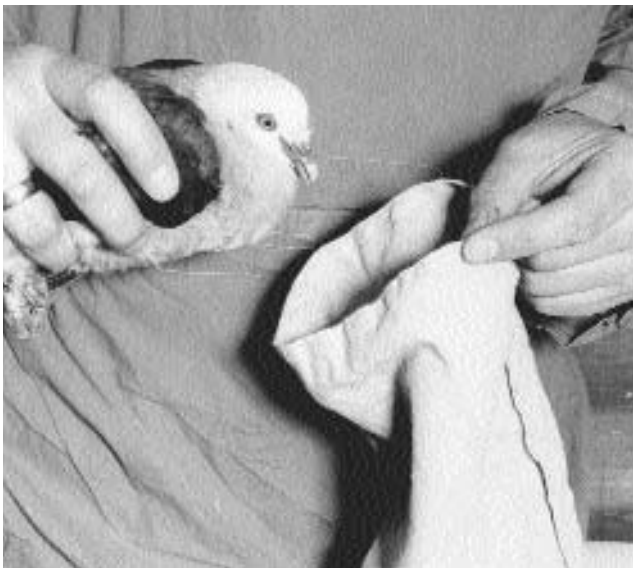

Plate 1.2. A Mauritius pink pigeon is placed in a cloth bag for weighing.

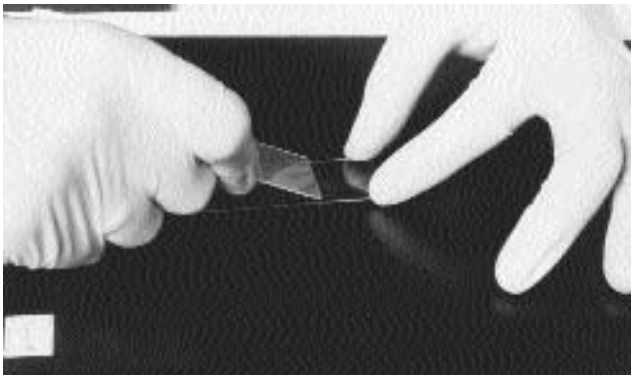

Plate 1.3. A blood smear is prepared. Examination of the stained sample may assist in the detection of subclinical changes in the bird.

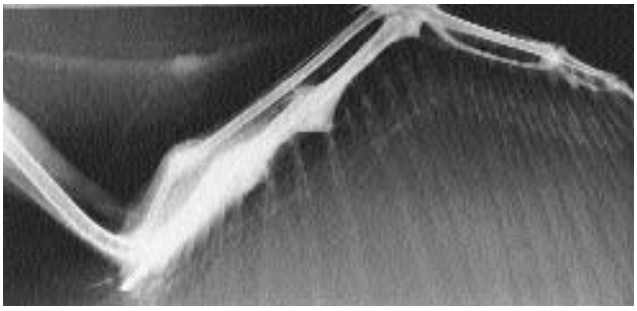

Plate 1.4. Radiography of the wing of a wild bird casualty which has been treated surgically. Excess bone deposition (callus) is seen, which hampers proper movement.

Plate 1.5. A radiograph (x-ray examination) of a snipe illustrates the anatomy of the bird's long, specially adapted, beak.